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Tele-Dentistry and Remote Consultations: The Future of Dental Care

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Abstract

With social distancing measures in place, many dental practices (Chen et al., 2003) have had to close their doors or limit their services, leaving patients with limited access to dental care (Arora et al., 2014). As we know, dentistry is one of the top listed risky jobs in the COVID-19 situation (Goswami, 2016). However, one application of telehealth (Amtha et al., 2021, Torosyan et al., 2021) technology is dentistry. Hence, teledentistry and remote consultation offer a solution to this problem, allowing patients to receive dental care from the comfort of their own homes.

Keywords: Pandemic; Telehealth; Teledentistry; Teleconsultation; Algorithms; Hygiene; Orthodontic; Dental Practices; Prognosis; Technology

1 Introduction

Teledentistry is a combination of telecommunications and dentistry, involving the exchange over remote distances for dental consultation (Clark, 2000) and treatment planning. It is a relatively new concept and is gaining popularity nowadays. It has no alternative to provide a safer patient consultation by lessening the burden of clinics at times of crisis. Hence, it plays a vital role in serving patients with a dynamic management strategy and the needs of the patient's treatment in the best possible way. Teleconsultation (Alawwad et al., 2019) allows professionals from different specialties to discuss diagnosis, treatment plan, and preservation. Thus can include video conferencing, remote monitoring (Baheti et al., 2014), and the use of digital images and records. Consultation through teledentistry has two methods: -

First one is Real-time consultation

This method involves a video conference between the dentist and the patient. Both of them may see, hear and communicate with each other from two locations. Second one is Store-and-forward method. This method refers to the gathering and secured transfer of encoded data, such as patient records and photographs, which are then saved for later examination by a dentist or specialist for consultation and treatment planning.

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Teledentistry has removed the barriers of distance (Wilson et al., 2020), and patients can now have access to initial diagnosis (Zundel, 1996) from the comfort of their homes.

1.1 Benefits of Teledentistry

Convenience and increased access to dental care

Teledentistry also eliminates the need for patients to take time off work or school to attend a dental appointment (Rahman et al., 2020), making it more convenient for them to receive the care they need.

Another special benefit of teledentistry

This is especially important for vulnerable populations, such as the elderly and those with underlying health conditions.

Teledentistry can help to bridge the gap by allowing dental professionals to provide care remotely, regardless of their location.

Cost-effective

Teledentistry can be more affordable than in-person dental visits, as it eliminates the need for travel and reduces overhead costs.

Improved patient outcomes

Teledentistry can lead to improved patient outcomes, as patients may be more likely to follow through with treatment plans (Daniel et al., 2013) when they can receive care in a more convenient and accessible way.

With its numerous benefits, incorporating teledentistry into the existing practice will go a long way in enhancing the standard of oral healthcare delivery to inhabitants of remote communities in developing countries of the attending problems and challenges of teledentistry are overcome. In short, the main benefit of teledentistry is to reduce health inequalities, promote better access to expert opinion, optimize true and quality (Irving et al., 2018), and reduce waiting lists. Hence, mapping teledentistry practices in other countries and extending services to under-covered populations increases the benefit of teledentistry.

While teledentistry has many benefits, such as increasing access to care and reducing costs, it also has limitations or disadvantages that must be considered.

Limited physical examination

Teledentistry relies heavily on visual assessment and cannot replace a comprehensive physical examination by a dentist. This may result in missed diagnoses or inaccurate treatment plans.

Limited access to technology

The difficulty of assessing the dentition and soft tissue, especially in the posterior oral cavity, would be the utmost limitation of online consultations in this field.

Hence, internet accessibility, and patient considerations including the ability to connect to the software, provide real-time interactive video consultations, proper light arrangement, manual dexterity, and acquaintance with mobile/tablet devices should be taken into consideration.

Limited treatment options

Some dental procedures require physical intervention and cannot be performed remotely. For example, filling cavities or performing root canals require physical access to the mouth.

Limited patient-provider relationship

Teledentistry may limit the development of a strong patient-provider relationship due to the lack of in-person interaction.

Limited insurance coverage

Some insurance plans may not cover teledentistry, which could limit its accessibility for some patients.

Legal and regulatory limitations

Teledentistry requires technology, which could raise privacy concerns if patient information is not properly protected. Hence, it is subject to legal and regulatory restrictions, which may limit its scope and effectiveness.

During the COVID-19 pandemic (Singh et al., 2020), dentistry can be particularly useful in remote areas that might not be accessible due to the lockdown situation. Hence, it is important to balance the advantages (Snow et al., 2000) and disadvantages of teledentistry when deciding whether to implement it in a dental practice. By teledentistry, dental professionals can improve access to care, reduce the spread of infectious diseases, and provide more convenient and efficient care for patients.

With technological advancements, it is becoming easier for dentists to diagnose and treat patients remotely (Batra et al., 2022). This trend is expected to continue even after the pandemic subsides. Artificial Intelligence (AI) in tools can analyze images and data collected during virtual consultations (Gajarawala & Pelkowski, 2021) to provide dentists with insights and recommendations that can help them make more informed decisions. For example, AI algorithms can analyze dental x-rays and identifying potential issues that may be missed by human dentists. AI can also help dentists identify patterns in patient data that may indicate an increased risk of certain dental conditions. AI has the potential to make teledentistry more efficient and effective, improving access to dental care for people who may not have easy access to traditional dental services. Teledentistry creates a remote connection between patient and dentist, but it doesn't remove the human element entirely. The dentist can also directly interact with the patient via email or app, give advice, and monitor a patient's progress.

The Potential Future of Teledentistry in 2050

Despite the growth in teledentistry research during the COVID-19 pandemic (Chaudhary et al., 2022), teledentistry in daily clinical practice is still limited in most countries. However, the growth in teledentistry research (Golder & Brennan, 2000; Zundel, 1996) indicates an interest in generating evidence to guide teledentistry in clinical practice. Few countries have instituted teledentistry programs at the national level. Laws, funding schemes and training are needed to support the incorporation of teledentistry (Coiera, 2002; Golder & Brennan, 2000) into healthcare systems to institutionalize the practice of teledentistry. In 2050, teledentistry may become more advanced and widely used. With advancements in teledentistry, dentists may be able to perform more procedures remotely, such as fillings, root canals, and even some orthodontic treatments (Petruzzi & De Benedittis, 2016). Teledentistry may also become more accessible and affordable, allowing people in remote areas or with limited access to dental care to receive treatment. Additionally, virtual reality technology may be used to provide a more immersive and interactive experience for patients during teledentistry appointments. However, with few drawbacks (Sfikas, 1997) and constant efforts to combat them, teledentistry has a very promising future and a long way to go.

The last but not the least, the future of teledentistry in 2050 looks promising, with potential

advancements in technology and increased accessibility for patients.

The future might also see distant telemedical control (Elmokadem, 2013) of robotized instruments in situations with long-term unavailability of dental care, e.g. during space flights, on transoceanic ships, and in various rural areas. The results achieved so far are very encouraging, setting the road signs for future investigations.

2 Conclusions

AI has been transforming the world and shaping the future (Birnbach, 2000) of technology in remarkable ways. Hence, new technologies are developed and adopted rapidly in the dental field. AI is among the most promising ones, with features such as high accuracy and efficiency if unbiased training data is used and an algorithm is properly trained. Dental practitioners can identify AI as a supplemental tool to reduce their workload and improve precision and accuracy in diagnosis (Minervini et al., 2022), decision-making, treatment planning, prediction of treatment outcomes, and disease prognosis.

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