



Teledentistry in Oral Health Care

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In the past few years, it has been seen that digital technology captured all field of life and health sciences. These advances revolutionized the field of dentistry and oral health education as well. Advancements have been observed mainly in education as e-learning platforms has been massively subscribed, then digital gadgets, telecommunication technology, digital diagnostic imaging services, artificial intelligence, and other softwares for disease analysis and dental follow-up.¹ These modifications and innovations related to technology have improved the quality of patient care providing health care centers and qualified dentists the chance to practice effectively at long distances.^{2,3} This concept of hobnobbing, communicating, and providing distant consultations, work-up, and analysis digitally is the part of the science of telemedicine concerned with dentistry known as “*Teledentistry* (TD).”⁴ According to the literature, the concept of TD was drafted in 1989 as a component of the blueprint for dental informatics and patient data mining. It was introduced at a conference in Baltimore; the focus of the discussion was applying dental informatics in dental practice to help deliver quality oral health care.³ The significance of TD is stress-free examination, for example, child patient sitting with their parents and the dental care practitioner providing a cooperative consultancy with the child. Also, it is convenient for the patient as well to stay at home and reduce the multiple visits from far distance.

Prof. Cook first used the term TD in 1997, who defined it as an amalgamation of information technology and dental-related consultancy involving the exchange of clinical data of patient over remote distances for appropriate treatment planning.⁴ Introduction by these events to TD has given a new and feasible way to dental practice and improved patient care. Modern technology has created opportunities in the field of dentistry and improved TD to get complete, deep analysis, and precise patient information to give satisfactory results and redesign businesses.^{2,5} This was evident in almost all the fields of dentistry utilizing TD as a mode of

consultation and delivering minor dental services, such as in oral surgery it was proved to be a way of providing preoperative evaluation wherever mobility was restricted and improved referral system. Furthermore, it is also reported in Ireland that TD has worked in oral medicine and diagnosis where TD consultation system was implemented and reported effective in diagnosing oral lesions. Moreover, in orthodontics it was useful for interceptive orthodontic treatments, in prosthodontics, pedodontics, operatives, endodontics, and other fields of dentistry. TD was fruitful for video communication (consultation and examination) providing initial care and postoperative care to patients.⁴ Adding to that it has improved patient care as reported in one of the studies done by the “Group of Chin-Shan in their Health Center and National Taiwan University Hospital” in 2000. In this study, they have selected a doctor under training to visit Chin-Shan Township consisting of 17,000 people. He carried only some armamentariums with intraoral camera, a portable digital radiographic machine, and a software application to transfer all images to the hospital. This piloted study demonstrated the importance of TD in providing patient care related to dental issues to individuals living at remote places, facing pandemic, cannot travel, or have some major financial issues and also reinforced the viability of remote specialty consultations.⁶ Moreover, there are more studies, one of which conducted in the United States on a TD project where they have hired doctors “in six inner-city elementary schools and seven childcare centers” who has diagnosed dental caries in 173 children, almost 40% of the children aged 12 to 48 months had active dental caries.⁷ Following this study the dentist of Northern Ireland in 2010, also introduced and positively established TD program with the support of “Community Dental Service of the Home first Legacy Trust” in collaboration with the “Oral Medicine Department at the School of Dentistry, Belfast, UK Trust” using the feasibility of TD as an alternative approach to the management of oral medicine referrals.⁵

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With all these benefits and establishments, TD has also carried some shortcomings and reservations, as to be part of TD team, a dentist should have gone through good training by experts, should be attached to a specialist practicing TD, and then apply individually. Undertrained dentist can lead to loss of productivity through TD. So it is mandatory for a dentist to get proper training and gain sufficient experience before adding value in their practice of practicing TD. Not only that a dentist need to be careful and get skilled in dealing with lawful activities, technical, ethical, and social matters as these are embedded components in current practice era.^{8,9} Second, there is always pressure for a prompt response. There can be miscommunication which can also have privacy concerns.⁹ In addition, there may be patients' concerns regarding information transfer related to their sickness. "Informed consent in TD should cover everything that exists in a standard, traditional consent form." It is mandatory to inform patient beforehand of all the risks involved when diagnosing or treating patients via technology-dependent softwares as there can be sudden technical issues which are uncontrollable.¹⁰ One of the major problems for practicing TD in our part of setup are unclear images, radiographs that can hamper in correct diagnosis, and the logistics that is availability of the resources as many times there is a need of "store-and-forward TD system techniques consisting of a computer with a good hard drive memory, a speedy processor, a high quality intraoral video camera, a digital camera, and a high speed Internet connection," additionally a fax machine, a scanner, a printer, and other technical hardware may also become a requirement in some cases.⁴

However, by the in-depth literature search, it can be said that looking at the multiple benefits of practicing dentistry with telecommunication cannot be overlooked. The most highlighted points are that it can improve access to rural areas and bridge oral health care delivery, it is easy, saves time, make experts available, and help in relevant patient data transfer for consultation and diagnosis along with that economical for nonaffording patients.^{2,4,11} In many literatures, it was evident that using TD was a great help in areas where dental services were not available.¹² Other than that, "improving interprofessional communications by integrating dentistry into the more extensive health care delivery system as well as in taking second opinions, preauthorization, and other insurance requirements" with the use of real images of dental problems rather than tooth charts and written descriptions are some of the advantages too.¹⁰

It is suggested to integrate TD as a part of dental education in final year of bachelor degree which will help and support dental students before entering professional practice and to get insight and build their future in this evolving field. It is also helping in other fields of dentistry as tremendous results can be seen in practicing family dentistry in spreading awareness regarding dental diseases. Moreover, dental educationists and dental experts can plan and offer postgraduation in TD that can also add value in the current era to make dental health care effective and efficient.^{1,11}

According to the Evidence Found in Dentistry for Teledentistry are as Follows

One researcher introduced a prototype TD system in oral medicine in a community dental service in Belfast, Northern Ireland which got a good response in terms of clinical diagnosis and referral system.⁵ Another dentist suggested that remote diagnosis is an effective alternative in the diagnosis of oral lesions using transmission of digital images by email.¹³ Moreover, doctors specialized in oral and maxillofacial surgery, successfully proved that the diagnostic assessment of different problems related to dental surgery can be easily resolved and diagnosed via TD, as it supports effective and efficient preoperative evaluation in situations in which patient transport is difficult or costly.^{14,15} In endodontics, it was reported that dental practitioners treating from distance could identify root canal orifices based on images of endodontically accessed teeth.¹⁶ Moreover, including TD in interceptive orthodontic treatments was a viable approach in reducing the severity of malocclusions in underprivileged children when referral to an orthodontist was not feasible.^{17,18} It has also served in prosthodontics by using synchronous collaborating platforms for diagnosing and planning for managing patients requiring prosthetic or oral rehabilitation treatment. It is stated that consultation through videos in dentistry has the "potential to increase the total number of dental specialist services in sparsely populated areas."¹⁹ In addition to this TD has benefited other dental fields as well like periodontics, pediatric, and preventive dentistry providing access to treat underprivileged population.⁷ Synergistically, TD also have a good impact on managing COVID 19 patient suffering from severe illness with dental problems and dental emergencies during the pandemic.^{15,20-22}

Conclusion

With all these major benefits and minor drawbacks of TD, one should weigh the importance of this field. We suggest that health care practitioners should try to make some links to virtual dental clinics and create an interprofessional relationship to benefit the patients. Looking at the present condition of the world, the future will be dependent on distant telemedical control of robotized instruments with lack of availability of dental care if we as dentist will not standby and make ourselves tech savvy to deal with upcoming future shortage. However, the literature shows and proved the encouragement, TD has received and achieved so far, so now it is time for setting the road signs and start mapping for future incorporation of technology in dentistry and make our communication stronger with community to serve humanity at its peak.

Conflict of Interest
None declared.

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