

“Teledentistry In Practice – An Update”

Aluckal Eby MDS¹ Lakshmanan Sanju MDS², Chikkanna Shilpa MDS³,
Kunnilathu Abraham M.P.H, M.P. Ed. (C), C.C.R.A⁴

¹Associate Professor, Department of Public Health Dentistry, Annoor Dental College and Hospital,
Muvattupuzha

²Associate Professor, Department of Oral And Maxillofacial Surgery, Annoor Dental College and
Hospital, Muvattupuzha

³Assistant Professor, Department of Oral And Maxillofacial Surgery, Annoor Dental College and
Hospital, Muvattupuzha

⁴Research Associate, Western University, Canada

Abstract: Teledentistry could be the next phase of oral health care with great potential of reducing morbidity and mortality in rural population with early detection, diagnosis and prevention activities. This is a fast developing area of dentistry that integrates electronic health records, telecommunications technology, digital imaging, and the Internet to link dental providers and their patients. Teledentistry provides tremendous potential in improve access and delivery of oral health care, improving cost effectiveness and facilitating fast and efficient diagnosis and treatment planning with teleconsultation. Teledentistry could also bridge the gap between demand and supply by providing dental care in rural areas, where there is a shortage of specialists and comprehensive sophisticated health care.

Keywords: dental care, health records, teledentistry,

I. Introduction

Teledentistry is a relatively new field that combines telecommunication, technology and dental care. Due to the enormous growth of technological capabilities, teledentistry possesses the potential to fundamentally change the current practice and the face of the dental care. The term “teledentistry” was used in 1997, when Cook defined it as “the practice of using video-conferencing technologies to diagnose and to provide advice about the treatment over a distance”^[1]. “Tele” is a Greek word meaning “distance” and “mederi” is a Latin word meaning “to heal.”

Teledentistry is a developing area of dentistry that integrates electronic health records, telecommunications technology, digital imaging, and the Internet to link dental providers and their patients.^[2] The use of teledentistry presents as an emerging web-based intervention system, distance learning framework, and a vehicle to decrease the phenomenon of professional isolation common to rural and underserved areas^[3-4]. Teledentistry has high usability and significance for dentists, clinicians, patients, hospital managers and health care decision/policy makers in state governments and central government⁵.

History of Teledentistry

Telemedicine began in 1924, with the concept of a physician seeing his patient over the radio using a television screen. Telemedicine programs first started in 1950.^[6] The initial concept of teledentistry developed as apart of the blueprint for dental informatics^[7]. Teledentistry was put into practice in US army in 1994 by doing dental consultations on person located more than 100 miles apart^[17]. Since then, various institute and organization have practiced teledentistry with varying degree of success.

Equipment:

A few years ago, teledentistry involved calling an expert on the telephone for advice. Now it involves consulting experts using the Internet. It involves the local dentist digitizing and electronically transmitting drawings, diagrams, photographs, and X-rays to a specialist.

To develop the teledentistry-assisted, affiliated practice dental hygiene workforce model and add teledentistry skills to its curriculum two each of the following equipment is required: Open Dental office management software; Tiger View Professional digital imaging management software; Acclaim Intraoral Digital Cameras; Scan-X Duo digital x-ray film scanners; Nomad Portable Handheld X-ray radiographic systems; Dell laptop computers; and Dell projectors. All of the equipment chosen integrates seamlessly and has proven to be successful in both local and remote applications of teledentistry-assisted, affiliated practice dental hygiene.

Interactive video-conferencing may be conducted via POTS (plain old telephone service), satellite, ISDN, Internet or Intranet. Nowadays social media like facebook and whats-app are being used for teledentistry. It allows dentist to seek opinion of experts and peers for difficult procedures. Also pictures are posted of treatment already done by the dentist.

Scope:

Teledentistry has the ability to improve access to oralhealth care, improve the delivery of oral healthcare andlower its costs.It also has the potential to eliminatethe disparities in oral healthcare between rural andurban communities.^[7]Teledentistry may turn out tobe the cheapest, as well as the fastest, way to bridge therural-urban health divide. Inter-professional communications will improve dentistry’s integration into the larger healthcare delivery system.The use of teledentistry for specialist consultations, diagnosis, treatment planning and coordination, and continuity of care will provide aspects of decision support and facilitate a sharing of the contextual knowledge of the patient among dentists.^[8]Second opinions, preauthorization and other insurance requirements will be met almost instantaneously online, with the use of real images of dental problems rather than tooth charts and written descriptions.

Role of Teledentistry in different fields:

It has been successfully proved by the use of teledentistry in oral medicine in a community dental service in Belfast, N. Ireland, using a prototype teledentistry system that distant diagnosis is an effective alternative in the diagnosis of oral lesions using transmission ofdigital images by email.^[9] The diagnostic assessment of the clinical diagnosis of impacted or semi impacted third molars assisted by the telemedicine approach was equal to the real-time assessment of clinical diagnosis.^[9]Ziccardi VB statedthat Smartphones provide fast and clear access to electronically mailed digital images and allows the oral/maxillofacial surgeon free mobility, not restricted by the constraints of a desktop personal computer.This in turn allows for improved efficiency of the specialty consultation and improved triaging, ultimatelyproviding improved care to the maxillofacial patient.^[10]It also increases training for dentists and dental students in the rural community in the management of orofacial disorders.^[18]

Remote dentists can identify root canal orifices based on images of endodontically accessed teeth^[10]and teledentistry based on the Internetas a telecommunication medium can be successfullyutilized in the diagnosis of periapical lesions of the frontteeth, reducing the costs associated with distant visitsand making urgent help available.^[11]

Interceptive orthodontic treatment provided by sufficiently prepared general dentists and supervised remotely by orthodontists through teledentistry are a viable approach to reducing the severity of malocclusions in disadvantaged children when referral to an orthodontist is not feasible.Telecommunications is particularly useful in the orthodontic field, as minor emergencies (rubber ligature displacement, discomfort due to the appliance, irritation of cheeks) can be solved easily at home, reassuring patient and parents on one hand, and limiting visits to the dental office to cases of real need.

Teledentistry offers a potentially efficient means of screening high risk preschool children for signs of early childhood caries.^[12] teledentistry project established in inner-city child-care centers stated that remotediagnosis of children dental problems based on noninvasive photographs constitute a valid resource.^[13]Schools and child care centers play a vital role in ensuring the optimum oral health of the children through Screening for dental problems, helping children in managing chronic illnesses and providing urgent care. It also helps in connecting children and their families to needed health and social services.

Legal Issues:

Largely still untested by law, and with significant variation among countries, issuessuch as accountability, jurisdiction, liability, privacy, consent and malpractice iscrucial to consider, when attempting establishing sound foundations for telehealthpractice.

Licensure of teledentistry practice is largely depends upon the country definition ofteledentistry. The most significant barrier to a nationwide teledentistry practice is thetraditional system of state-by-state licensing. Confidentiality: Patients should be made aware that their information is to betransmitted electronically and the possibility exists that the information will beintercepted, despite maximum efforts to maintain security. The form should containthe name of both the referring and consulting practitioners to ensure adequatecoverage for malpractice, and the consulting doctor should acquire a copy of theinformed consent before any form of patient contact is established.^[12]

Benefits Of Teledentistry:

Use of Telecommunication to provide dental services will lower the cost of service and improve the quality of care provided. General dentists will send multimedia patient records to dental specialists, often enabling the specialist to make a diagnosis and develop a treatment plan without having to see the patient in person. There is improvement in diagnostic services, communication with the Insurance industry with respect to requirements and improved communication with dental laboratories^[13]. The beneficiaries of teledentistry will not only be the vulnerable patients who aren't able to obtain care in traditional dental practices, but the oral health teams that can work together in exciting and productive new ways.^[14]

Limitations:

Teledentistry is a little time consuming until dentist gets accustomed to the system as compared to regular office visits. There is possibility of misdiagnosis or medical error along with issues of malpractice that has to be considered. The equipments required have to be tested and back up communication system and technical support group are also needed. Teledentistry projects gain financial support from grants and other limited resources and since there is no particular reimbursement from insurance companies maintaining these projects after the grant period ends poses a problem. The examination of the patient is not done on face to face basis due to which it is difficult to rely on results hence proper protocol is needed which will enable to control the problems and result in more objective evaluation.

Future of Teledentistry:

Light field based 3 D Telemedicine could be the next-generation cutting edge technology by providing high quality immersive teleconsultation experience.²⁰ Light field photography enables recording light rays in a single shot and provides 3 D glass –free display with a wide zone of viewing. This provides an immersive 3D display and highly detailed convertible algorithm with all the important details of the patient/ case for the doctor and health professionals. So this could lead to fast and accurate diagnosis of dental diseases and pre-cancerous conditions of rural and remote population by specialist doctors residing miles away. This could have a great positive impact to the health and welfare of the population.²⁰

Scope of Teledentistry in India

India has opened up to telemedicine to address various issues which are being faced by the healthcare delivery system, like inadequate health infrastructure and clinical services, paucity of qualified doctors, the almost non-availability of specialist care, the late discovery of the ailment, the delay in the delivery of the treatment due to the greater time which is required for the transport of the patients to urban healthcare facilities and the provision of healthcare by inexperienced primary healthcare service providers.^[15]

In India, where a majority of population lives in rural areas and where healthcare facilities are insufficient, teledentistry can have a significant contribution in bridging the gap between the demand and the supply. Integration of teledentistry into treatment protocols could considerably enhance patient satisfaction and improve efficiency in patient management.²¹ This could also improve access to underserved population and reduce oral disease burden.²² Live-video teledentistry consultations could also increase treatment adherence in complex adult and paediatric dental cases.²³

II. Conclusion

The portable digital diagnostic data acquisition equipment described is currently state of the art, and emerging technologies will only further the ability of distant dentists receiving the diagnostic data to properly diagnose, triage, and refer patients for appropriate treatment. Teledentistry can be used as a valuable tool for providing dental care in rural areas, where there is a shortage of specialists and a lack of comprehensive and sophisticated health care. Future advances in technology will enable teledentistry to be used in many more ways, such as clinical decision support, quality and safety assessment and health care, consumer home use, medication e-prescribing and simulation training. Teledentistry will produce wonderful advantages for the patients of a primary care doctor who partakes of the vast expertise available through teleconsultation.^[18] The dental colleges with a predetermined catchment area could be ideal places to serve as hub sites for teledentistry consultation as they encompass all the specialists serving under a common roof.

References

- [1]. Rajan Shirolkar, Kosha Ruparelia, Chandramani More, Prithesh Ruparelia. Teledentistry: An Art and Science of Healing. Journal of Indian Academy of Oral Medicine and Radiology. April- June 2011; 23(2): 108-111.
- [2]. Chen JW, Hobdell MH, Dunn K, Johnson KA, Zhang J. Teledentistry and its use in dental education. J Am Dent Assoc 2003;134:342-6.
- [3]. Hovliaras-Delozier CA. Teledentistry: telecommunication technology in the implementation of dental care. Access, February 2007:2-4.
- [4]. Ignatius E, Makela K, Happonen RP, Perala S. Teledentistry in dental specialist education in Finland. J Telemedicine Telecare 2006;12(3):46-9.
- [5]. Patel, R. N., &Antonarakis, G. S. (2013). Factors influencing the adoption and implementation of teledentistry in the UK, with a focus on orthodontics. *Community Dentistry and Oral Epidemiology*, 41(5), 424-431.
- [6]. Berndt J, Leone P, King G. Using teledentistry to provide interceptive orthodontic services to disadvantaged children. AJODO 2008; 134(5):700-06.
- [7]. Jain A, Bhaskar D J, Gupta D, Karim B. Teledentistry: Upcoming Trend in Dentistry. J Adv Med Dent Scie 2013; 1(2): 112-115.
- [8]. Kirshner M. The Role of Information Technology and Informatics Research in the Dentist-Patient Relationship. Adv Dent Res 2003; 17:77-81.
- [9]. Bradley M, Black P, Noble S, Thompson R, Lamey PJ. Application of Teledentistry in Oral Medicine in a Community Dental Service, N. Ireland. Br Dent J 2010; 209:399-404.
- [10]. Aziz SR, Ziccardi VB. Telemedicine Using Smartphones for Oral and Maxillofacial Surgery Consultation, Communication, and Treatment Planning. J Oral Maxillofac Surg 2009;67:2505-9.
- [11]. Brullmann D, Schmidtman I, Warzecha K, d’Hoedt B. Recognition of root canal orifices at a distance – A preliminary study of Teledentistry. J Telemed Telecare 2011;17:154-7.
- [12]. Kopycka-Kedzierawski DT, Billings RJ. Teledentistry in Inner-City Child-Care Centres. J Telemed Telecare 2006;12:176-81.
- [13]. Sfikas PM. Teledentistry: legal and regulatory issues explored. *J Am Dent Assoc* 1997;128:1716-8.
- [14]. Torres-Pereira CC, Morosini Ide A, Possebon RS, Giovanini AF, Bortoluzzi MC, Leão JC, Piazzetta CM. Teledentistry: Distant Diagnosis of Oral Disease Using E-Mails. Telemed J E Health. 2013; 19(2):117-21
- [15]. Susan Elliot- Smith, A new View on oral Health Care, Feb 2007; 10.
- [16]. Sood, Sanjay P. India telemedicine venture seeks to improve care, increase access. Telemedicine Today 2002; 25-26.
- [17]. Mittal Sanjeev. Teledentistry: A New Trend in Oral Health. International Journal of Clinical Cases and Investigations. November 2011. Volume 29 (Issue 6), 49; 56
- [18]. Chen H, Friction J. Teledentistry: seeing the doctor from a distance. Northwest Dent 2007; 86(2):27-68.
- [19]. Glenn T. Clark. Teledentistry: What is it Now and What It Will be Tomorrow? Journal of the California Dental Assosiation 2000; 24: 10.
- [20]. Wang, G., Xiang, W., & Pickering, M. (2016). A cross-platform solution for light field based 3D telemedicine. *Computer Methods and Programs in Biomedicine*, 125, 103-116.
- [21]. Kruger, E., Estai, M., & Tennant, M. (2016). Perceptions of Australian dental practitioners about using telemedicine in dental practice. *British Dental Journal*, 220(1), 25-29.
- [22]. Khan, Saad&Ahmed, S. A. (2013). Teledentistry in practice: literature review. *Telemedicine journal and e-health*, 19(7), 565-567.
- [23]. McLaren, S. W., &Kopycka-Kedzierawski, D. T. (2016). Compliance with dental treatment recommendations by rural paediatric patients after a live-video teledentistry consultation: A preliminary report. *Journal of Telemedicine and Telecare*, 22(3), 198.