Teledentistry – A review

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Abstract

Teledentistry is a blend of communication technologies like Internet and dental practice. Various hospitals and research centers are operating with this communication system. In dentistry it is used by specialist in various branches and serving the general dentist too. Distant dental check up, expert opinion for dental diagnosis, treatment planning, computer based dental prosthesis are being exchanged. This review gives a brief outline of the telecommunication role in dentistry.

Key words: Teledentistry, Internet, Telecommunication

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Introduction

Technologic innovations in the field of dentistry have been extensive in recent years. Teledentistry is a combination of telecommunications and dentistry. "Tele" is a Greek word meaning "distance" and "mederi" is a **Latin** word meaning "to heal."[1]

Teledentistry can be defined as the use of electronic information and telecommunications technologies to support long-distance clinical oral health care, patient and professional health-related education, public health, and health administration.[1]

Internet and Teledentistry:

(http://cdn.intechopen.com/pdfs/14328/InTech-Telemedicine_in_dentistry_teledentistry_.pdf)

The basic need of teledentistry is provided by internet, being modern, advanced and speed factor supports for transmission of larger data.

Factors why internet-based teledentistry has taken precedence over other ways of communication:

Speed, low cost, efficacy, documented consultation, minimize occupancy, simultaneous communication of multiple participants, asynchronism.

Potential shortcomings are:

Necessity of appropriate training, pressure for an instant response, impression, message misunderstanding, privacy concerns, possibility to overlook/neglect the message.

History:

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. The earlier idea of teledentistry was part of the design for dentistry. In conference conducted in 1989 a new era of combination with computer, information technology and other branches in engineering used the practice of dentistry. Its focus was a discussion of how to apply dental informatics in dental practice. In 1994 teledentistry was introduced into dental practice in US army by performing

consultation on a person located more than 100 miles apart. Since then, various institute and organization have practiced teledentistry with varying degree of success.[1,2]

Teledentistry Services:

Teledentistry can be integrated in general dental practice and specialty practices. The following teledentistry services could evolve from current telemedicine practices:[3]

- **Specialist referral service** involves a specialist assisting a general practitioner to diagnose and manage a patient. This may involve a patient "seeing" a specialist over a live, remote consult or the transmission of diagnostic images and/or video along with patient data to a specialist for viewing later.
- **Patient consultation** uses telecommunications to provide medical and dental/oral health data, which may include audio, still or live images. Data is exchanged between a patient and a health professional for use in making a diagnosis and treatment plan.
- **Remote patient monitoring** uses devices to remotely collect and send data to a monitoring station for interpretation.
- **Professional education** offer continuing education benefits for professionals and delivers health related seminars for targeted groups in remote locations.
- **Consumer medical and health information** includes the use of the Internet for consumers (patients) to obtain specialized health information and on-line discussion groups to provide peer-to-peer support.

Forms of Teledentistry:

Teledentistry can occur in two form "real time consultation" and "store and forward."[2,4] The real time consultation transfers information as early as possible, whereas the other method stores the information in the local database and transfers the information as and when required. Advanced technology is used in real time method by allowing the dentist and the patient to see, hear and communicate. The store-and-forward method, involves collecting all the patient information and images and storing that data for review by a dentist specialist at a later time. Later, the dentist reviews the information make a diagnoses and a treatment plan.[1]

Applications in different branches of dentistry:

Oral Medicine:

Torres-Pereira et al. have shown an effective distant access to oral lesions and benefits of use of e-mail services.[7] (Table 1)

Endodontics:

Pulp and periapical disorders are common in day to day practice. Treatment of these disorders is not only performed by endodontist but also the general dentist. So this teledentistry provided a path to get the expert opinion for managing these disorders through a net based diagnosis, treatment plan and even the procedures.

Pediatric and Preventive Dentistry:

Various studies done demonstrate that

- Net based diagnosis of pediatric problems, is a valid grounding for an appropriate insight into dental problems and dental treatment preparation.[8]
- Study of prevalence of dental caries in children using the telemedicine method and dental photographs taken with intraoral cameras and web-based storage of images.[9]
- Net based systematic dental check-up in children using again the transmission of digital images, have been able to get a complete insight into the status of teeth of these children, with special emphasis on early dental caries.[10]

Oral surgery: (Table 2)

Orthodontics: (Table 3)

Prosthodontics: [11, 12] (Table 4, 5)

Teledentistry Delivery Mechanisms

The different ways of how providers and patients can connect shows several delivery mechanisms provide the teledentistry services described above. Telehealth and telemedicine have used the following delivery mechanisms, which could be developed to support teledentistry services:[3]

- **Networked programs** link hospitals and clinics with outlying clinics and community health centers in rural or suburban areas.

Point-to-point connections used by hospitals and clinics that deliver services directly.

- **Primary or specialty care to the home connections** involves connecting primary care providers, specialists and home health nurses with patients
- **Home to monitoring center links** are used for patient monitoring, home care and related services that provide care to patients in the home.
- **Web-based e-health patient service sites** provide direct consumer outreach and services over the Internet.

Conclusion:

'*Dentistry not only going digital but also advance*' is the new quote by reviewing this critique. In near future teledentistry will evolve as expertise for oral health care providers even in inaccessible areas where there is lack of Dental care resulting in e-consultation, e-diagnosis and e-medicine. Still future appraisal is required to sense the role of telecommunication in dentistry.

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Table 1

Oral lesions

⬇

Electronically photographed

⬇

Macrolens and circular illumination system

⬇

Clinical Data

⬇

Stored in textual file

⬇

600Dpi resolution

⬇

Interpret by oral physician

⬇

Analyst independently

⬇

Diagnosis

⬇

Electronically return of results

Table 2

Impacted 3rd molar

⬇

Regular OPG Imaging

⬇

Translated

⬇

Binary record on HDD as JPEG file

⬇

Extraoral and intraoral photographs

⬇

Stored in JPEG as 300DPI

⬇

Uploaded on internet server

⬇

Teleconsultants access server

⬇

Diagnosis and treatment schedule

⬇

Electronic return of results

Orthodontic Dental impression

↓

Send the impression

↓

Special postal service

↓

3 D scanning and digitalization

↓

Digital 3D models

↓

Concerned specialist

↓

Sharing

↓

Others via network

↓

Effectuating necessary consultation

Table 3

Non skillful

↓

Dentist and Dental technician

↓

Designing shapes and interjaw relationship

↓

CAD software

↓

Project file encrypted

↓

Email

↓

Teleconsultant

↓

Project analysis, projection of shapes of restoration and interjaw relationship

↓

Encrypted and returned to clinic

Table 4

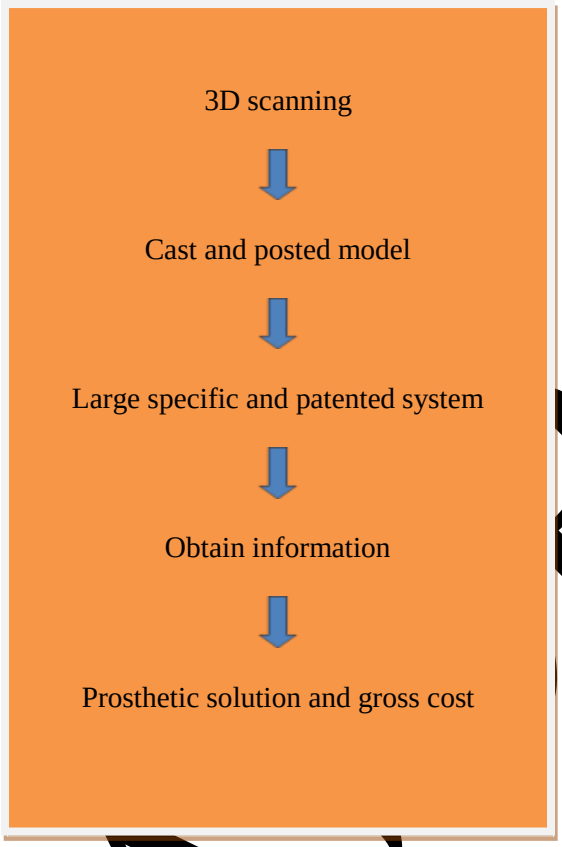

Table 5