Review Article

TELEDENTISTRY: A REVIEW AND AN UPDATE

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ABSTRACT

Teledentistry, a relatively new field, can change the dynamics of the dental care delivery system. Most of the dentists are unaware about Teledentistry, about its goals and advantages and how to get involved into it. This article illustrates as to how Teledentistry can be an effective solution for dentists and their patients. Teledentistry presents a possible solution to many longstanding problems in dentistry, but it also faces significant challenges. Its maturation will depend as much, on the efforts of the health authorities as on the collective efforts of the dental professionals. Teledentistry can meet the dental care needs of the underserved in the rural areas and it can ensure the good oral health of the children in schools and child care centres. Teledentistry provides new opportunities for dental education by providing an easy access to primary care professionals for efficient consultation, thus helping in conducting effective postgraduate education and continuing dental education programmes.

KEYWORDS: Teledentistry; Tele - communication; dentistry

INTRODUCTION

Dental care is being constantly transformed by the opportunities which are provided by technology and telecommunication.[1] 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.[2] The term "teledentistry" was used in 1997 and defined it as "the practice of using video-conferencing technologies to diagnose and to provide advice about the treatment over a distance".3 'Teledentistry' allows a whole new way of providing specialist advice. Through the use of telecommunication and computer technologies, it is now possible to provide interactive access to specialist opinions that are not limited by the constraints of either space or time.[4]

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 initial concept of teledentistry developed as part of the blueprint for dental informatics, a new domain combining computer and information science, engineering and technology in all areas of oral health, which was drafted at a 1989 conference funded by the Westinghouse electronics system group in Baltimore.[5] Teledentistry was put into practice in US army in 1994 by doing dental consultations on person located more than 100 miles apart. Since then, various institute and organization have practiced teledentistry with varying degree of success.

WHAT IS TELEDENTISTRY

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.

FORM OF TELEDENTISTRY

Teledentistry can occur in two form "real time consultation" and "store and forward."5 The real-time method transfers the information immediately, whereas the store-and-forward

method allows data to be stored in a local database to be forwarded as needed. In real time consultation dentist and patient at different location can see, hear and communicate with each other using advanced telecommunication technology.[6] 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.[7]

TECHNOLOGICAL REQUIREMENTS

To practice teledentistry, there are certain hardware, software and network connection requirements. A desktop or laptop computer with substantial hard drive memory, a significant amount of RAM, and a speedy processor is essential. A digital camera, video camera, and intraoral camera, and a panoramic digital X-ray unit, preferably portable, is required to provide consulting dentists with images of maximum clinical value.[5] Microphone, headset or external speaker, and a webcam is highly desirable for PC-based video-conferencing.

TELEDENTISTRY AND ITS USE IN RURAL AREAS

It is evident from literature that there are definite inequalities in the delivery of oral health care in India, with majority of qualified manpower, especially the specialists, being concentrates only in urban areas where only 28% of population havens. There are many barriers for rural Indian to access speciality dental care such as geographical remoteness, poor or no transportation and poverty, leading to a compromise on quality dental care, resulting in complications.[8] Teledentistry can increase the accessibility of the specialists these underserved areas for their dental needs, besides decreasing the time and the cost which are associated with the speciality consultations.[9]

TELEDENTISTRY AND ITS APPLICATION IN DENTAL EDUCATION

The role of teledentistry in education can be divided into two main categories: Self-instruction and interactive video-conferencing. The Web-based, self-instruction educational system contains information that has been developed and stored before the user accesses the program.[10] The advantage of this system is that the user can control the pace of the learning and can review

the material multiple times as he or she wishes.[11] Johnson and Schleyer studied the Web-based dental continuing education or the CE courses and evaluated them on the basis of a set of well designed guidelines by using the Design of Educational Software.[12,13] Spallek and colleagues conducted a survey of the participants in several Web based dental CE courses and found the that lack of face to face communication with their peers and instructors could result in dissatisfaction.[14]

TELEDENTISTRY AND ITS ROLE IN POSTGRADUATE EDUCATION AND DENTAL PRACTICE

Teledentistry can serve as a good tool for educating postgraduate students and for providing continuing updates for the practicing dentists. In interactive video-conferencing, the patient information is evaluated first (with or without the patient's presence), which allows for the interaction and feedback between the educator and the students. The patient cases can be reviewed thoroughly and at the students' pace. The cases can be discussed at length after all the clinical data have been collected and transmitted, without the patient being present at the scheduled meeting. This enhances the students' enthusiasm and provides new learning opportunities for the dental students and the practicing dentists.[4]

THE ROLE OF TELEDENTISTRY IN SCHOOLS AND CHILD CARE CENTRES

Schools and child care centres play a vital role in ensuring the optimum oral health of the children through:-

- Screening for dental problems before these become emergencies
- Helping children in managing chronic illnesses.
- Connecting children and their families to the needed health and social services
- Providing urgent care. Paediatric dentists at the University of Rochester use the photographs of toddlers to identify those with early childhood dental caries. A study of the program found that nearly 40 percent of 162 toddlers suffered from tooth decay. The early detection of such decay can prevent the child from painful and financial trauma, visits to the emergency treatment room, and ultimately, extractions of the teeth.[15]

FUTURE PROSPECTIVES OF TELEDENTISTRY

The advances in telecommunication have rightly enabled the dental care to promise many exciting changes during the next few years.[16] However, like any revolution, it will not be easy or painless. There are certain issues which require resolution for the success of teledentistry. These issues include inter-state licensure, jurisdiction and malpractice, as well as technological, security and ethical aspects.[17] Various measures that can be employed for the effective implementation of teledentistry are:

- The instructors of the teledentistry education courses need to be well versed with computer knowledge and they should have adequate teaching experience.[18] The practitioners who are engaged in teledentistry must have a license in each state in which they practice.[19]

- Dentists who are engaged in teledentistry must make every effort to ensure the security of their systems, as well as of any data that they may transmit. For example, data encryption, password protection and user access logs can help in deterring most of the people and in protecting patient confidentiality.[7]

ETHICAL AND LEGAL ISSUES

Confidentiality: Concern about the confidentiality arises from the transfer of medical histories and records as well as from general security issues of electronic information stored in computers. Practitioner of Teledentistry should take utmost care to ensure that patient privacy is not compromised by unauthorised entities. However patient should be informed that their information is to be transmitted electronically and possibility exist that information will be intercepted, despite maximum efforts to maintain security. Patient should also be informed about inherent risk of improper diagnosis and/or treatment due to failure of technology involved.[7] Medico legal and copyright issues: In Teledentistry practice, medico legal and copyright issues also have to be considered. These problems are primarily due to lack of well defined standards. Many of legal issues such as licensure, jurisdiction, and malpractice have not yet been definitively decided by legislative or juridical branches of various governments.[20] In 2002, 20 states in US enforced restrictive licensure laws requiring

Teledentistry practitioner to obtain full licence to practice across state lines.[7]

PRACTICE IMPLICATIONS

Telemedicine and Teledentistry are relatively new to the dental field. Many of the legal issues reviewed have yet to be resolved by the legislature or the courts. Furthermore, technology has not yet progressed to the point where the practitioner can be certain that no technological failure will occur during a teledental consultation. In spite of these problems, the potential of telemedicine and Teledentistry is tremendous. Improvement in accessibility of health care and lowered health care costs are only two of the many advantages that will emerge as telemedicine and Teledentistry become integrated with, and fundamentally change, the practice of medicine and dentistry.[7]

FEASIBILITY IN INDIA

India is developing country and most of the population belongs to rural background where some of the basic amenities of daily routine life are missing, especially primary health education and services. Development in the modern telecommunication and information technology in our country has changed the various prospect of life in the form of knowledge and awareness. These resources can have a cumulative effect in Indian population toward the transition and transformation of teledentistry. Primary health center and community health center can be equipped with modern telehealth and teledentistry to facilitate the education and better services in the society. Students and teachers from schools and college at various levels and even social workers from gram panchayat can be educated and trained toward the importance and functioning of telehealth with connectivity to higher center and experts. Government should take the initiative to highlight the importance and benefits of teledentistry in the society by providing infrastructure and basic facility by diverting some of the responsibility of higher institutions and centers located all around the states.[21] But being a developing country, there are challenges as well among which uneducated population, poverty and lack of infrastructure being the major challenges. Apart from these, training of the dentists in use of newer technology, patient compliance, unreliability in internet connectivity, computer hardware and

software problems and the need for on-site information-technology support are important issues which also needs to be considered.

CONCLUSION

Dentistry has definitely reached a new horizon with a fast and technology savvy pace. Utilizing current teledentistry technologies, oral health care providers can digitally acquire and transmit diagnostic data to a distant dentist for triage, diagnosis and patient referral. Day by day, the use of this new field is attracting dentists across the globe and bringing the fraternity closer as well as improving the quality of the services rendered. However, with few drawbacks and constant efforts to combat them, teledentistry has a very promising future and a long way to go.

CONFLICT OF INTEREST & SOURCE OF FUNDING

The author declares that there is no source of funding and there is no conflict of interest among all authors.

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