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TELEDENTISTRY: A GRACE TO THE HUMANITY IN COVID 19 SCENARIO

Dental Science

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ABSTRACT

The rapid spread of COVID-19 virus all over the world has a devastating effect on the dental practices. As the COVID-19 virus wreaks havoc with the health care system, teledentistry is stepping up into the spot light and helps in bridging the gap between the people and the dentists. Thus many oral health related problems can be solved virtually via video conferencing or by simple telephone conversation.

KEYWORDS

SARS CoV2, Pandemic, Teledentistry, Telecommunication.

INTRODUCTION:

A novel corona virus (nCoV) spread rapidly all over the world with its epicentre in Wuhan, People's Republic of China has emerged a public health emergency of international concern.[1] The etiologic factor was found to be Severe Acute Respiratory Syndrome Corona Virus 2(SARS CoV2), colloquially known as Corona Virus and also being called as human corona virus 2019(H CoV-19). The World Health Organization (WHO) declared the outbreak as Public Health Emergency of International Concern on January 30,2020.[2] and as a pandemic on March 11, 2020. Following consequences India faced a nationwide lockdown on March 24, 2020.

Covid19 has a devastating effect on dental industry. With the majority of practices, it is difficult to maintain strict hygiene protocol, sterilization and sanitization which directly increases the risk of getting infected by the virus. Preventive procedures can curve the risk of cross contamination from aerosol and splatter which possess a serious health risk to dental practitioner as well as patient and subsequently their family.

The implementation of nationwide lockdown became a real problem for the citizens within the country to visit the hospital or dental setups. To overcome these problems new method of treating patients needs to be encouraged.

Dramatic growth of high-speed internet, Information Technology in the last decade can provide contamination-less way of treatment. The coming together of dentistry and medicine, pharma and IT can make a huge positive impact in providing emergency acute dental service to masses. In this situation, 'tele-dentistry plays a very important role for providing communication between the dentists and the patients.

TELEDENTISTRY AND ITS ORIGIN: The term 'tele-dentistry 'was first used in 1997, by Cook. Cook defined it as "the practice of using video-conferencing technologies to diagnose and provide advice about treatment over a distance".[3] Development of tele-dentistry lie in telemedicine. Telemedicine (and by inclusion tele-dentistry) can be defined as, "the practice of health care delivery, diagnosis, consultation, treatment and education using interactive audio, video or data communication ".[4] By using telecommunications and computer technologies it has become easier to access to the specialists. In rural areas where health care facilities are inefficient; tools like tele-dentistry can contribute substantially in bridging the gap between demand and supply.

In 1959, Albert Jutra first used communication cable in transmit of videotaped tele-fluoroscopic examination between two hospitals in Montreal 5 miles apart.[5]

Initial concept of tele-dentistry originates as a part of the blueprint for dental informatics (a new branch that combines computer and information science engineering and technology in all areas of oral health) which was initiated in the year of 1989 in a conference arranged by Westinghouse Electronic Systems Group in Baltimore.[5]

The US Army's project Total Dental Access (TDA) project began in 1994 which was based on Plain Old Telephone System (POTS).[6] In 1995, Rocca et al conducted a pilot study to connect general dentist in Haiti to Dental specialists in Washington DC, via satellite system.

In 1997, Integrated Services Digital Network (ISDN) based tele-dentistry tested in Germany, Belgium and Italy and later on Scotland, Japan, England and Taiwan.[7]

Technologies recently available are leading to change in dynamics of dental care delivery. Earlier email, fax, telephone calls were used but more recently video conferencing and high-quality image transfer become easily accessible.

Store and forward method of tele-dentistry system comprises of computer, digital cameras, intraoral video cameras, modem and internet connection.

Like telemedicine, tele-dentistry can be delivered by means of tele-consultation, tele-education, tele-monitoring and tele-surgery by two major ways – 1. Real-time consultation, 2. Store and forward method.[8]

Real time consultation includes a video conference between dental practitioners and patients Thus it transfers data information directly; whereas, store and forward method of tele-dentistry includes exchange of information and static images collected and stored in telecommunication equipment. The required information is sent to the specialist for consultation and treatment planning and then proper treatment guideline is provided to the patient in a cost-effective manner.

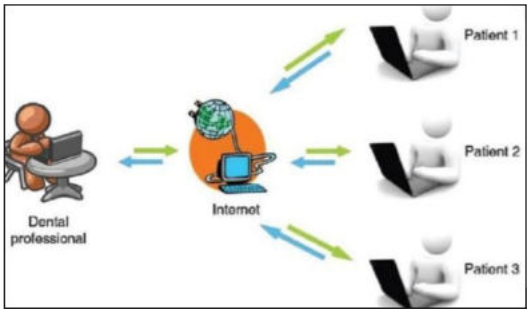

Figure 1: Real-Time Consultation

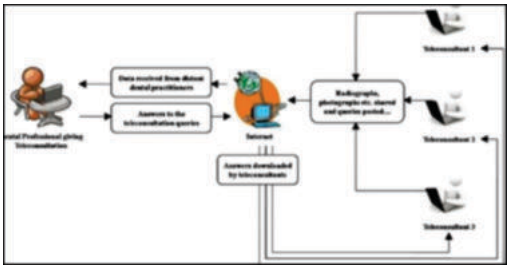

Figure 2: Store and Forward Method

Third method includes 'Remote Monitoring Method' where patient is monitored at a distance which can be either hospital based or home based.[9]

A 'Near-real time' consultation has been mentioned in some literatures.[9]

APPLICATION OF TELE-DENTISTRY:

Tele-dentistry helps the common people both in rural and urban areas to get access to specialized oral health care measures at a lower cost.

In Oral Medicine and Diagnosis: - Patient with oral ulcerative lesion or soft tissue ulcer can send the images by clicking through smartphones and send to the dentist. Dentist can analyse and prescribe proper medication through tele-prescription. Orthopantomograph (OPG), Cone Beam Computer Tompgraphy (CBCT) or other laboratory test reports can be sent digitally in treatment of cysts, tumors or any kind of fractures or carcinomas and treatment will be done accordingly. Torres Pereire et al suggested effective dental diagnosis of oral lesions via transmission of digital images by email.[10]

In Oral and Maxillofacial Surgery: - Duka M et al. proposed assessment of impacted or semi impacted third molars assisted by telemedicine approach was similar to real-time assessment of clinical diagnosis.[11] M.K. et al. provided telemedicine consultation in patients for dentoalveolar surgery with general anaesthesia and nasotracheal intubation are as reliable as traditional method, in addition teleconsultation was cost effective.[12]

In Endodontics: - Most common complaint of the patients is pain. Patients can send their photographs and tell their symptoms to the dentists over phone. Zivkovic D et al. Demonstrated that tele-dentistry based on the internet as a telecommunication medium can be successfully utilized in the diagnosis of periapical lesions of the front teeth, reducing the costs associated with distant visits and making urgent help available.[13] Brullmann D et al. Reported that remote dentists can identify root canal orifices based on images of endodontically accessed teeth. [14]

In Orthodontics: - Most common complaints include breakage of orthodontic appliances or loosening of wire. Dentists can instruct the patients to fix those appliances temporarily over telephone. According to Berndt F et al. Interceptive orthodontic treatments are provided sufficiently by trained general dentists and supervised remotely by orthodontic specialists through tele-dentistry.[15] Cook J et al. Tested an online tele-dentistry service and showed that it helped to reduce the high level of inappropriate orthodontic referrals to consultants and provided general dental practitioners with quick access to advice that would enable them to tackle a wider range of cases themselves .[16]

In Prosthodontics: - Most common complication can be breakage or dislodgement of denture. Such problems can be solved temporarily by tele-dentistry. Ignatius E et al. Investigated the use of videoconferencing for diagnosis and treatment planning for patients requiring prosthetic or oral rehabilitation treatment and stated that video-consultation in tele-dentistry has the potential to increase the total number of dental specialist services in sparsely populated areas.[17]

In Pedodontics: - Children can be more easily get affected by SARS CoV 2 hence, emergency situations like pain, trauma, abscess formation can be solved through tele-dentistry by giving analgesics and antibiotic coverage. Kopycka-Kedzierawski DT and Billing RJ proved that tele-dentistry is as good and effective as visual/ tactile examination of dental caries screening in young children.[18] Kopycka-Kedzierawski D T et al. Suggested that tele-dentistry offers a potentially efficient means of screening high risk preschool children for signs of early childhood caries.[19] Amavel R et al. Stated that remote diagnosis of children dental problems based on non-invasive photographs constitute a valid resource.[20] In Periodontics: - Both periodontists and patients have high chance of getting affected by the Corona virus due to development of aerosols during scaling and root planning procedure. Periodontists can make use of tele-dentistry by store and forward method where patient will provide required radiograph and photograph and periodontist will deliver subsequent treatment plan by tele-prescription. Earlier, 15 underwent periodontal surgery at Fort Gordon, Georgia and one week later their sutures were removed at a location 150 miles away under tele-supervision of periodontist. Only 1 patient avail the follow-up procedure.[21]

ADVANTAGES: -

COVID-19 pandemic has forced entire industries and organizations to fastrack digital transformation to continue providing services. With many dentists and patients taking advantage of tele-dentistry during the pandemic. Such advantages are-

Role in dental education- The two categories of information exchange namely, real time method and store and forward method, play a very important role in the field of dental education. In store and forward method, the materials can be reviewed for a number of times as per the wish of the dentists and dental students.

Role in dental practice- Patients can send their photographs through smart phone and have a conversation with the dentist over phone. Video conferencing interactive sessions can also be arranged. Thus, the dentists can make proper treatment plan and guide the patients accordingly even in the absence of the patients.

Role in schools and child care centres- Tele-dentistry plays a very important role in educating the children about their oral hygiene maintenance. It also provides emergency dental care to the children.

Emergency treatment management- Dentist can treat patient through teleconsultation and give suitable antibiotics and analgesics till situation gets normal.

Improves access to specialists- Patient in rural areas can be treated in more efficient ways by specialists through teleconsultation.

Reduces cost- Seeing a patient virtually means dentist does not require to spent money upon gloves, masks, PPE kits which will be more economical.

Follow-up visits can be avoided- Dentists after doing emergency procedures like extraction or emergency access opening can get a proper follow-up by tele-dentistry.

Increased safety- COVID-19 has made it risky for patients and dentists to physically enter into dental practices for treatment need. Tele-dentistry serves as an effective way to treat without direct physical contact.

LIMITATIONS: -

Though tele-dentistry is a grace during the lockdown period, but the accuracy of diagnosis cannot match the same performed clinically. Following are some limitations of tele-dentistry: -

Visit to clinic is must for treatment: - Any preventive or diagnostic procedure can be done through tele-dentistry; but actual treatment like extraction, restoration, endodontic procedure need visit to the clinic.

Technological illiteracy among patients: - Some patients may find it difficult to use electronic gadgets as a mode of communication with the dentists.

Protecting essential data: - Hackers may be able to access a patient's data especially if patient accesses tele-dentistry on a public network or via an unencrypted channel.

Care delay: - When a person is in need of emergency care services, accessing tele-dentistry may delay the treatment since dentist cannot provide lifesaving care or laboratory tests digitally.

Insurance coverage: - Not all insurers cover tele-dentistry since laws are constantly changing.

Network coverage and internet accessibility: - For some patients as well as dentists, especially those who residing in rural area, network coverage and internet accessibility is a huge problem. For them tele-dentistry is not the choice of option.

Safety regarding storage of data and information: - Some patients may think that it is not safe to share data and information within these platforms which make them sceptical about using tele-dentistry.

ETHICAL AND LEGAL PROBLEMS: -

Security and safety of the patients' information is a very important factor which should be taken care of. Tele-dentistry practitioners

should take care of the privacy of the patients' details shared through this platform. It is also very important to inform the patient about the chances of inaccurate diagnosis or treatment because of inappropriate photographs sent or because of technical issues.

Medicolegal and copyright issues also have to be considered. No method can absolutely ensure quality, safety, effectiveness of information or its exchange. Various legal issues like licensure, jurisdiction, malpractice have not been properly decided by the legislative or judicial branches of various governments. In 2000,20 states of the US enforced restrictive licensure laws requiring tele-dentistry practitioners to get full licenses to practice across state-lines.[22] Despite, information on tele-dentistry licensure does not appear to be readily available today .[23]

SCOPE OF TELEDENTISTRY IN INDIA: - In 1999, Department of Information Technology, the Ministry of Communications and Information Technology (Government of India) launched a pilot project which was named as 'Development of Telemedicine Technology' with the objective of reinforcing natural healthcare delivery system. Three hospitals namely All India Institute of Medical Sciences (AIIMS), New Delhi; PGIMER, Chandigarh; Sanjay Gandhi Post Graduate Institute of Medical Sciences (SGPGIMS), Lucknow have been involved to identify appropriate technological tools and services.[24]

According to report released by McKinsey Global Institute (MGI) entitled as 'Digital India: Technology to Transform a Connected Nation' has stated that the implementation of telemedicine technology including tele-dentistry could save India's $4billion to $5billions every year and replace half of in-person outpatient consultation in the country.[25]

CONCLUSION: - In this COVID-19 pandemic situation both the dentists and the patients are in a state of anxiety. In this difficult time period, tele-dentistry really proved to be a boon for the dentists who can provide efficient oral health care to their patients through video conferencing or by simply over a telephone conversation. Thus, many oral health related problems can be solved virtually. Though tele-dentistry may involve many errors in diagnosis and may involve many medicolegal issues, it is really very beneficial in handling emergency situations without causing actual visit of patients to the dental clinics.

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