

A Review on Application of Telemedicine in Public Health to Attain Social Equity

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ABSTRACT: Telemedicine is the evolution of the health care sector in the digital era of mankind. In a larger country like India, distance is a critical factor for health care professionals and facilities not to reach out people of rural and unattainable areas. These areas have been continuing to suffer from poor access to Diagnosis, Consultancy, Safe Medicine and other health care facilities. Based on this context, it has been necessary to implement telemedicine model to reach equitable distribution of health care services in India. This article is about review on Telemedicine Practices in India and to find our position in the same as a country. This innovative “healing at a distance” technique encompasses health care delivery along with education, research, health, surveillance and public health promotion. During this review, we came to the conclusion that telemedicine is the future of the healthcare profession as it works irrespective of time, place, social status or gender. Thus, we can attain social equity through telemedicine in all aspects of human welfare.

KEYWORDS: Telemedicine, Telepathology, Role of health care system, E-Sanjeevani

services, where distance is a critical factor, by all healthcare professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries, research and evaluation, and for the continuing education of healthcare providers, all in the interests of advancing the health of individuals and their communities".

During Covid-19 Pandemic, due to sudden peak in the patient count, sufferer has faced unavailability of medical services in the health care centre. In this scenario telemedicine was the blessing. It has surely helped to decrease the burden of the healthcare system to a large extent. This review text is written in context to study applications of telemedicine in modern era of healthcare sector.

I. INTRODUCTION

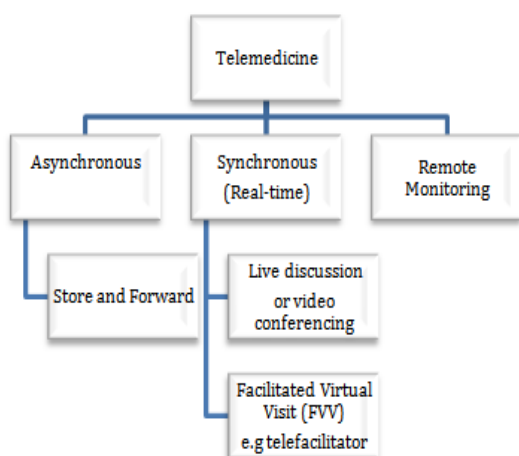
India is the seventh-largest country by area and the second-most populous country in the world. Thus, it has enormous issue in primary health care sector. Almost a billion Indians lack a minimum level of life due to underdevelopment, inadequate infrastructure, and significant urban-rural divide. For many Indians those who live in rural regions, it is very hard for them to find reliable and qualified physicians the neighborhood for medical help. To bridge the gap and facilitate the health care, technology came into picture in the form of “telemedicine”. “Tele” is a Greek word meaning “distance” and “medicos” is a Latin word meaning “to heal”. It is the medicinal practice using technology to deliver care at a distance by well qualified medical professional to the patient. World Health Organization (WHO) elaborate the term telemedicine as, “the delivery of healthcare

II. HISTORY:

Sr.No.	Historical milestone	Year	Reference
1	Initially telemedicine journey was started to discuss Electro Cardio Graph over telephonic line to consult by William Einthoven with fellow physicians.	1905	5,6
2.	Consultation of patient on radio by professional for merchant ship. News Magazine which showed a patient sitting with T.V. And microphones on one end to communicate with a doctor present on another end.	1924	6,7
3.	The first known record of real-time video consultation occurred where doctors of Nebraska University (U.S) interacted to transmit neurological examination by means of Telemedicine.	1959-1964	6,8
4.	NASA medical assistance during space missions (satellite connection).	1960-70	2, 9,10
5.	With the rise of the internet, telemedicine resurfaced	1990	
6.	The movement related to Telemedicine started in India and the government supported the movement.	1999-2000	11
7.	Telemedicine practice through devices like Computer, Smartphone.	After 2000	11
8.	The ISRO deployed the first nation-wide SATCOM-based telemedicine network.	2001	12
9.	In India, to give a boost to telemedicine, the Ministry of Health and Family Welfare in partnership with NITI Aayog released 'Telemedicine Practice Guidelines' on March 25, 2020.	25th march 2020	13,14

III.

IV. TYPES OF TELEMEDICINE:



- 1. Asynchronous (Store and Forward Telemedicine):** Asynchronous Telemedicine whereas a patient or physician collects medical history, images, video, pathology reports with other essential records (which explain the term "Store"). Then forward to a specialist physician for diagnostic and treatment or expertise opinion (which explain the term "Forward").
- 2. Synchronous Telemedicine:** It is real-time or live type of telemedicine. This method involves live video conferencing or video meet between patient and doctor. It is more comfortable for both parties as meet is virtual and can be conducted more easy way anytime and anywhere. Most important feature is two-way communications. Other feature includes the assessments of medical history, visual examinations, psychiatric questionnaire,

evaluations, and ophthalmic tests can be done through this mode. It helps doctor to understand patient concern in more precise way from facial expression and body language of patient in virtual mode.

- 3. Remote Monitoring⁶:** -It is also known as “Telemonitoring”. This method enables healthcare professionals to monitor and track the patient’s medical vitals and activity from a distance. Remote monitoring is extensively used in the treatment of various chronic conditions. The elderly patients at home can be conveniently and inexpensively monitored.

V. TELEMEDICINE IN INDIA

Many physicians in India choose to work in cities rather than in rural regions. As a result there is a large imbalance in number of doctors per people count in rural area which cause social inequality. When we compared cities with rural regions, it is also found that primary medical care necessary for any health condition was insufficient in rural regions. Addition to it, rural area has difficulties to connect patient with doctor as they are part of remote area. As a result, equal distribution of healthcare resources has repeatedly shown to be an important aim in public health management. To address this issue, the government launched a telemedicine trial project in 2001, connecting Chennai’s Apollo Hospital with the Apollo Rural Hospital in Aragonda village in Andhra Pradesh’s Chittoor district¹². The establishment of standardised telemedicine practise guidelines by the Department of Information Technology within the Government of India, as well as the formation of a National Telemedicine Task Force by the Health Ministry in 2005, these were two of the steps taken by the government to ensure the smooth operation of the telemedicine project. As per the said guidelines, patients may consult with a registered medical practitioner (RMP) for diagnosis and treatment of their condition or for health education and counselling. A patient can also use telemedicine service for follow-up consultation on their ongoing treatment with the same RMP who prescribed the treatment in an earlier in-person consult¹³. A few important examples of the successfully established telemedicine services in India include mammography services at Sri Ganga Ram Hospital, Delhi; Oncology at Regional Cancer Centre, Trivandrum; surgical services at Sanjay Gandhi Postgraduate Institute of Medical Sciences, the School of Telemedicine and the Biomedical Informatics. Indian Space Research Organisation (ISRO) has developed telemedicine network which

has grown in recent years to connect 45distant and rural hospitals as well as 15 super specialty hospitals. The islands of Andaman and Nicobar, the mountainous region of Jammu and Kashmir, and the medical college hospital in Orissa are among the distant nodes.

VI. APPLICATION

- 1. Treatment of Chronic Illnesses:** We can monitor patients with chronic conditions including asthma, chronic obstructive pulmonary disease (COPD), diabetes, heart failure, and hypertension employing telemedicine in a very convenient manner. It also saves us a considerable sum of money. On a daily basis, it is used to keep track of vitals such as blood pressure, glucose levels, and heart rate. This sort of access will aid doctors in providing care to their patients. It can also help with quick action in the event of a medical emergency. The synchronous or asynchronous way of involving healthcare personnel with patients has been shown to reduce morbidity and perhaps death. Chronic illness treatment by digital tools are important in delivering chronic illness education, enhancing self-management, transferring information, facilitating interaction with health care providers, and improving electronic records. In other words, telemedicine has been used in both the process and the outcome of care.
- 2. Telenephrology:** Many individuals are suffering from chronic kidney disease (CKD) and end-stage kidney disease (ESKD). They demand quick medical attention in a primary care facility. Telenephrology has developed as a new treatment option for renal sufferers. Healthcare providers use a telemedicine programme to upload information about CKD or ESKD patients and exchange it with a nephrologist through a distant network. Patients with CKD and ESKD have a high illness burden, limited resources, and require treatment from numerous health care providers, all of which contribute to their disease burden; this might be an ideal patient population for telemedicine to help. There are considerable gaps in the management of patients with advanced CKD. It includes a lack of proper CKD knowledge and dialysis modality education among patients, as well as inconsistent CKD identification among medical care professionals. Telenephrology applications began in remote places to address this challenge.

- 3. Telepathology:** Telepathology is a kind of telemedicine in which pathology report is delivered remotely via electronic communication. A pathology professional can examine digital photos of pathology and make a diagnosis via telepathology. It is becoming one of the most popular applications as telepathology apps and high-resolution cameras become more widely available. Intraoperative consultations occur in an extension of operation timeframes due to the time delay, resulting in longer anesthesia and idle time during surgery. Transfer delays between the hospital and the pathologist may be minimized with the use of a remote-controlled microscope for telepathology, and pathological expertise can be provided regardless of the hospital's geographic location. A macroscopic examination system is included in the telepathology system. The addition of macroscopic equipment enables for inspection and interactive sample guiding, reducing sample mistakes.
- 4. Tele dermatology:** Skin disorders can be helped through telemedicine. Medical workers with little dermatology training regularly provide dermatological care in rural areas. As a result, professionals get asked challenging inquiries, and replies may take many days. In these situations, Smartphone apps are being used to deliver real-time dermatological diagnostics. Medical records, exams, and testing are used to diagnose the skin disorders of patients. Telemedicine is becoming more and more dependent on digital healthcare tools.
- 5. Teleneurology:** Neurology Telemedicine, sometimes known as "teleneurology," has been used to transmit medical reports to neurologic experts for patients in areas where specialists are few or who have neurologic problems that prevent them from travelling or who require immediate care. Telemedicine offers services that are difficult to deliver in person and increases the efficiency and efficacy of current services. Wherever access to neurology knowledge is limited, whether due to a lack of doctors or a patient's inability to move about, telemedicine may be used to help. While teleneurology is most commonly used in emergency stroke and neurocritical care. It plays a role in the management of patients with chronic neurologic diseases such as epilepsy, Parkinson's disease, and other movement disorders, new neurologic outpatient referrals or consultations, community rehabilitation programmes, neurology e-consults from domestic and global health sources, and e-mail triage of referrals from general practitioners.
- 6. Medical application:** Medical apps are programmes that offer patients with both synchronous and asynchronous healthcare services. Patients in underdeveloped areas with limited medical access to treatment might benefit from eHealth platforms, which provide medical guides and resources. Furthermore, eHealth systems connect patients to remote physicians during natural disasters or emergencies when medical services are in high demand. Primary Care, K Health, Teladoc, and Doctor on Demand are examples of medical application software that may be downloaded from the Google Play and Apple Stores. These medical applications connect people with qualified physicians for non-emergency health concerns and are HIPAA-compliant in the United States.
- 7. Wireless technology in telemedicine:** Traditional telemedicine systems are meant to be utilised at certain locations and can only be transferred seldom. As a result, whether they are linked to phone lines or other wired devices are irrelevant. Telemedicine solutions, on the other hand, will be more useful if they properly utilize mobility and can be quickly taken to patients rather than being fixed in one location. Wireless networks are readily applicable to telemedicine technology since modern wireless network technology has allowed individuals to access audio-visual data with mobile devices, and some businesses even offer high-speed data transfers via tiny antennae over low-orbit satellites. Because the primary goal of wireless telemedicine kits is for medical professionals to bring them to patients' homes and set them up there, they are unavoidably smaller and less complicated than traditional telemedicine systems. As a result, some of the medical features of traditional systems are sacrificed by wireless telemedicine kits. Wireless telemedicine, on the other hand, is frequently used for brief medical consultations or specialised healthcare, such as emergency first aid or telecardiology, and hence does not require all of the characteristics of traditional systems. Conventional telemedicine systems, on the other hand, frequently provide extra system features for wireless telemedicine.
- 8. Flexible Practice:** Doctors are no longer subjected to excessive working hours, and travel expenditures are reduced as a result of remote check-ups made possible through video-

call conferencing. Patients can communicate with their doctors at any time through telemedicine. It also appeals to the rising number of people who need telemedicine as a treatment alternative. The use of telemedicine benefits both physicians and patients in a variety of ways.

- 9. E-Sanjeevani:** Telemedicine has been available for decades, but it has lately risen to prominence in health services as a result of the COVID-19 instances that have caused panic and mayhem in the country. The abrupt nationwide lockdown proved ineffective and exacerbated the situation for economically disadvantaged people. During our country's battle to overcome the Covid-19 predicament. Telemedicine was quite helpful. On August 9th, telemedicine was reintroduced in India. It was given the name e-Sanjeevani. With the continuing pandemic, it was part of the "digital India" project, which assisted medical practitioners in using communications techniques like videoconferencing to deliver improved health care. The toll-free number 1075 can be used to get the free service.
- 10. Remote Follow-Ups:** Telemedicine apps allow patients to participate in remote follow-up sessions with doctors, who can check that the patient is following the aftercare advice. It's also beneficial in situations when in-person follow-ups aren't required or urgent. Remote follow-ups will help minimise the number of last-minute cancellations. So, enhancing a practice's profitability³⁴.
- 11. Virtual Second opinions:** A patient may be unhappy with the outcome of a diagnostic or treatment plan. Attending a virtual meeting and getting a second viewpoint takes the bother out of living³⁴.

VII. CHALLENGES TO TELE-MEDICINE:

- 1. Lack of acceptance and believe of telemedicine:** Doctors are not totally convinced of the benefits of e-medicine. Patients are sceptical about the effectiveness of e-Medicine.
- 2. Expensive Technology:** Telemedicine is often financially impossible due to expensive technology and connectivity expenses.
- 3. Diversity in languages:** Which restrict communication between patient and doctors.
- 4. Technical constraints:** E-medicine, which is backed by many types of software and technology, is still in its early stages. We need

improved biological sensors and more bandwidth support for accurate data diagnosis and pacing.

- 5. "Quality is essential,"** and everyone wants it, yet it may occasionally cause issues. In the case of healthcare, there is no competent regulatory authority to create standards and urge organisations to follow—it is entirely up to the organisations to decide how to handle it.
- 6. Government Assistance:** Any technology in its early stages requires care and assistance. Only the government has the resources and power to assist it in surviving and growing. There is no such required support from government programme to develop it. Now even Indian government taking efforts to promote telemedicine under title "digital India"

VIII. CONCLUSION:

Telemedicine played a vital role in the health care system. It helps us to decrease the health issue as vitals can be monitored easily. It is the platform where health care continues to be monitored. It is time saving and affordable to every person, as technology is evolving. It has a significant role in upcoming future of the healthcare system. As it is bringing the world closer and distance is no longer an obstruction in attaining quality healthcare. The e-Sanjeevani platform developed by the Indian government during the global pandemic of COVID-19 is one of the best example of telemedicine. It came into act when everyone was isolated in their own homes for safety but simultaneously needed a doctor's assistance. As the government is also supporting this service so we should be more familiar with telemedicine. At present telemedicine is working flourishingly in every region of India irrespective of time, place, social status or gender. Thus, we can attain social equity through telemedicine in all aspects of human welfare.

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