

Telemedicine: A Comprehensive Review of Current Trends and Future Directions in India

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ABSTRACT:

Telemedicine, the use of telecommunication and information technologies to provide remote medical services, has emerged as a promising tool for healthcare delivery in India. With the COVID-19 pandemic, the adoption and utilization of telemedicine have accelerated significantly in India, leading to significant changes in healthcare delivery. In this review article, we aim to provide a comprehensive overview of the current trends and future directions of telemedicine in India. We highlight the benefits and challenges of telemedicine, examine the various technologies and modalities used in telemedicine, and discuss the regulatory and policy frameworks governing telemedicine in India. Finally, we present the potential future directions and implications of telemedicine in India.

Keywords: Telehealth, health care, telemedicine, Health monitoring, COVID-19

I. INTRODUCTION:

Telemedicine is a healthcare practice that leverages electronic communications to exchange medical information between different locations, with the aim of enhancing a patient's clinical health status. The word "Tele" originates from the Greek language, which means "distance," while "mederi" is derived from Latin, meaning "to heal." As described by Time Magazine, Telemedicine is often referred to as "healing by wire," and involves using information and communication technologies to deliver care remotely. The field of Telemedicine continues to evolve, incorporating new technological advancements and adapting to changing health needs and societal contexts [1].

As per the World Health Organisation (WHO), telemedicine is the delivery of health care services, where distance is a critical factor, by all health care professionals using Information Technology (IT) for diagnosis, treatment and prevention of disease and injuries, research and

evaluation, etc, all in the interests of advancing the health of individuals and their communities. Teleconsultation is one of the applications of telemedicine. It uses IT to facilitate communications between a patient and a doctor who are otherwise geographically separated. [2][3]

Appropriate local community-level healthcare intervention is a prerequisite to achieve 'Health for All' in India. Telemedicine is a rapidly growing field that uses technology to enable remote medical consultations and care. It allows patients to receive medical care from the comfort of their own homes, reducing the need for in-person visits to a doctor's office or hospital. [4]

Benefits and Challenges of Telemedicine in India:

Telemedicine offers several benefits in India, including increased accessibility to healthcare services, improved patient outcomes, and reduced healthcare costs. It also allows for remote monitoring of chronic conditions and provides a means for healthcare professionals to consult with each other, regardless of their location. However, telemedicine also presents several challenges in India, including the need for reliable and secure technology, the lack of regulatory and policy frameworks, and the limited digital literacy among patients and healthcare professionals.

Benefits:

There are numerous advantages to telemedicine, such as enhanced accessibility to timely and suitable interventions, including expedited access and availability of services that might otherwise be inaccessible.

1. Convenience: Telemedicine offers convenience for patients who may have difficulty traveling to a healthcare provider's office. Patients can receive care from the comfort of their own homes, without having to travel long distances or spend time in waiting rooms.[5]

2. Accessibility: Telemedicine can be particularly beneficial for patients who live in rural or remote areas, where access to healthcare providers may be limited. It can also be helpful for patients who have mobility issues or disabilities that make it difficult to leave their homes. [6]

3. Cost savings: Telemedicine can be a cost-effective option for both patients and healthcare providers. Patients may save money on travel expenses and time off work, while healthcare providers can save on overhead costs associated with maintaining a physical office.[7]

4. Improved patient outcomes: Studies have shown that telemedicine can lead to improved patient outcomes, particularly in areas such as chronic disease management, mental health, and prenatal care.[8]

5. Time savings: Telemedicine can save time for both patients and healthcare providers. Patients can avoid long wait times in a doctor's office, while healthcare providers can see more patients in less time.[9]

Drawbacks:

Telemedicine has seen significant growth and acceptance, there are challenges that need to be addressed. These challenges include ensuring data privacy and security, maintaining the quality of care, addressing the digital divide, and training healthcare professionals in telemedicine practices.

1. Limited physical exams: Telemedicine is limited in its ability to provide physical exams. Healthcare providers may not be able to perform certain tests or procedures remotely, and patients may still need to visit a physical office for some aspects of their care.[10]

2. Technology barriers: Patients may face technological barriers, such as a lack of access to high-speed internet or a lack of familiarity with technology, that can make it difficult to participate in telemedicine consultations.[11]

3. Insurance coverage: While telemedicine is becoming more widely accepted by insurance companies, coverage can still be limited. Patients may face out-of-pocket costs for telemedicine visits, and healthcare providers may not receive adequate reimbursement for their services.[12]

4. Privacy concerns: Telemedicine consultations take place over the internet, which can raise concerns about privacy and security. Healthcare providers must take steps to ensure that patient information is kept secure during these consultations.[13]

Types of Telemedicine Programs

Telemedicine programs can be broadly classified into two categories: Synchronous and asynchronous healthcare programs

Synchronous healthcare programs are conducted in real-time and facilitate live two-way interaction between the patient and healthcare provider. This mode of telemedicine includes virtual appointments that can be easily accessed through a smartphone, tablet, or computer with a camera. In order to initiate a virtual appointment using a smartphone or tablet, patients are required to download a designated app that enables connectivity with a healthcare provider.

Alternatively, asynchronous telemedicine programs, commonly referred to as "store and forward" applications, do not require live interaction between the patient and healthcare provider. Instead, these programs involve the transfer of clinical data, such as images, videos, and health reports, which are viewed and responded to by the provider at a later time. Patients using this mode of telemedicine may wear medical devices to track and monitor health information, such as blood pressure, which they can then transmit to their healthcare provider using a personal health application.[14]

Technologies and Modalities in Telemedicine:

Telemedicine in India utilizes a variety of technologies and modalities, including video conferencing, remote patient monitoring, mobile health apps, and electronic health records. Video conferencing allows for virtual consultations between patients and healthcare professionals, while remote patient monitoring enables the collection of patient data through wearable devices and other sensors. Mobile health apps provide patients with a means of accessing health information and services from their mobile devices, while electronic health records allow for the sharing of patient information between healthcare professionals. [15]

Healthcare professional have the flexibility to utilize various telemedicine tools for conducting technology-based patient consultations, such as telephone, video calls, devices connected via LAN, WAN, or the Internet, mobile or landline phones, messaging platforms like WhatsApp or Facebook Messenger, dedicated mobile apps, internet-based digital platforms for telemedicine, or data transmission systems like Skype, email, or fax. [16]

Regulatory and Policy Frameworks:

The regulatory and policy frameworks governing telemedicine in India have evolved significantly in recent years. In March 2020, the Ministry of Health and Family Welfare issued guidelines for telemedicine practice in India, which provided a legal framework for the practice of telemedicine. The guidelines allowed for the prescription of medicines through telemedicine, provided that certain conditions were met. These guidelines established legal and ethical standards for telemedicine practice, and provided guidance on issues such as patient consent, privacy and confidentiality, and medical records management. [17]

Increased adoption during the pandemic: The COVID-19 pandemic has accelerated the adoption of telemedicine in India. The government encouraged the use of telemedicine to reduce the risk of infection transmission in healthcare facilities, and many healthcare providers began offering telemedicine consultations to patients. [18]

Current Status of Telemedicine in India

Government initiatives: The Indian government has launched a number of initiatives to promote the use of telemedicine in India. For example, the Ministry of Health and Family Welfare has launched the eSanjeevani telemedicine platform, which enables doctors to provide remote consultations to patients. [19]

eSanjeevani telemedicine

The eSanjeevani telemedicine platform is an initiative of the Indian government to provide remote healthcare services to patients. Launched in November 2019, it is one of the largest telemedicine platforms in the world and has played a significant role in expanding access to healthcare services in India, particularly during the COVID-19 pandemic. [20]

eSanjeevani: It is a doctor to doctor telemedicine system, being implemented under the Ayushman Bharat Health and Wellness Centre (AB-HWCs) programme. AB-HWCs are envisaged to be the platform for delivery of an expanded range of primary health care services closer to the communities. eSanjeevani is a cohesive part of Ayushman Bharat Digital Health Mission (ABDHM), and more than 45,000 ABHA IDs have been generated via eSanjeevani application. Leading ten states for usage of this platform are: Andhra Pradesh, West Bengal, Karnataka, Tamil Nadu, Maharashtra, Uttar

Pradesh, Madhya Pradesh, Bihar, Telangana and Gujarat. [21]

The eSanjeevani platform enables patients to consult with doctors remotely, using video conferencing technology. Patients can access the platform using a mobile phone, tablet, or computer with internet access. The platform is available in both English and Hindi, and patients can choose to consult with doctors from a range of specialties. It tackles the issues of uneven distribution of healthcare personnel and infrastructure by bridging the divide that exists between urban and rural, rich and poor, in terms of access to healthcare services. [22]

One of the key advantages of the eSanjeevani platform is that it enables patients to access healthcare services from anywhere in the country, regardless of their location. This is particularly important in a country as vast and geographically diverse as India, where access to healthcare services can be limited in remote or rural areas. [23]

The eSanjeevani platform has been widely adopted by both patients and healthcare providers in India, and has played a significant role in expanding access to healthcare services during the COVID-19 pandemic. The platform has been used to provide remote consultations, follow-up care for chronic conditions, and mental health services, among other services. [24]

Features/Outcomes of eSanjeevani:

- It endeavors to bridge rural-urban digital health divide by providing assisted teleconsultations.
- It ensures that e-beneficiaries of Ayushman Bharat Scheme are able to avail of the benefits they are entitled to.
- This vertical operates on a Hub-and-Spoke model wherein the AB-HWCs set up at state level, act as spokes, are mapped with the hub (comprising MBBS/ Specialty/Super-Specialty doctors) at zonal level.
- This model has been successfully implemented in 1,09,748 AB-HWC and 14,188 Hubs, hence, achieving a total of 7,11,58,968 teleconsultations. [25]

eSanjeevani OPD:

It was launched amid the Covid-19 pandemic to enable patient-to-doctor teleconsultations. Offered at no cost, this e-health service has made it convenient for the people to avail of the health services without having to travel. It enables two-way interaction and even generates a prescription slip. It is hosting over 40 online Out

Patient Department (OPD) services, more than half of these are speciality OPDs which include Gynaecology, Psychiatry, AntiRetroviral Therapy (ART) for the AIDS/HIV patients, Non-Communicable Disease (NCD) etc. [26]

These platforms can be a gamechanger for people in the rural areas who do not have easy

access to medical specialists located in cities. Telemedicine saves time and cost. Further, these platforms are in line with the government's vision of 'Digital India' and necessary to tackle situations created by a pandemic like Covid-19. [27]

Features of eSanjeevani OPD:

Patient Registration	Token Generation	Queue Management
Audio-Video Consultation with a Doctor	ePrescription	SMS/Email Notifications
Serviced by State's Doctors	Free Service	Fully configurable (no. of daily slots, no. of doctors/clinics, waiting room slots, consultation time limit, etc).

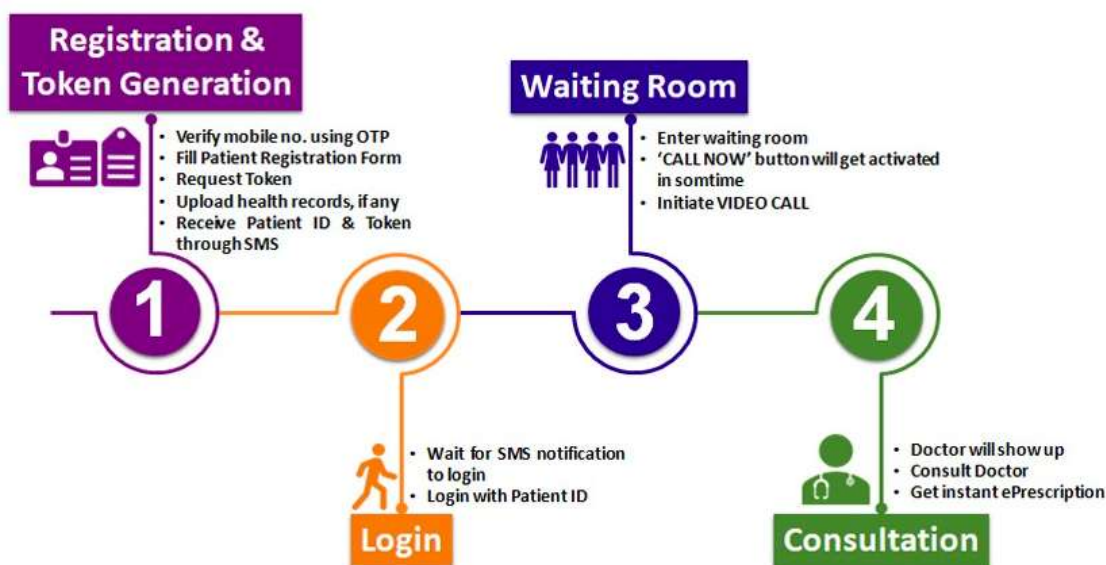


Fig: Flow Chart for Telecommunication

The telemedicine service platforms of the Ministry of Health & Family Welfare i.e. 'eSanjeevani' and 'eSanjeevaniOPD' have completed 1.5 lakh tele-consultations. The top two States which have registered highest consultations through the platforms are Tamil Nadu (32,035 consultations) and Andhra Pradesh (28,960). Since November 2019, tele-consultation by eSanjeevani and eSanjeevaniOPD have been implemented by 23 States. Both the platforms have been developed by

the Centre for Development of Advanced Computing (C-DAC) Mohali. C-DAC is the premier R&D organization of the Ministry of Electronics and Information Technology (MeitY) for carrying out R&D in IT, Electronics and associated areas. Presently, telemedicine is being provided through more than 3,000 HWCs in 10 States. eSanjeevaniOPD has trained and onboarded 2,22,026 specialists, doctors and health workers. This platform has an impressive record of

having served over 4.34 lakhs patients in one day. [28][29]

Significance of Telemedicine Services like eSanjeevani:

1. Telemedicine services are essential in a country like ours where the doctor to patient ratio is much lower than the number prescribed by WHO. In India, there is one doctor for every 1445 Indians (the WHO recommended ratio is 1:1000. [30][31]

2. The availability of medical services including doctors is highly scarce in rural and remote areas of the country. In such conditions, it is important to have a system that will provide consultation services to people residing in rural and backward/hilly areas. This is where eSanjeevani OPD can be helpful.[32]

3. Also, during the current pandemic times, it is important that patients find a way to have consultations with doctors for ailments. This can prevent them from travelling to hospitals/PHCs and increase the risk of catching infections especially covid-19. This has proved beneficial in containing the spread of Covid while simultaneously enabling provisions for non-Covid essential healthcare.[33]

Overall, the eSanjeevani telemedicine platform is an important initiative that has helped to expand access to healthcare services in India, particularly during the COVID-19 pandemic. As telemedicine continues to grow in popularity in India and around the world, platforms like eSanjeevani will likely play an increasingly important role in delivering healthcare services remotely. Enhancing healthcare delivery while reducing financial burden.[34][35]

Future Directions and Implications:

The future of telemedicine in India is likely to be shaped by several factors, including advancements in technology, changes in healthcare policy, and the evolving needs of patients and healthcare professionals. The continued development of wearable devices and remote monitoring technologies is expected to facilitate the expansion of telemedicine in India. Additionally, the integration of telemedicine with artificial intelligence and machine learning could improve diagnostic accuracy and treatment outcomes. [36]

Recent data suggests that telemedicine has significant potential in the area of chronic disease management, which is currently underutilized compared to other telemedicine services such as tele-behavioural health and specialty telemedicine. This patient population requires frequent doctor

visits, and targeting them with telemedicine may lead to decreased emergency room visits and hospital admissions. Another emerging area in telemedicine is the "hospital-at-home" model, where stable patients who meet the criteria for hospitalization can be treated at home for conditions such as chronic obstructive pulmonary disease, pneumonia, and heart failure. This model has been shown to be cost-effective, with shorter treatment durations and lower rates of delirium. However, telemedicine also raises ethical and legal concerns, such as patient privacy and data security. [37]

Expansion of telemedicine services: A number of telemedicine startups have emerged in India in recent years, offering a range of services including virtual consultations, online medicine delivery, and remote monitoring of chronic conditions.

Here are a few telemedicine apps that were widely used in India at present scenario:

1. Practo: Practo is a popular telemedicine app that allows users to find and consult with doctors online. It offers features such as online consultations, e-prescriptions, and appointment scheduling.

2. mfine: mfine is an AI-powered telemedicine platform that connects patients with doctors through video consultations. It offers services across various specialties and allows users to maintain electronic health records.

3. DocsApp: DocsApp is a telemedicine platform that provides online doctor consultations 24/7. It covers a wide range of medical specialties and offers features like e-prescriptions and lab tests.

4. 1mg: Although primarily known as an online pharmacy, 1mg also provides teleconsultation services. Users can consult with doctors through video or audio calls and get e-prescriptions for medications.

5. Lybrate: Lybrate is a telemedicine app that enables users to consult with doctors through text, voice, or video calls. It covers various medical specialties and offers personalized health tips. [38] However, there are still several issues that need to be addressed, including the lack of clarity on liability and malpractice issues, and the need for a national telemedicine policy.

Despite the growth of telemedicine in India, there are still a number of challenges that need to be addressed. These include issues related to internet connectivity, digital literacy, and the need for clear guidelines and regulations to ensure

the quality and safety of telemedicine services. Overall, the development of telemedicine in India is an important step forward in expanding access to healthcare, particularly in rural and remote areas where access to healthcare services may be limited. While there are still challenges to be addressed, the future of telemedicine in India looks promising.[39]

II. CONCLUSION:

Telemedicine has emerged as a promising tool for healthcare delivery in India, particularly during the COVID-19 pandemic. It offers several benefits, including increased accessibility to healthcare services, improved patient outcomes, and reduced healthcare costs. However, telemedicine also presents several challenges, such as the need for reliable and secure technology, the lack of regulatory and policy frameworks, and the limited digital literacy among patients and healthcare professionals. The continued development of telemedicine in India is likely to have significant implications for healthcare delivery and patient outcomes.[40]

In conclusion, telemedicine offers many benefits, including convenience, accessibility, cost savings, improved patient outcomes, and time savings. However, it also has some drawbacks, such as limited physical exams, technology barriers, insurance coverage issues, and privacy concerns. Overall, telemedicine is a valuable tool that can help to expand access to healthcare, but it should be used in conjunction with in-person care to ensure that patients receive the best possible care.[41]

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