

OPPORTUNITIES AND CHALLENGES OF TELEMEDICINE SYSTEM IN HEALTHCARE SECTOR- A CONCEPTUAL STUDY

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Abstract:

Telemedicine activities in India took off in 1999. The Indian Space Research Organization has been a pioneer, deploying a nation-wide SATCOM-based telemedicine network. The Union government of India has also implemented various projects and has in fact extended telemedicine services to South Asian and African countries. The high demand for telemedicine in India has initiated a lot of activity among regulating bodies: the Department of Information Technology has defined the Standards for Telemedicine Systems and the Ministry of Health and Family Welfare has constituted a National Telemedicine Task Force. Activities have also picked up in curriculum and non-curriculum telemedicine training programs. These efforts are consistent with India's goals to make healthcare accessible and affordable to all. In this background, the research paper is trying to focus on the various opportunities, challenges and future trends of telemedicine in health care sector in India.

Keywords: Telemedicine, Healthcare, Medical professionals, Patients, Information Technology

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I. INTRODUCTION: Indian subcontinent is diversified with more than one billion population, which is still struggling to improve their poor health factors. Almost 75% of the population lives in rural areas, lacking access to medical proficiency and infrastructure. With aenormousgap between urban and rural infrastructure telemedicine enable health amenities holds a great promise. Government held HealthCare supply follows a three tier structure which is a primary obligation of the state.

S. P. Sood, explains in his research paper asIndia's rural population is more exposed to various healthcare problems than urban based population for these three particular reasons: late discovery of ailment, transport time to urban healthcare facilities, and inexperienced primary health-care providers in rural areas. In this context, Telemedicine is offering the rural population to address these concerns and to save the patient extra costs associated with treatment, such as travel and other living expenses.

The prospective of telemedicine technology in providing healthcare access to rural populations and distant areas has long been recognized, and many technical ministries of the Government of India such as Information Technology, Science & Technology, and Space have been experimenting with telemedicine pilot projects since early 2000. Based on the successful results of these pilots, the Ministry of Health and Family Welfare has now adopted telemedicine into the National Rural Health Mission, an initiative focused on improvement of the rural healthcare delivery system.

Telemedicine activities in India took off in 1999. The Indian Space Research Organization has been a pioneer, deploying a nation-wide SATCOM-based telemedicine network. The government of India has also executed various projects and has extended telemedicine services to South Asian and African countries. The great demand for telemedicine in India has incentivized a lot of activity among regulatory bodies: the Department of Information Technology has defined the Standards for Telemedicine Systems and the Ministry of Health and Family Welfare has constituted a National Telemedicine Task Force training programs have also been chosen up in course and non-course telemedicine training programs. These hard works are

steady with India's aim to make healthcare available and inexpensive to all. At present-day, India has about 500 telemedicine nodes across the nation and few more projects are in the pipeline.

II. LITERATURE REVIEW:

VirendraSinha (2012) Eye Opening Aspect of Telemedicine in Punjab have discussed the various technical issues, their drawbacks in India. A set of standards need to be implemented. They have discussed telemedicine in terms of neuron surgical emergencies and recommend the standards to be constantly refined for successful implementation of this growing technology.

Mishra (2008) have highlighted the present state of telemedicine in India. In his study **Design and Implementation of Telemedicine Network in a Sub Himalayan State of India** that There are lots of efforts initiated by the private and the public sector in order to improve the quality of medical services. Digital medical libraries have also been introduced.

Moghadas (2008) An Improved Three Pattern Huffman Compression Algorithm for Medical Images in Telemedicine defined a telemedicine health care system which can be used for monitoring the patient in an emergency situation. The proposed telemedicine system consisted of a portable/non portable telemedicine section and a portable/non portable base section. The use of TCP/IP makes the operability of systems in a telemedicine environment more efficient.

Yang Xiao (2007) in his paper **Wireless telemedicine and m-health: Technologies, applications and research issues** explains the usage and future potentials of telemedicine technology with examples. A brief discussion about LINCOS project was also presented. A detailed discussion on various technical issues like compression, artificial intelligence was presented. Medical sensors, home monitoring systems, Electrical Medical Records EMRs which were considered the future of telemedicine systems was also briefed upon.

Amrita Pal (2005) Telemedicine Diffusion in a Developing Country: The Case of India presented a detailed study on the current state of telemedicine in a developing country like India. Owing to the majority 75% of the Indian population living in rural areas, the authors discuss the

necessity of telemedicine in India and have also presented a case study on three scenarios and discussed some of the crucial factors for telemedicine to be actively implemented still further.

III. OBJECTIVES OF THE STUDY:

- To know what a Telemedicine system means
- To Identity the Opportunities and Challenges of Telemedicine system in Healthcare Sector.
- To find out the perception of Health Professionals and patients towards telemedicine system.
- To Study the Future Trends of Telemedicine system.

IV. RESEARCH METHODOLOGY:

The present study is based on secondary sources of data/.For the preparation of this research paper, journals, newspapers and relevant government department websites have been accessed in order to make the study an effective one. The study attempts to look at the opportunities, present position and challenges of telemedicine in healthcare sector in India.

What is a Telemedicine?: Telemedicine is the use of Information Technology or electronic information to communicate, to provide and support healthcare when distance separates the participants from medical professionals. Telemedicine is the exchange of medical information from one location to another using electronic communication, which improves patient's health. In simple words Telemedicine is the distant delivery of healthcare services, such as health assessments or consultations, over the telecommunications infrastructure. It allows healthcare providers to evaluate, diagnose and treat patients using common technology, such as video conferencing and smartphones, without the need for an in-person visit to healthcare centres. Telemedicine has an umbrella of applications containing critical care monitoring, telemedicine procedures/surgery, robotics, disease surveillance and program tracking, disaster management and continuing medical education and public awareness.

“Tele” is a Greek word meaning “distance” and “mederi” is a Latin word meaning “to heal”. Time magazine called telemedicine “healing by wire”. Although initially considered “futuristic”

and “Experimental,” telemedicine is today a reality and has come to stay. Telemedicine has a variety of applications in patient care, education, research, administration and public health. Worldwide, people living in rural and remote areas struggle to access timely, good-quality specialty medical care. Residents of these areas often have substandard access to specialty healthcare, primarily because specialist physicians are more likely to be located in areas of concentrated urban population. Telemedicine has the potential to bridge this gap and facilitate healthcare in these isolated areas.

Process of Telemedicine: Telemedicine process can be categorised in two ways i.e. technology involved and application adopted.

(a) Technology involved or Real Time Real time telemedicine could be as simple as a telephone call or as complex as tele medical video conference and tele robotic Surgery. It requires the presence of both parties at the same time and a telecommunication link between them that allows a real-time interaction to take place. Video-conferencing equipment is one of the most common forms of technology used in synchronous telemedicine.

(b) Store-and-forward telemedicine or Asynchronous: It involves acquiring medical data (like medical history, images) and then transmitting this data to a doctor or medical specialist at a convenient time later for assessment offline. It does not require the presence of both parties at the same time. Examples are tele-pathology, tele-radiology, and tele-dermatology.

Picture of a Telemedicine System



Technical infrastructural requirements of Telemedicine: Technical infrastructure requirements will vary depending on the type of telemedicine services the organization plans to offer, the basic telemedicine programs require the following:

- **Access to broadband internet.** You need sufficient bandwidth to transmit audio and video data. As a rural health care organization, you may have difficulty connecting to or obtaining affordable and reliable broadband service. Learn more about getting connected.
- **Imaging technology or peripherals.** These devices are the backbone of telehealth. They allow rural health organizations to see and hear patients even when they are miles apart. Digital stethoscopes, for instance, can transmit heart and lung sounds to remote providers.
- **Access to technical support staff.** Technical support staff members can help answer questions about telehealth programs. To help with efficiency, technical support staff may be shared across collaborating organizations.
- **Staff training.** You will need to train your staff to use telehealth technology, which may take time. You should consider whether workflow changes may be required and train accordingly.

Opportunities: Telemedicine tool has become a boom for Indian health care sector. Which has changed the rural health care practices? People who are living in rural areas are not getting good medical facilities due to various technical reasons. Through this technology they are able to get the health services to their doorsteps. Apart from these some other benefits are as follows:

- Telemedicine is not so costly. Everybody can afford such facilities.
- It is also used even having fewer resources too.
- It helps in providing services in rural and distant regions of the country.
- It helps in exchanging knowledge among Health professionals.
- It helps in education of Health professionals.
- It helps in saving the life of people in war, floods, earthquake and other natural calamities.
- It also helps in improving coordination among Health professionals.

Challenges: Some of the hindrances identified for the successful implementation of the telemedicine system in Indian health sector are:

- **Attitude of the Health Professionals:** Health Professionals are not fully convinced and familiar with Telemedicine system
- **Patients' fear:** There is a lack of confidence among patients about the outcome of Telemedicine system
- **Financial unavailability:** The technology and communication costs being too high, sometimes make Telemedicine financially impractical.
- **Lack of basic facilities:** In India, nearly 50% of population lives below the poverty level. Basic Infrastructural facilities like transportation, electricity, telecommunication, safe drinking water, primary health services, etc. are disappeared. No technological advancement can change anything when a person has nothing to change.
- **Literacy rate and diversity in languages:** Only 65.38% of India's population is literate with only 2% being well-versed in English.
- **Technical constraints:** telemedicine system supported by various types of software and hardware still needs to mature. For correct diagnosis and pacing of data, we require advanced biological sensors and more bandwidth support.
- **Quality aspect:** "Quality is the essence" and every one wants it but this can sometimes create problems. In case of healthcare, there is no proper governing body to form guidelines in this respect and motivate the organizations to follow-it is solely left to organizations on how they take it.

V. RESULTS AND FINDINGS:

Government Initiations towards Telemedicine system in India: To provide healthcare facilities in rural areas, the government of India has launched a telemedicine initiative program in the year 2015 in collaboration with Apollo Hospitals, NSE -0.79 % under which people can consult doctors through video link. The doctors at Apollo Hospitals will be able to provide consultancy to the patients using the video link facilities. Apollo Hospitals has opened India's first telemedicine centre in 2000 in Aragonda, Andhra Pradesh, which was inaugurated by Bill Clinton, the then president of the US.

The flagship Digital India initiative is an umbrella programme that seeks to build digital infrastructure, provide government service on the web and mobile platforms and digitally empower all the citizens with an estimated investment of Rs.1.13 trillion over the next three to five years. The program also targeted to connect 60,000 common service centres (CSCs) across the country and provide healthcare access to citizens irrespective of their geographical location. Under this service, people can visit CSCs and fix an appointment for seeking expert consultancy with a doctor and also provide diagnostic services and promote sale of generic drugs through collaboration With Ministry of Health, by setting up JanAasudhi Stores. Sehat a part of this service, Sehat is short for Social Endeavour for Health and Telemedicine. People in rural areas can consult doctors online and also order generic drugs.

Some major Telemedicine programs are also being run by the following health care organizations:

All India Institute of Medical Sciences(New Delhi), Apollo Hospitals (Hyderabad), Aravind Eye Hospital (Madurai), Army Hospitals, Fortis Healthcare (Delhi), KLES Hospital (Belgaum), L. V. Prasad Eye Institute (Hyderabad), Manipal Health Systems (Bangalore), Max Healthcare (Delhi), Narayana Hrudayalaya (Bangalore), Navy Hospitals, PGI (Chandigarh), SankaraNethralaya (Chennai), SGPGI (Lucknow), Space Hospitals (Chennai), SRMC (Chennai), Tata Memorial Hospital (Mumbai).

Perception of Health Professionals and Patients:India's telemedicine market is witnessing significant growth in the current era, mainly because of its prospective to provide world class clinical and healthcare services to distant and rural locations across the nation.

In this context, Rajesh V. Acharya¹, Jasuma J. Rai have conducted a cross sectional study viz..Evaluation of patient and doctor perception toward the use of telemedicine in Apollo Tele Health Services, India. With a sample size of 122 (71 patients and 51 doctors) in the region of Hyderabad and Telangana. Study reveals the following information's about the perception of health professionals and patients.

The respondents were happy that, their appointment with doctors was pre -scheduled according to their convenience and were highly Satisfied with the kind of medical treatment given to them through the channel of telemedicine and that they would recommend the same to their relative other family members and friends. Patients, who were the beneficiaries of this telemedicine system, are open to promoting telemedicine. The patients specified that the treatment was both cost feasible and convenient. Patients responded with high scores on pædiatrics telemedicine consultations with cost savings as it reduces traveling time, costs and decreases the need to take time off work for patients. Detailed medical history and consent been taken before treating the patients

The health professionals reported that telemedicine was beneficial for them too and they got desirable results on the diagnosis of patient's condition. Hence forth, there is an increase in the patient's inflow. Study concludes that using telemedicine in rural areas is helping both the patients and health professionals.

Future Trends: A report by Mordor Intelligence predicts that global telemedicine will be worth more than \$66 billion by the end of the year 2021. Here's how five telemedicine trends will shape the future of the healthcare industry.

- **Patient Data Collection and Data Analytics:** During a telemedicine session, patient information is automatically seized by the use of telemedicine services, such as sensors and mobile apps. Using this data and with modern devices available, patient self-monitoring has been huge in 2017 and it will continue to grow in the coming years. Some devices track patient ECG's and send the results to doctors, providing an invaluable tool for healthcare professionals to monitor cardiovascular activity. Also, Big Data analytics plays a key role in analysing data from

many patients, helping to improve telemedicine treatments as a whole going forward. Patient data collection can help identify risk factors for certain illnesses, assisting physicians with recommending prophylactic treatments.

- **Mobility and Cloud Access:** By 2018, it's estimated that 65 % of interactions with healthcare facilities will ensue with mobile devices. According to a 2015 research2guidancereport, 80 % of doctors already use smartphones and medical apps in their medical practice. Hospitals and insurance companies now store medical records in the cloud so that patients can access their test results online 24/7. This, in turn, decreases paper usage and saves time. Cloud data warehouses are one way of storing the data securely and efficiently (read more on types of data warehouses in the research2guidance article).

- **Improved Security:** With lots of data being collected from patients across the nation to assist with telemedicine services, data security is vital. There are different techniques available today which help to enhance data security in telemedicine, including: Conducting a HIPAA security check once a year to reduce data security risk factors Insisting on encryption of data on all portable devices Conducting more frequent penetration testing and vulnerability assessments of IT systems.

- **Better Investment Opportunities:** Because telemedicine is one of the fastest growing segments in the healthcare industry, many organizations are investing in it. Mergers between small and larger telemedicine operators provide financial stability to smaller companies and a platform to provide telemedicine care effectively. Also, larger telemedicine providers are collaborating with international medical institutions, helping them to spread their expertise abroad, widening the telemedicine market, and generating more revenue. Investment opportunities in telemedicine will only increase as India and China open their doors to telemedicine practices from the west.

- **Better Healthcare Applications:** In the coming days, we can assume more customised telemedicine apps for both patients and health professionals, with the flexibility to specify the information transmitted between doctor and patient. Telemedicine app development also will give rise to MHealth, also known as mobile Health. Apps such as MDLIVE, Amwell, MyTeleMed, and Express Care Virtual will facilitate convenient interactions between patient and physician.

VI. CONCLUSION: A Telemedicine service provides a cost-effective treatments and less wasted time for patients and for Health professionals. Increased prevalence of chronic diseases, technological advancements particularly in software and a rise in the aging population are major factors driving the massive growth in telemedicine. Expect to see telemedicine become much more prominent in healthcare over the coming years, with more patients than ever having access to top-quality medical care at their fingertips. For the successful implementation of various programs of the government Health professionals need to gain an understanding of how to evaluate, interpret, and apply this information to their specific practice. Telemedicine can also support in improving the quality of health care by helping to increase the qualifications and skills of health and medical professionals and thereby improve the delivery of health services be instrumental in helping the public to become more informed about their health and how to be healthy, though until a greater percentage of the population is on-line and technologically literate, low-tech solutions are likely to be more effective. By the adoption of telemedicine system in rural area, No Medic to E-Medic and Time alone will prove that Telemedicine is a “forward step in a backward direction” or to paraphrase Neil Armstrong “one small step for IT but one giant leap for Healthcare”.

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By Adam pollard- 02 oct 2013
