

# Artificial Intelligence in Healthcare/Telemedicine

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**Abstract-** The Current Corona virus (COVID-19) pandemic is again boosting us of the importance of using telemedicine to deliver health care services especially as means of reducing the risk of physical contamination caused by physical contact. Telemedicine uptake also requires a significant change in management effort and the redesign of existing model. It supports efforts to significantly improve the quality of healthcare by increasing accessibility and efficiency through reducing the need to travel, providing clinical support overcoming geographic barriers by providing various types of communication devices and improving patient outcomes. Telemedicine is an attractive tool to use for success in remote areas .This article focuses on the growing role of telehealth in standard society and impact of using technology which can eradicate all health problems .In India ¼ th of the adults are suffering from hypertension which leads to usage of digital machines. Our IT sectors are fundamentally helping to bring decisive support to patients, and improving in adherence to quality metrics. According to reliable statistics only 15-16% who was treated via telemedicine services found to visit hospital for further treatment. In India around 41% populations are using telemedicine services. Many Indian Pharmacy apps whose market shares are about 30% playing a significant role in Telemedicine services

**Index terms-** Telemedicine, Tele-monitoring, Remote counseling, Indian Scenario, Technology Integration

## INTRODUCTION

World Health Organization defines telemedicine as “The delivery of health care services, where distance is a critical factor, by all the health care professions using information and communication technologies for exchange of valid information for diagnosis, treatment and prevention of illness and injuries, research and evaluation ,and for the continuing education of health care providers, all in the interests of advancing the health of individuals and the communities” [1] Telemedicine, a term coined within

the Nineteen Seventies, which accurately suggest that “healing at a distance”. Telemedicine refers to technologies that bring patients and care suppliers nearer along in a very digital atmosphere. Gone are the days of rushing towards doctors for simple cold or minor flu – or minimum of that’s the promise of telemedicine. From more than 30 years, clinicians, health care researchers and others are investigating use of advanced telecommunications and technologies to improve health care. Today with the Nations health care system undergoing profound able changes telemedicine is attracting people in rural areas. In one analysis study, doctors using telemedicine were profitable to treat their patients effectively 83% of the time. The fact, that stated by Americans Medical Association and Wellness Council of America, approximately 75% of all regular doctors, urgent care, and ER(emergency room) visits are too inessential or may well be handled effectively via phone or video. This includes patients with inflammation, cold or viral infection and bladder or urinary tract infection, the four most common diagnoses is the study. Near about sixty percent of telemedicine visit within the study completed with doctor writing a prescription, According to Mordor Intelligence Telemedicine is expected to be worth more than \$36 billion at the end of 2020.With telehealth, text messages, emails clinical content and data can be sent directly to the patients. Telehealth may be a catchy puzzle today in developing countries but it is slowly cementing itself in the world of healthcare.

## ROLE OF INFORMATION TECHNOLOGY IN TELEMEDICINE

It is generally held that IT (information technology) will revolutionize patient care, medical research, medical education and the administration of health services, which involves m-health, Telemedicine

applications, computational framework for telemedicine, Internet-based Telemedicine [2]. [3]The application of this appliance covers a wide and diverse scope, including

- a. Online database and tools to ensure standards of care
- b. Critical pathway and patients outcome
- c. Computer-assisted diagnosis
- d. Effectual drug information and electronic prescription filler
- e. Enhanced availability of research data

New trends in Telemedicine allocate faster internet connections and better software that provide a better video chat experience than in the past, with mobile devices, people can consult a doctor from anywhere, the adoption of electronic health records makes it easier for doctors to access patient records[2].

Physicians are now often more comfortable using a keyboard rather than pen, and this is particularly true of the new generation of medical students and residents.

#### BACK BONE OF REMOTE MEDICAL COUNSELLING: TELEMEDICINE

Telemetering, a telemedicine outgrowth that extends the reach of best-practice care by building the skills of providers who aren't necessarily specialist, is also winning ardent advocates across Africa and India [4]. Telemedicine is the roadmap for improved medical care in rural areas. NITI (National Institute for Transforming India) Aayog states that, the National Health Stack (NHS) is a virtual digital platform for healthcare in the country. NHS study aims to have digital health records for all citizens by 2020 to make telemedicine and E-Health easy[5]. The Bristol-Myers Squibb Foundation, a leader in developing provider capacity in oncology, is supporting project ECHO(echocardiography), a telemedicine movement to increase the availability of cancer care in sub-Saharan African, where specialists are few and far between[4]. Health data is important in many aspects and one of them is AI (Artificial Intelligence). In Coming days, this will definitely help in identifying issues regarding to medical health. Through IOT (internet of things) perspective medical emergencies like Asthma attack, heart failure, diabetes can be monitored via connected devices [5]. This integrated market of telemedicine platform will have a mix

approach in the coming year, In developing country like India there is lot of room for development, with the communication industry evolving at such a rapid pace, telemedicine sector is bounded to develop too[5].

#### HISTORY

The history of Telemedicine provides all-inclusive and in-depth historical view of telemedicine from ancient Greece to the present day[6]. While the out-break of interest in Telemedicine over the past 4 or 5 years makes it look like a relatively new use of telecommunications technology, the truth is that telemedicine has been in use in some form or the other for other thirty years[7]. Back in the past, information that a new sovereign was crowned can be sent over the same long-distance communication medium as a warning about a dangerous disease Outbreak[8]. The National Aeronautics and Space Administration (NASA) played a major role in the early development of telemedicine, NASA's efforts in telemedicine began in the early 1960s when humans began flying in space[8]. Telemedicine was first conceived in 1924 when the black and white cover of Radio news showed a doctor guiding a patient encounter via a radio transmission, it took nearly two more decades for this ground breaking science fiction idea to become reality[9]. In the last 50 years, Telemedicine has shift into the mainstream. If you want to acquire that how far the technology has come, consider that in 2016, Kaiser Permanente declared they were noticing more patients in virtual telehealth visits than they were via traditional in-person visits [9]. In 2016, 59 million people connected virtually through apps, web portals and virtual visits, it was a breakout year for telemedicine, clearly initiating the technologies growth into mainstream healthcare [9].

[9]From 2014 to 2015 Kaiser used telehealth applications in the following ways:

- a. Sent 20 million emails between patient and their doctors.
- b. Scheduled four million appointments.
- c. Viewed 37 million tests online.
- d. Refilled 17 million patient prescriptions

At present, after more than 5 decades, Telehealth has become an accepted part of the majority of health systems across the United States which has proven

that established technology is an important part of the future state of healthcare both in the United States and abroad [9]



Fig.1 Graphics from Telemedicine: A Guide to Assessing Telecommunication in Health care.

Institute of Medicine (US) Committee on Evaluating Clinical Application of Telemedicine, Field MJ, Editor, Washington(DC): National Academies Press(US),1996[9].

#### TYPES

Two different kinds of technology are most common in telemedicine application in use today. The first called,

- a. Store-and-forward Telemedicine which is also called as asynchronous telemedicine. It is method by which healthcare providers share patients medial information like reports, imaging studies, videos, and other records with a physicians, radiologist, or specialist at another location [10]. A digital image is taken using a digital camera, ‘stored’ and then sent (forward) by a computer to another location [7].
- b. Remote Patient Monitoring (RMP) or “telemonitoring” is a method that allows

healthcare professionals to track a patients vital signs and activities at a distances, this type of monitoring is often used for the management of high-risk patients, like those with heart conditions and people who have recently been release from hospital[10].

- c. The third most widely used technology, the two-way interactive television (IATV), which is used while ‘face-to-face’ consultation is necessary. The patients and sometimes their providers or more commonly a nurse practitioner or telemedicine coordinator, are at the originating site [7].



Fig.2 Remote Patient Monitoring (RPM)[11]

#### TELEREVOLUTION IN INDIAN HEALTH SECTOR

India comes in the largest nation with a population of more than 121core. Due to this fact, the equitable distribution of healthcare services has proven to be major goal in public health management time and again[12]. The present scenario of India we are unable to provide even total primary medical care in the rural areas, secondary and tertiary medical care are not uniformly available even in suburban and urban areas. ISRO (Indian space Research Organization) made a modest beginning in telemedicine in India with a Telemedicine Pilot Project in 2001, associated with Chennai’s Apollo Hospital with the Apollo Rural Hospital at Aragonda village in Chittoor district of Andhra Pradesh [12]. Initiatives taken by ISRO (Indian Space Research Organization), Department of information Technology(DIT), Ministry of External Affairs, Ministry of Health and Family Welfare and the state government played a vital role in the development of telemedicine services in India[12].

They Started from a simple web cameras and ISDN (Integrated Services Digital Network) telephones lines, the village hospital has a state-of-the-art

videoconferencing system and Very Small Aperture Terminal (VSAT) satellite installed by ISRO[7]. Coupled with this was the Sriharikota Space Centre project which formed an important launch pad of the Indian Space Research Organization in this field [7]. The current status of telemedicine market has witnessed spectacular growth during the last two years only because of timely convergence in the areas of IT, Communication and HealthCare along with launching of central e-health schemes involving telemedicine by the Health and Family Welfare. In collaboration with state government it has established a Telemedicine Network consisting of 382 Hospitals 306 Remote/Rural, District Hospitals/Health Centers connected to 51 super specialty hospitals located in major States and 16 mobile Telemedicine units are part of this network[13].

#### TECHNICAL MEDICINE

##### 1. Interactive Stethoscope:

The Interactive Stethoscope is the first digital stethoscope of its kind that provides a remote healthcare practitioner with live stethoscope sounds and one function is to adjust the audio frequency range and volume from remote site [14]. This USB digital stethoscope is used in conjunction with Agnes Interactive telemedicine software to stream live heart or lung sounds and eliminates the need of stethoscope [14]Features:

- a. Digital stethoscope with convenient volume controls and frequency filters
- b. Hear live heart and lung sounds with just a PC, internet access and headset.



Fig.3 Interactive Stethoscope[14]

##### 2. Medical Camera and Scope System:

The Multipurpose Camera and scope can be used for clinical Telemedicine patient exams and workflow processes, This device is equipped with

interchangeable lenses for horoscopy, dermatology and ophthalmology exams making it simple for digital imaging needs[14].

[14]Features:

- a. Medical Camera system comes with 3 interchangeable lenses to accommodate multiple medical specialties including primary care like ear, nose, throat and dermatology.
- b. Direct USB connection allows you to immediately view the medical images on PC



Fig.4 Medical Camera and scope system[14]

##### 3. Digital Spiro meter:

The Digital Spiro meter is used in clinical telemedicine applications to quickly evaluate respiratory problems such as asthma, chronic obstructive pulmonary disease, pneumonia, smoking related problems and post-operative respiratory conditions, This PC based Spiro perfect spirometer measures lung capacity and respiration rate in few seconds and provides accurate pulmonary test results[14].

[14]Features:

- a. Single use disposable transducers reduce the risk of cross contamination.
- b. Incentives graphs helps motivate and coach pediatric patients to ensure quality test results.



Fig.5 Digital Spirometer[14]

##### 4. Digital Watch:

Digital watches have the potential to support health in our everyday life by self-monitoring of personal activity and getting feedback of based on activity

measures. Most studies employed the use of consumer grade digital watches (14/17, 82%)[15]. Due to their functions and widespread popularity digital watches are also a boon to health researchers. In year 2019 Stanford university announced results of a recent study that many digital watches could also detect Atrial fibrillation a stroke risk, with 84% accuracy. Many digital watches uses 8 sensors capturing sound ,heart rate , galvanic skin response, motion, body temperature ,ambient light ,RR interval (the time elapsed between two successive R-waves of the QRS signal on the cardiogram). This helps in finding the personal health record of the patient.



Fig.6 Digital Watch [16]

### 5. Digital Glucometer:

These devices monitor the approximate condition of the level of glucose in human bodies. These portable electronic devices provide feedback about blood sugar level. It is a key component of home blood glucose monitoring by people with diabetes mellitus or hypoglycemia. To get the reading a person pricks the skin in a finger and applies the blood sample gained to the test strip inserted in the meter. According to ISO 15197 Blood glucose meters must provide results that are within 15% of a laboratory standard for concentrations above 100mg/dl.



Fig.7 Digital Glucometer [17]

### CONCLUSION

Telemedicine has several advantages over hospitalization. It promotes more efficiency resulting in proper financial management. Due to telemedicine patients can make an active involvement in their own medical care at home.

Telemedicine actually helps clinicians for seamless accessing of patient records, radio graphs, pharmacy information and billing records. This information is accessible to any authorized medical personnel anywhere in the world. So on this basis, online interactions with the specialists can be scheduled for patients in order to get diagnosed. Emergency medical assistance can be done smoothly by the help of telemedicine.

As impact of telemedicine on Indian health sector is very significant, it needs to be implemented with proper caution. Telemedicine coverage on Indian land is expanding day by day and proving itself reliable in the pandemic situations. Applications of telemedicine have transformed the routine medical care to novel system of health care. Information technology and health care system as an integration can redesign the future of medical care.

Especially for India, telemedicine is definitely a ‘Game Changer’

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