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Telemedicine- A catalyst to health promotion.

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ABSTRACT

Information and communication technologies (ICTs) has made a tremendous influence in both developing and developed nations around the globe with regard to providing effective health care services at minimal cost, increased accessibility to the rural and under privileged people. Through its Telemedicine projects, Indian Space Research Organisation (ISRO) has successfully linked hospitals and healthcare centers in remote rural areas with specialty hospitals in cities through Indian National Satellite System (INSAT) satellites. Thus, connectivity between patients at remote end and the specialist doctors at urban centers has been effectively established. India's telemedicine market which has been growing at a compounded annual growth rate (CAGR) of over 20 per cent holds the potential to cross $32 million (mn) mark by 2020 from the current level of over $15 mn, noted a recent study by apex industry body Associated Chambers of Commerce and Industry of India. ICT applications used in telemedicine have the potential to enhance education, training, knowledge sharing, health research, and access to care throughout the universe in culturally suitable ways that tackle fundamental issues relating to the specific health needs in each country. This global eHealth system paves way for altruistic reasons rather on commercial grounds and also provides a context for global health professional education and evaluation.

Keywords: Telemedicine, technology, ehealth and health research.

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INTRODUCTION

Information and communication technologies (ICTs) has made a tremendous influence in both developing and developed nations around the globe with regard to providing effective health care services at minimal cost, increased accessibility to the rural and under privileged people. Telemedicine which is widely highlighted these days makes use of ICTs to overcome ecological barriers, and thereby provide increased access to health care services to the disadvantaged groups that traditionally experience lack of access to health care.

Availability and Access, Equal Distribution, Quality Care Services, and Cost-effectiveness are the major factors that influence health care services in both the economically developed and less developed nations. Modern ICT tools such as computers, the Internet and cell phones, are bringing in a revolutionized era and brought significant changes on how individuals engage in communication with each other, provide and exchange information which in turn enriches their lives. These developments in the field of technologies have risen up to the extent of addressing contemporary global health problems.

Telemedicine which is term coined in 1970 actually signifies "healing at a distance" with the use of ICT to benefit the client outcomes by means of improving the accessibility to health care and medical information. According to World Health Organisation (WHO) "The delivery of health care services, where distance is a critical factor, by all health care 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 health care providers, all in the interests of advancing the health of individuals and their communities"[1].

Telemedicine: An overview

Telemedicine may be as simple as two health professionals discussing a case over the telephone, or as complex as using satellite technology and video-conferencing equipment to conduct a real-time consultation between medical specialists in two different countries [2].

Successful implementation of telemedicine entails involvement of all the stakeholders, namely, the specialists, general duty doctors, paramedical personnel, technical staff, coordination staff, policymakers and, most importantly, the target community, from the design stage itself [3].

Telemedicine in India has achieved success and is seen as a parallel healthcare delivery system and patients portray a healthy acceptance towards eHealth camps using telemedicine technology in the rural areas[4].

Telemedicine is the use of medical information exchanged from one site to another via electronic communications to improve a patient's clinical health status. Telemedicine includes a growing variety of applications and services using two-way video, email, smart phones, wireless tools and other forms of telecommunications technology. It is now becoming integrated into the ongoing operations of hospitals, specialty departments, home health agencies, private physician offices as well as consumer's homes and workplaces [5].

Various government agencies—Department of Information Technology and Ministry of Health & Family Welfare, state governments, premier medical and technical institutions of India—have taken initiatives with the aim to provide quality healthcare facilities to the rural and remote parts of the country[6].

Telemedicine- An Indian scenario

Indian Space Research Organisation (ISRO) has coupled its prowess in satellite communication technology with medical science and information technology to project specialty healthcare to the doorsteps of the rural, remote, and distant populace across the country. Having set the telemedicine program as a model for benefiting society with advances in modern technology, India is advancing to international dimensions the proven domestic program to people in other parts of the globe [7].

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Through its Telemedicine projects, ISRO has successfully linked hospitals and healthcare centers in remote rural areas with specialty hospitals in cities through Indian National Satellite System satellites (INSAT). Thus, connectivity between patients at remote end and the specialist doctors at urban centers has been effectively established.

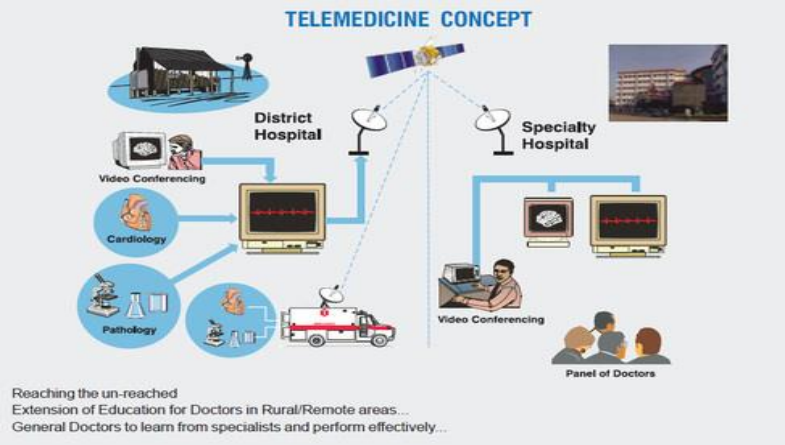

Figure No: 1

Telemedicine is a confluence of Communication Technology, Information Technology, Biomedical Engineering and Medical Science. The Telemedicine system consists of customised hardware and software at both the Patient and Specialist doctor ends with some of the Diagnostic Equipments like ECG, X-ray and pathology Microscope/Camera provided at the patient end. They are connected through a Very Small Aperture Terminal (VSAT) system and controlled by the Network Hub Station of ISRO. Through a Telemedicine system consisting of simple computer with communication systems, the medical images and other information pertaining to the patients can be sent to the specialist doctors, either in advance or on a real time basis through the satellite link in the form of Digital Data Packets. These packets are received at the specialist centre, the images and other information is reconstructed so that the specialist doctor can study the data, perform diagnosis, interact with the patient and suggest the appropriate treatment during a Video Conference with the patient end. Telemedicine facility thus enables the specialist doctor and the patient separated by thousands of kilometers to see visually and talk to each other. This enables the specialist doctor to assess the physical and psychological state of the patient and suggest treatment. This remote tele-consultation and treatment is much more valuable in case of post operation (Post Surgery) follow up since the patient is not required to travel unnecessarily and hence saving money and time. In this way, the systematic application of Information and Communication Technologies to the practice of healthcare rapidly expands the outreach of the healthcare system.

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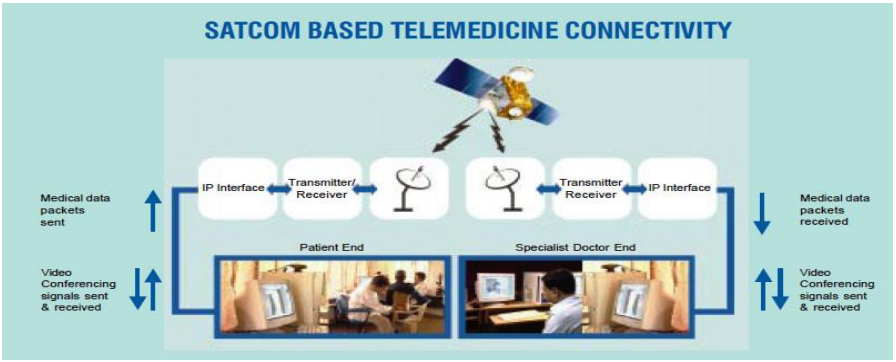

Figure No: 2

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- Point to Point System - One patient end connect to One Specialist Doctor within the hospital
- Point to Multi Point System - One patient end at a time connect to any of the specialist Doctors' end within the hospital
- Multi Point to Multi Point System - Several patients' end simultaneously connect to different Doctors' end at different hospitals at different geographical locations[8]

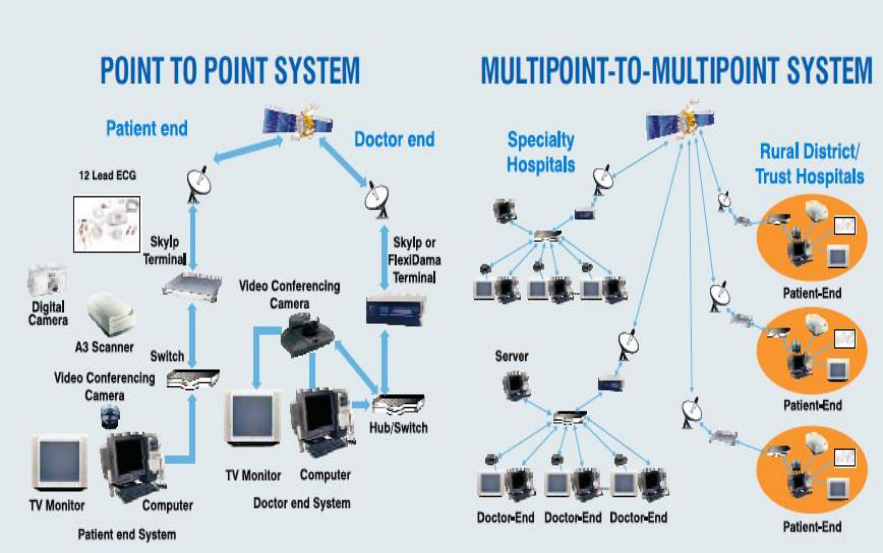

Figure No: 3

Department of Information Technology (DIT) Ministry of Communications and IT (MCIT) have implemented successful telemedicine projects various states and also established link among the three premier institutions viz. Sanjay Gandhi Postgraduate Institute of Medical Sciences (SGPGIMS), Lucknow, All India Institute of Medical Sciences (AIIMS), New Delhi, Post Graduate Institute of Medical Sciences (PGIMER), Chandigarh which in turn connected to the state level hospitals.

Ministry of Health & Family Welfare (MoH&FW) has implemented Integrated Disease Surveillance Programme 3network which connect all district hospitals with medical colleges of the state to facilitate tele-consultation, tele-education/ training of health professionals and monitoring disease trends. It has funded few pilot national level tele-ophthalmology and rural telemedicine projects. State Governments took initiatives to establish state wide telemedicine networks to strengthen the healthcare facilities in their states. Academic Medical Institutions and Corporate Hospitals like: SGPGIMS, Lucknow AIIMS, New Delhi, PGIMER, Chandigarh and Sri Ramachandra Medical College and Research Institute , Chennai, Tata Memorial Hospital, Mumbai, Christian Medical College, Vellore are also involved in similar activities.

In the corporate sector, the major players are Apollo Hospital Group, AIMS, Kochi, Asia Heart Foundation (tele-cardiology & mobile van), Bangalore, Fortis Hospital, Narayana Hrudayalaya, and Escorts Heart Institute and Research Center, Sir Ganga Ram Hospital (SGRH), New Delhi. With the support of ISRO, Shankar Nethralaya at Chennai, Meenakshi Eye Mission and Aravind Eye Hospital Madurai and four other corporate eye hospitals have launched Mobile Tele-ophthalmology service for early diagnosis and treatment of ophthalmic diseases under National Blindness Control Program. SGRH, AIMS, SRMC, and AHF have launched mobile Tele-hospitals for rural access of specialty healthcare services [9].

India's telemedicine market which has been growing at a compounded annual growth rate (CAGR) of over 20 per cent holds the potential to cross $32 million (mn) mark by 2020 from the current level of over $15 mn, noted a recent study by apex industry body (Associated Chambers of Commerce and Industry of India) ASSOCHAM. Improved access to specialists, increased patient satisfaction with care, improved clinical outcomes, reduction in emergency room utilisation, cost savings are certain key benefits of telemedicine. "With limited resources and much of population living in remote, rural areas (68 per cent), telemedicine has

the potential to revolutionise delivery of healthcare in India," said Mr D.S. Rawat, secretary general of ASSOCHAM. During the course of past decade (2005-09) the number of sub-centres across India has increased by about 6,300, the number of primary health centres (PHCs) has increased by about 1,800 and there has been a rise of over 2,000 in the number of community health centres, noted the ASSOCHAM study highlighting extent of growth and development of rural healthcare in India.

There is a shortage of about 32 per cent in terms of the number of (Community Health Centre) CHCs in India at present while there is 23 per cent shortage of PHCs in the country. Amid states, it is Jharkhand, West Bengal and Madhya Pradesh face maximum shortage to the extent of 66 per cent, 58 per cent and 42 per cent in terms of PHCs. While Bihar (91 per cent), Andhra Pradesh (united) and Karnataka (41 per cent) are facing highest shortfall in terms of required number of CHCs [10].

It is possible to provide e-health care through telemedicine to children in Indian rural and semi-urban setting. The e-health can be extended to critically ill children including newborns on a restricted basis [11]. Barriers to telemedicine use include a lack of reimbursement, language commonality, technological availability, physician licensure or credentialing, trained support staff and patient privacy, and security assurances [12]. The main objective of telemedicine is to cross the geographical barriers and provide healthcare facilities to rural and remote areas (health for all) so it is beneficial for the population living in isolated communities. Besides this other advantages telemedicine are to eliminate distance barriers and improve access to quality health services. It is useful in emergency and critical care situations where moving a patient may be undesirable and/or not feasible. It facilitates patients and rural practitioners' access to specialist health services and support. It lessens the inconvenience and/or cost of patient transfers and reduce unnecessary travel time for health professionals. It also reduces isolation of rural practice by upgrading their knowledge through tele-education or tele-CME(continuing medical education) [13].

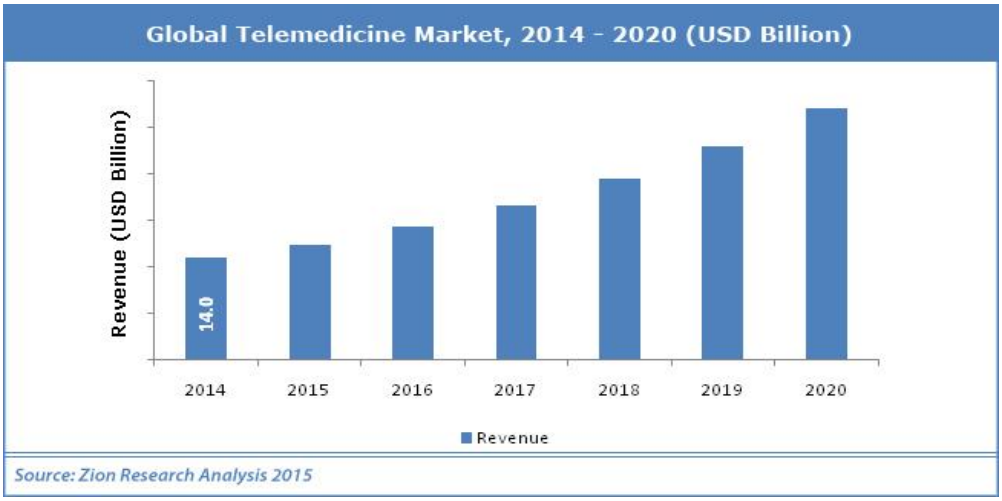

Figure No: 4

Zion Research has published a new report titled "Telemedicine (Tele-Consultation, Tele-Monitoring, Tele-Education, Tele-Training, Tele-Care, and Tele-Surgery) Market for Cardiology, Dermatology, Neurology, Orthopedics, Emergency Care, Internal Medicine, Gynecology, and Other Applications: Global Industry Perspective, Comprehensive Analysis and Forecast, 2014 - 2020". According to the report, the global telemedicine market was valued at approximate USD 14.0 billion in 2014 and is expected to reach approximately USD 35.0 billion by 2020, growing at a CAGR of slightly over 14% between 2015 and 2020 [14]. Based on services the market is segmented into tele-consultation, tele-monitoring, tele-education, tele-training, tele-care, and tele-surgery. Key application market covered includes cardiology, dermatology, neurology, orthopedics, emergency care, internal medicine, gynecology, and others. The regional segmentation includes the current and forecast demand for North America, Europe, Asia Pacific, Latin America and Middle East and Africa with its further bifurcation into major countries including U.S. Germany, France, UK, China, Japan, India and Brazil. This segmentation includes demand for telemedicine based on individual applications in all the regions and countries [15].

CONCLUSION

Transformation in the health system always requires association and collaboration of all its stakeholders to facilitate change and this telemedicine is no exception. Stakeholders from the end users to the policy makers need to be involved to bring about productive changes which would echo and act in response to the needs of the society. Just like any other developments in the field of medicine telemedicine also relies on designed clinical trials, dependency on local expertise which would go a long way to improve and augment the usage and as such incorporate the varied social factors that influence the telemedicine adopting users. It should also be kept in mind that in order to enhance the technical feasibility, application relating to telemedicine should be developed in parallel with that of ICTs and basic technological infrastructures and connectivity locally. ICT applications used in telemedicine have the potential to enhance education, training, knowledge sharing, health research, and access to care throughout the universe in culturally suitable ways that tackle fundamental issues relating to the specific health needs in each country. It is important that the experiential lessons of other countries need to be taken for better and quality service provision. Telemedicine has the prospective capacity to provide significant humanitarian and development benefits by promoting access, collaboration, and resource sharing across jurisdiction. This global eHealth system paves way for altruistic reasons rather on commercial grounds and also provides a context for global health professional education and evaluation.

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