

# Logistics of Telemedicine and Online Clinical Care as an Innovative Health Care Strategy

Dr. Lakshmi Priya Vinjamuri

**Abstract:** *The logistics of innovative health strategies have taken a new turn and emerging into a new and independent field in the management sphere. Hospital administration management hitherto confined to infrastructure has extended its arms into areas of clinical research, medical and health care, telemedicine and diagnostics. The effectiveness and efficiency of telemedicine and the implementation strategies of outsourcing medical prescriptions, medical history and clinical data can be strategically implemented in developing nations such as India so as to render a legally efficient policy keeping in view the cost-benefit analysis. The paper is an attempt to identify the strategic and innovative logistic application of telemedicine and clinical care applications in vogue and their effective use in the Indian context.*

## 1. Introduction

The understanding and scope of telemedicine as an emerging and innovative area of medical science enhancing its capacity as a service provider is stupendous and the growth fast and exponential. The entire gamut of telemedicine may be comprehended as an extension of the principles of healthcare and hospital management in the virtual world. The principle of telemedicine is applicable to the administration of clinical and diagnostic care from across borders thereby limiting the concerns of availability, accessibility and affordability in the new age world.

According to World Health Organization, telemedicine is defined as, *“The delivery of healthcare 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 continuing education of healthcare providers, all in the interests of advancing the health of individuals and their communities”*.

A broader definition of telemedicine is *“the use of telecommunication technology to deliver healthcare services and health education to sites that are distant to the host site or educator”*.

Telemedicine can also be defined as *“the transfer of electronic medical data (i.e. high resolution images, sounds, live video and patient records) from one location to another. This transfer of medical data may utilize a variety of telecommunications technologies, including, but not limited to ordinary telephone lines (POTS), ISDN, AM, the internet and the satellites”*.

The literal meaning of telemedicine encompasses and envisages “healthcare at a distance.”

Telemedicine may thus represent healthcare practiced in real-time using a video link for example, asynchronously, perhaps by email.

## 2. Telemedicine Globally

Telemedicine is globally recent and emerging field in health and management sciences arising out of the effective fusion

of Information and Communication Technologies (ICT) with medical science.

Worldwide strategic implementation of the principles and practice of telemedicine would provide healthcare delivery in various sectors and forms to remote areas of the world. Integration of the medical science to communication technology has been a not too young two decade old concept in the name of medical transcription, a predominantly outsourced industry capitalized by the developed nations in the guise of catering to the economically available work force in more populous and less employed nations of the world.

Telemedicine includes not just the lucrative and economically viable medical transcription of the west making use of the needs of the developing worlds, but focuses on the enormous potential the integration of the medical sciences and technology to management offers.

Globally, the application of telemedicine may be categorized depending on the kind of the telemedicine process, its unique feature being its integration and applicability into other areas of hospital management and administration.

The global telemedicine process is predominantly technology driven on the asynchronous mode of acquiring medical data and subsequently transferring it to the doctor or specified recipient, for assessment offline. The emerging concept of technology driven real time or synchronous telemedicine requires the presence of both the parties simultaneously through highly efficient communication systems, the latest being tele-robotic surgery. The technologies may be applied to any of the modes of tele-pathology, tele-cardiology, tele-radiology, tele-surgery and tele- ophthalmology to cite a few.

The basic principles of telemedicine applicable globally are fast emerging with the present telemedicine market at a growth rate of 76% and a market capital of approximately USD 100 million.

### Logistics of Innovative Health Care Strategies

The telemedicine implementation is a challenge especially, when the requirement is to cater to the remote and rural areas of the world where the communication system is perhaps poor or existent.

Volume 8 Issue 11, November 2019

[www.ijsr.net](http://www.ijsr.net)

Licensed Under Creative Commons Attribution CC BY

The connectivity is a crucial logistic concern even if world-class medical and clinical care is available and cutting edge technology is in the waiting. The second major logistic concern which needs innovative brain storming is the strategy of mapping the two or perhaps multiple ends of communication for an efficient, effective and economical service. The various nodes shall be identified based on the purpose of the telemedicine and are predominantly for imparting medical education, medical and clinical care and health management.

The Point-To-Point Communication Protocol (PPP) is a data link protocol commonly used to establish a direct connection between two nodes over terrestrial and satellite link and the Point- To-Multipoint Communication Protocol (PMP) is communication which is accomplished via a specific and distinct type of multipoint connection, providing multiple paths from a single location to multiple locations

Globally, the application of telemedicine is in the four broad areas of tele-healthcare including tele-consultation and tele follow up, tele-education through regulated and un-regulated distance education processes by using the information and communication technologies for flexible and accessible learning, disaster management for providing medical care for victims of natural disaster through satellite connectivity and customized telemedicine and tele- home health care for elderly or underserved, home bound patients with chronic illness allowing monitoring and treatment through economical and time efficient methodologies.

The global application of telemedicine promotes efficient medical care in the major areas of

- 1) Easier accessibility to patients
- 2) Cost effectiveness
- 3) Time efficiency
- 4) Integration of communication, information technology and health science increasing the scope for research and development

The implementation of telemedicine caters to the three main social aspects of sustained sustainability through

- 1) Addressing needs of grass root levels
- 2) Ease of health care and management by the government
- 3) Social responsibility of the government

### **3. Implementation of Telemedicine in India- Cost Effectivity and Grass Root Level Care – A Lucrative Social Initiative in Developing Nations**

The challenges of healthcare delivery to rural and remote areas besides several other applications in education, training and management in health sector may be met with partially if not completely by the innovative and strategic implementation of telemedicine.

The application of telemedicine may be as simple as two health professionals discussing medical problems of a patient and seeking advice over a simple telephone to as complex as transmission of electronic medical records of

clinical information, diagnostic tests such as E.C.G., radiological images etc. and carrying out real time interactive medical video conference with the help of IT based hardware and software, video-conferencing using broadband telecommunication media provided by satellite and terrestrial network.

The Indian population is of about 1.1 + billion spread in 28 States & 5 union territories of which vast Population (80%) is spread in inaccessible & remote areas (border areas), remote islands and around 627,000 villages. Statistics reveal that about 80% of the super-specialty clinics and medical professionals live in big cities challenging the ease and feasibility of providing health care to the inaccessible majority. The Indian healthcare system is predominantly government managed through a three-tier hierarchical system of Primary, Secondary and tertiary healthcare with ~ 23000 Primary Healthcare Centers (PHCs), 3000 Community Healthcare Centers (CHCs) and 670 District Hospitals (DHs) as the major governmental healthcare delivery system besides the high-end, highly sophisticated private institutions serving the population. Agencies like the ISRO, Department of Information technology, the Indian Railways, state governments besides private networks like the Apollo Group, AHF, AIIMS ESCORTS cater to the need of the day in the field of telemedicine.

The ISRO along with other agencies has launched many programs to promote and spread awareness on the potential capacity and thrust on telemedicine through special space based rural development programs with thrust on telemedicine since the 1990's spearheading the telemedicine movement towards continuous development and improvisation. The special program of ISRO initiated in t 2001 was focused on providing tele-healthcare to the un-served and under-served, a major social responsibility initiative by setting up facilities in distant and rural parts of the country to supplement the general health care infrastructure and fill the gaps through the technological advancement that telemedicine offers through the satellite network in terms of ease of access, quick installation, flexibility, extensive and consistent geographic coverage doing away with the challenges of geographical and environmental barriers and most importantly, efficient support to broadcast and multipoint communications for medical education consultation and quick medical care through high network flexibility, reliability and security it offers.

Telemedicine had helped in the Indian context in providing technology and connectivity in remote and rural hospitals, continuing medical education through distance mode training, installation of mobile units for telemedicine besides the integration of telemedicine with the village resource centers in the rural areas. The primary focus of the telemedicine program had been the disaster management support that allowed providing immediate medical help to victims of any kind of a disaster as the satellite network helped provide the information on any untoward incident in a very short period of time. Applying telemedicine to the principles of geospatial science promotes the quicker accessibility through connectivity by setting up information kiosks for multiple services.

Indian government in the implementation of telemedicine had adopted a unique approach of proof of concept through demonstrative pilot projects by the technology department in several states, development of national standards and guidelines with Efforts to optimize the clinical requirements for evolving a suitable e-health technology and to minimize the costs to bring in affordability and maximize the reach.

The telemedicine had received proactive encouragement through new models of innovative insurance schemes, integration of healthcare administrators, planners, technologists and entrepreneurs and bringing all the stake holders to a common platform.

#### 4. Trends, Challenges & Suggestions for Effective Implementation

The implementation of the telemedicine concepts has challenges manifest in the technological and logistics of implementation. The biggest challenge still remains the laws for regulation of the practice in India as also the global perspective.

The biggest challenge in a developing nation like India is the inhibition and resistance to adopt and adapt new and unknown technologies. However, the training and educating users have to create interest in utilizing the tele-med and e-Health tools which can be efficiently and effectively employed.

The other methodology that is challenging despite the advanced ICT is the mobile health care system for reaching the doorsteps of the rural populace.

Telemedicine in India as in any nation, developed or developing has evolved from the point to point approach to point to multipoint and further to multipoint to multipoint and finally in the stage of tele-education, thus broadening the scope of application. The other aspect is the mobile telemedicine technology devised to overcome the prohibitive costs of large number of terminals and reaching out to the rural areas.

Some of the prominent private organizations to implement effective telemedicine are Sankara Nethralaya and Aravind Eye Hospital and the Apollo Group. The PPP in India was implemented at The SGPIMS, Lucknow by providing PPP to medical colleges in Orissa via satellite link and District Hospitals of Rae Bareilly via fiber optic cable. The PPP has a longer way to tread with it being implemented in two district hospitals of Uttaranchal likes to the SGPIMS via ISDN links.

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 and reduce the isolation of rural practice by upgrading their knowledge.

The practice of telemedicine – through transmission of digitized data, audio, video and images – is getting popular all over the world as it provides hitherto unavailable access to tertiary level specialist healthcare even in geographically

remotest areas without displacement of the patient, physician or the equipment. It is not only cost-effective to the patient but cost-beneficial to the society also. More and more doctors and patients are resorting to the use of telemedicine due to its advantages of convenience and cost-saving.

The practice of telemedicine, however, has brought with it several complicated issues. These issues involve not only healthcare workers and consumers but the society, technologists and the lawmakers. The primary issue in the implementation of telemedicine is the Physician/Patient Acceptance. Physicians and patients have unique technological resources available to improve the patient-physician relationship. It has been found that patients have no difficulty in accepting telemedicine program. The survey conducted by SGPIMS tele-follow up program for the patients of Orissa state revealed that 99% patients were satisfied with using telemedicine technology. In almost all the cases the patients are more than happy and satisfied as they don't have to travel 1500 km to show their diagnostic reports to their doctors. In tele-consultation they were also happy that they get the specialist consultation and their cases have been seen by some expert doctors.

However, some resistance is seen amongst doctors. Doctors in government sector tend to look upon telemedicine as an additional duty or workload. Therefore, there is need to weave telemedicine into the routine duties of the doctors. The private doctors sometime fear that telemedicine is likely to reduce their practice. They need to realize that this technology enhances their reach and exposure and is only likely to increase their practice further.

It is myth that to establish a telemedicine platform is an expensive. The basic system needs hardware, software and telecommunication link. In all the areas there is a significant reduction in the prices. Most of these costs are well within the reach of most of the hospitals, and can be recovered by nominal charge to the patients and students in case of tele-education which would be much less than the physically traveling.

Although information technology has reached in all corner of the country but the accessibility of people living in remote and rural area to the nearest health center (PHCs, CHCs or district hospital) may not be easy due to poor infrastructure of road and transport. It may be possible that the available telemedicine system in the health centers may not function because of the interruption in power supply.

Some healthcare professionals have doubts about the quality of images transmitted for tele-consultation and tele-diagnosis. In tele-radiology, tele-pathology, tele-dermatology the quality of image (color, resolution, field of view, etc) should be international standards to avoid any wrong interpretation and mis-diagnosis. The delay in transmission of data may be of critical importance in tele-mentoring and robotic surgery and have to be reduced to the minimum.

There should be a format to calculate the investment and recurring cost of the telemedicine system. The insurance

companies have to decide whether the cost of tele-healthcare should be reimburse or not.

Telemedicine is a new emerging field there is lack of training facilities with regards to application of IT in the field of medicine. Most of the healthcare and IT professionals are not familiar with the terms commonly used in telemedicine such as HIS, EMR, PACS, etc. Telemedicine is also not the part of course curriculum of medical schools.

Telemedicine technology has been proved and established and its advantages and benefits are well known but still many healthcare professionals are reluctant to engage in such practices due to unresolved legal and ethical concerns. In case of a cross-border tele-consultation the question of the application of the litigation laws of the national to which they apply is a challenge as it is not yet clear if it would be those of the country in which the patient is living or those of the remote physician.

There are many issues that should be considered regarding the security, privacy and confidentiality of patient data, in telemedicine consultations in terms of the patients' rights of confidentiality of their personal data protected and thereby to ensure security of the data and restrict its availability to only those for whom it is intended and who are authorized and entitled to view it. The strategy and rules that prohibit the misuse and even abuse of electronic records in the form of unauthorized interception and/ or disclosure would be a huge challenge in the implementation.

## **5. Conclusion**

The challenges of the implementation of telemedicine are manifold and the most efficient procedure for apt and feasible use of the integrated technologies of medical science and information and communication would be the strategic and secure use of the resources available to provide the remote health care service and education.

The imposition and formulation of stringent laws and regulations for the reliable and accountable practice of telemedicine is the need of the hour.