

Telemedicine Services in Tamil Nadu Perception and Prospects

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Abstract

The blend of Health Care and Information and Communication Technology (ICT) has shown a great hope in the Health Care Delivery System in the recent years. To address the issue of shortage of 1 million Doctors and to serve the growing population of 1.21 billion Telemedicine is the solution. Telemedicine refers to the treatment of the patients from distance place by making use of information and Communication technologies. At this juncture, it is important to know the perception of the patients, since they are the ultimate beneficiaries. For this purpose this research was conducted. The researcher had identified 35 variables regarding patients' perception about the role of Telemedicine and 20 variables regarding agreement towards various disadvantages of Telemedicine. These variables were arranged in 5 point Likert scale in order to identify variables with high and low role. With those variables an interview schedule was prepared. That interview schedule was administered through 400 patients from 8 various hospitals using telemedicine technology. The weighted average and one way anova were applied for analysis. It is found that patients are accepting this technology very much. In view of the patients, providing remote diagnosis, getting second opinion and progress monitoring were the other important roles of Telemedicine.

Keywords – Telemedicine, telehealth, e-health, Health care delivery system.

1. Introduction

In present times, 75% of the Doctors in India practice in urban, 23% in semi-urban and only 2% in rural areas, where vast majority of population lives. Beds per 1000 people are 0.10 in rural in comparison to 2.2 in urban areas. Limited resources availability has leads to the use of information and communication technology to bridge the gap between the service provider and the user. This is the overall benefit of telehealth and telemedicine. In this context, a study about telemedicine services becomes important. Public healthcare largely depends up on the ease of access to health care system. Telemedicine can provide this access and reach. Though the advantages are plenty, there may be some drawbacks. Making a research on this system helps us to highlight the importance as well as the shortfalls of the system. It becomes important to gather the opinion of both the telemedicine service providers and the patients who are the recipients of this services and this attempt has been made in this study.

1.1 Telemedicine in India

Telemedicine, tele Health and e-Health are being promoted by WHO and ITU through their various projects and associated activities in the developing countries. The information on those projects is available in various reports published by these two premier international organizations, which illustrate the development of telemedicine in the various developing countries of the world.

India is an excellent example in the developing world in which the work on telemedicine has been taken up seriously both in the public as well as private sectors.

1.2. Government Initiatives in India

Here in India, telemedicine activity started as a pilot project supported by Ministry of Communication and Information Technology of Government of India in 1999. The participating institutes in the project were Centre for Development of Advanced Computing (C-DAC), Mohali, C-DAC, Pune and Post Graduation Institute of Medical Education and Research (PGIMER), Chandigarh. The project was implemented connecting PGIMER, Sanjay Gandhi Post Graduate Institute (SGPGI), Lucknow and All India Institute of Medical Sciences (AIIMS), New Delhi using ISDN connectivity. The technology developed is being deployed for setting up telemedicine systems in India and abroad

Indian Space Research Organisation (ISRO) initiated a number of telemedicine pilot projects which are very specific to the needs of the society. ISRO provided telemedicine technology between remote/ rural hospitals and super specialty hospitals for Tele-consultation, treatment and training of doctors and paramedics. Presently, ISRO's tele medicine network consists of over 225 hospitals – 185 remote/rural/district hospitals/health centres connected to 40 super specialty hospitals located in the major cities. The thrust areas of ISRO telemedicine systems are:

- (i) Remote/ Rural Hospitals and Specialty Hospitals
- (ii) Continuing Medical Education (CME)
- (iii) Mobile Telemedicine Units
- (iv) Disaster Management Support (DMS)

Regional Cancer Centre, Trivandrum established an Oncology Network in 2002 for providing telemedicine services in cancer detection, treatment, patient follow-up and continuity of care in peripheral hospitals. This telemedicine network utilizes Internet connectivity in addition to leased lines. The project was implemented by C-DAC and Regional Cancer Centre, Trivandrum.

A telemedicine project for diagnosing and monitoring of tropical diseases in West Bengal developed by Webel, Calcutta, Indian Institute of Technology, Kharagpur and School of Tropical Medicine, Calcutta has been implemented. The system has been installed in School of Tropical Medicine and two district level hospital. Several state level telemedicine networks are coming up as pilot projects showing promising results. In addition, three state capital district level hospitals in Nagaland, Mizoram and Sikkim in north-eastern states of India are getting connected with super specialty hospitals.

The National Task Force on Telemedicine, set up by the Union Ministry of Health and Family Welfare had recommended to establish a national telemedicine grid for networking all the medical colleges in the country. Accordingly, a major national initiative—the National Medical College Network Project is coming up in the field of e-Learning. The project aims to identify few tertiary care academic medical institutes from different regions of the country and connects each one of them to medical colleges (nodes) in the region. One of these regional hubs will be designated as the central hub which will coordinate the National Network and provide necessary infrastructure for the Central Content Development Centre.

1.3. Private Sector Initiatives:

Apollo, one of the leading healthcare institutions, is a pioneer in the field of telemedicine in India and is credited with being the first to set up a Rural Telemedicine Centre in the village of Aragonda in the state of Andhra Pradesh. In addition, Apollo has been taking various initiatives in telemedicine, specifically in the field of cardiology, neurosurgery and orthopedics.

Other active corporate participants in the telemedicine field are Amrita Institute of Medical Sciences, Kochi, Narayana Hrudayalaya, Bangalore, Sankara Nethralaya, Chennai, Sri Ramachandra Medical Centre, Porur, Chennai, Aravind Eye Hospitals, Madurai, Meenakshi Mission Hospital, Madurai, etc.,

2. Objectives

1. To study the Telemedicine services in public healthcare system rendered by specialty Hospitals in Tamil Nadu
2. To find out the role of Telemedicine services in public health care .
3. To study the perception of the patients about the role of Telemedicine services.

3. Research Methodology

3.1. Sampling Technique

1. Sampling method

The researcher used Judgement sampling method to identify the samples for collecting data from patients. Equal sized patients from Apollo telemedicine Network, Shankara Nethralaya, Sri Ramachandra, Mohan Diabetes foundation, CMC, vellore, Cancer Institute, Adyar, Aravind Eye Hospitals and Meenakshi mission were interviewed. In which, close to two fifths of the patients had visited telemedicine consultation centres for their follow up treatment.

2. Sample size

Patients = 400

Sample determination

- **Sample size = $z^2 * p * q / e^2$**
- where $z = 1.96$ (For $\alpha=5\%$ in social science studies, $z = 1.96$)
- $e = 0.05$ for Categorical data
- $p = 0.5$
- $q = 1-p$
- So for an Infinite population where Categorical data is used for data collection
- $n = (1.96^2 * 0.5 * 0.5 / 0.05^2) = 384$

Majority of the patients interviewed for this research are female and they were under the age group of 41-45. They were from nuclear family and their income was less than Rs.30000/- per month. And two fifths of the patients had three dependents in their family.

3.2 Primary sampling units

Sl.No	Hospital	Telemedicine centre
1	Apollo Telemedicine Network	Vaniyambadi, Vellore
2	Aravind Eye Hospital	Aravind Vision Centre, Alankanallur
3	Sri Ramachandra, Porur	Neyveli Lignite Corporation Hospital
4	Shankara nethralaya	Dr.Kumarasamy Health centre ,Kanniyakumari
5	Cancer Institute ,Adyar	CFCHC ,Ambilikkai, Dindigul District
6	Meenakshi Mission, Madurai	Rameswaram
7	Mohan Diabetes foundation	Chunampet, Kancheepuram District
8	CMC vellore	C.S.I .Mission Hospital,Salem

4. Tools for analysis

1. Weighted average
2. One way Anova

5. Hypothesis Tested

1. The overall opinion about the role of telemedicine in public health care does not vary with quantitative demographic characteristics of the patients.
2. The opinion about the overall disadvantage of telemedicine services do not vary with quantitative demographic characteristics of the patients.

6. Analysis and interpretation

6.1. Weighted average method to find out the Patients' perception about the role of Telemedicine.

. The researcher had identified 35 variables regarding patients' perception about the role of Telemedicine and 20 variables regarding agreement towards various disadvantages of Telemedicine. These variables were arranged in 5 point Likert scale in order to identify variables with high and low role. Further the weighted average of each variable was calculated. From this the overall weighted average was calculated. The individual weighted average and overall weighted average were listed below.

Table No 1
Weighted average of the Patients' perception about the role of Telemedicine.

Sl.No	Patients' perception about role of Telemedicine	Weighted average
1	Remote Diagnosis purpose	4.129676
2	Medicinal prescriptions	3.812968
3	Surgical Consultations	3.526185
4	To get second opinion	3.845387
5	For expert consultations	3.750623
6	Sending Blood requests	3.720698
7	Emergency services	3.548628
8	Follow up case	3.765586
9	Dosage details	3.640898
10	Progress Monitoring	3.927681
11	Physiotherapy Advice	3.817955
12	Video conferencing	3.703242
13	Audio conferencing	3.57606
14	Knowledge transfer	3.583541
15	Skill transfer	3.578554
16	Individualized Health Information	3.680798
17	Educating Patients	3.668329
18	Remote monitoring	3.608479
19	Information Transfer	3.598504
20	Health care delivery	3.518703
21	Reducing Geographical Barriers	3.571072
22	Catering to large segment	3.583541
23	Interactive conferences	3.670823
24	Reduction in Travel Time	3.703242
25	Easy access to various services	3.6425
26	Money saving	3.591022

27	Maintaining Electronic Medical Records	3.57606
28	Data Available for further research	3.568579
29	Reach more number of patients	3.670823
30	Maximum usage of expert's time	3.6425
31	Store and Forwarding Medical records easily	3.63591
32	Conducting Medical Education Programs	3.533666
33	Biometric measurements	3.581047
34	Compatibility with mobile, web technology	3.541147
35	Diseases control and prevention	3.475
	Total	127.989426
	Overall weighted average	3.65684

Inference

The above table shows the value of weighted average corresponding to the statements related to the patients' perception about the role of telemedicine. The overall weighted average is 3.6568. From this it was concluded that Telemedicine played a good role in the view of patients perception.

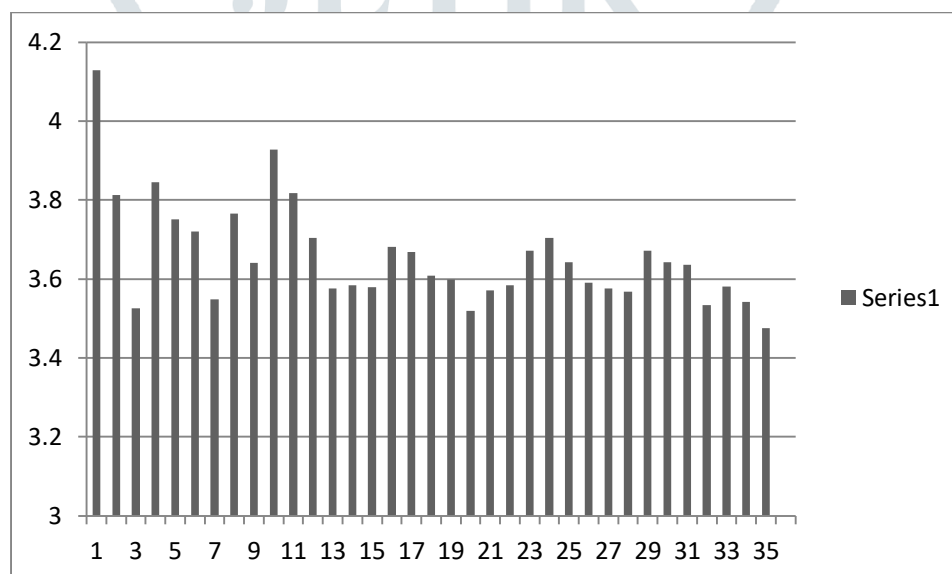


Figure 1. Weighted average of the Patients' perception about the role of Telemedicine.

6.2. Weighted average of the Patients' agreement towards disadvantages of Telemedicine

The table below presents the individual weighted average of the Patients' agreement towards disadvantages of Telemedicine and the overall weighted average.

Table No- 2

Weighted average of the Patients' agreement towards disadvantages of Telemedicine.

Sl.No	Patients agreement towards disadvantages of Telemedicine	Weighted average
1	Real physical Consulting is not available.	2.67581
2	Highly dependent on Technology	2.59601

3	Connectivity problem create confusion.	2.665835
4	Pooling of ideas tends to confusion.	2.548628
5	Infrastructure cost is high.	2.498753
6	Connectivity costs are high.	2.571072
7	Access to Telemedicine is poor.	2.501247
8	Physician do not pay full attention.	2.498753
9	Language Barriers’.	2.496259
10	People are not aware of Telemedicine.	2.541147
11	Physicians are not willing to involve in it.	2.506234
12	It requires continuous attention.	2.468828
13	Technical knowledge is lacking.	2.483791
14	Doctors unfamiliar with systems.	2.471322
15	In adequate support personnel	2.563591
16	Acceptance of treatment methods given by others are rare.	2.566085
17	Continuity of access to a physician is lacking.	2.581047
18	Patients are not comfortable	2.603491
19	Specific physician cannot be contacted on repeated visits.	2.598504
20	Government initiation is poor.	2.521197
	Total	50.95760
	Overall weighted average	2.547880

Inference

The overall weighted average is **2.547880**. This shows that the patients disagreed the disadvantages of telemedicine .And it is inferred that patients didn't find disadvantages in receiving care through telemedicine.

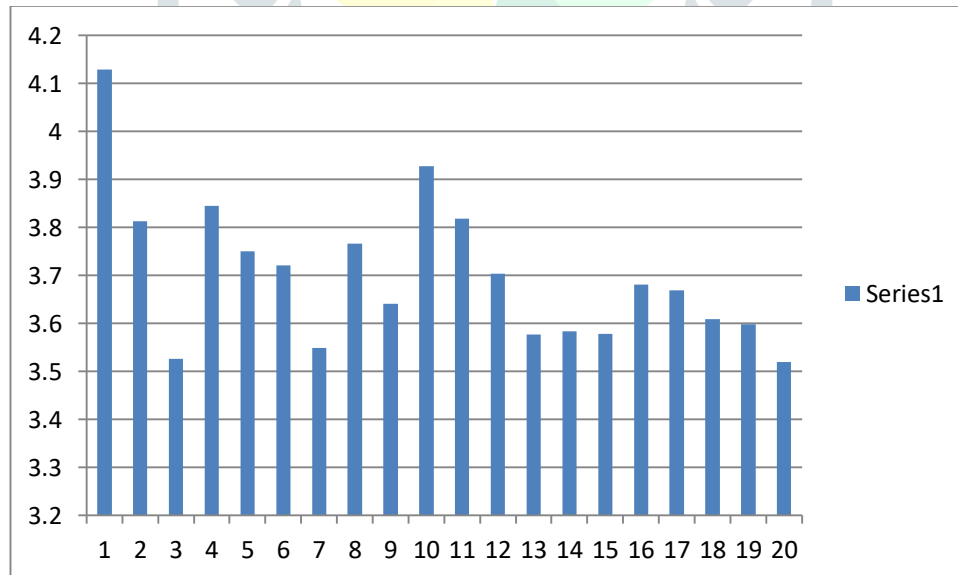


Figure 2. Weighted average of the Patients' agreement towards disadvantages of Telemedicine.

6.3. One way ANOVA between opinion about the role of telemedicine in public health care and quantitative demographic characteristics

The table below presents one way ANOVA between opinion about the role of telemedicine in public health care and quantitative demographic characteristics.

Table No 3

One way ANOVA between opinion about role of telemedicine in public health care and quantitative demographic characteristics

Demographic Characteristic	Source of variation	Sum of Squares	df	Mean Square	F	Sig.
Age of the patients	Between Groups	6.069	6	1.011	1.449	.195*
	Within Groups	274.291	393	.698		
	Total	280.360	399			
Monthly income	Between Groups	7.935	3	2.645	3.845	.010
	Within Groups	272.425	396	.688		
	Total	280.360	399			
Number of dependents in family	Between Groups	.872	3	.291	.412	.745*
	Within Groups	279.488	396	.706		
	Total	280.360	399			

(* H_0 accepted)

Hypothesis 1: The opinion about the role of telemedicine in public health care does not vary with quantitative demographic characteristics such as age of the patients, monthly income of the patients, and number of dependents in the patient's family at 5%.

The significance of F statistic is more than 0.5 for opinion about the role of telemedicine in public health care for quantitative demographic characteristics such as age of the patients, and number of dependents in the patient's family, So the null hypothesis is accepted and it is concluded that the opinion about the role of telemedicine in public health care do not vary with quantitative demographic characteristics such as age of the patients, and number of dependents in the patient's family at 5%.

The significance of F statistic is more than 0.5 for opinion about the role of telemedicine in public health care for quantitative demographic characteristic is more than 0.5 for monthly income of the patients, So the null hypothesis is not accepted and it is concluded that about opinion about the role of telemedicine in public health care do vary with quantitative demographic characteristic monthly income of the patients at 5%.

6.4 One way ANOVA between patients' perception about overall disadvantages of Telemedicine in Health services and their quantitative demographic characteristics

The table below presents one way ANOVA between patients' perception about overall disadvantages of Telemedicine in Health services and quantitative demographic characteristics.

Table No- 4

One way ANOVA between patients' perception about overall disadvantages of Telemedicine in Health services and quantitative demographic characteristics

Demographic Characteristic	Source of variation	Sum of Squares	df	Mean Square	F	Sig.
Age of the patients	Between Groups	7.688	6	1.281	1.905	.079*
	Within Groups	264.312	393	.673		
	Total	272.000	399			
Monthly income	Between Groups	3.750	3	1.250	1.845	.138*

Demographic Characteristic	Source of variation	Sum of Squares	df	Mean Square	F	Sig.
Age of the patients	Between Groups	7.688	6	1.281	1.905	.079*
	Within Groups	264.312	393	.673		
	Within Groups	268.250	396	.677		
	Total	272.000	399			
Number of dependents in family	Between Groups	1.183	3	.394	.576	.631*
	Within Groups	270.817	396	.684		
	Total	272.000	399			

(* H_0 accepted)

Hypothesis 2: The patients' perception about overall disadvantages of Telemedicine in Health services does not vary with quantitative demographic characteristics such as age of the patients, monthly income of the patients, and number of dependents in the patient's family at 5%.

The significance of F statistic is more than 0.5 for opinion about the role of telemedicine in public health care for quantitative demographic characteristics such as age of the patients, monthly income of the patients and number of dependents in the patient's family, So the null hypothesis is accepted and it is concluded that the opinion about the overall disadvantages of telemedicine in public health care do not vary with quantitative demographic characteristics such as age of the patients, monthly income of the patients and number of dependents in the patient's family at 5%.

7. Findings

1. More than three fourths of the patients perceived that telemedicine played a good role in public health care.
2. Majority of the patients did not find any disadvantages in receiving care through telemedicine.
3. Majority of the patients agreed that the important role of telemedicine is providing remote diagnosis to the patients. Getting second opinion and progress monitoring are the other two important roles of telemedicine.
4. The opinion about the role of telemedicine in public health care does not vary with quantitative demographic characteristics such as age of the patients, and number of dependents in the patient's family. And the opinion varies with the monthly income of the patients.
5. The opinion about the overall disadvantages of telemedicine in public health care does not vary with quantitative demographic characteristics such as age of the patients, monthly income of the patients and number of dependents in the patient's family.

8. Recommendations

1. The findings of this research show that the patients are accepting telemedicine. Acceptance of telemedicine technology is a good sign and which is the success of the technology. Usually there is a resistance in the acceptance of new technologies at initial stages. Telemedicine crossed this stage. So, the multi-speciality hospitals may include this telemedicine as a part of their service mode.
2. Telemedicine can be used in various ways in the process of providing health care. But the patients prefer very specific roles (such as getting second opinion) and some of the roles are neglected by patients. The service providers may pay attention in that areas and utilize the technology to the maximum.
3. There is a huge potential for this technology, so Doctors may include this technology in their practice in order to increase the service to the community.
4. Social entrepreneurs may develop business model for telemedicine. This also a great support for this technology to move further to greater heights.

9. Conclusion

Based on this study, it is concluded that the overall patients perception towards the telemedicine is in

the acceptable level. The prospects seem to be brighter if the awareness about telemedicine is made prevalent among the common public.

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