

## Utility of Telemedicine in Saving Patient's Time and Money

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### Abstract

Telemedicine is becoming an important part of clinical practice in today's armamentarium. Telemedicine has various utilities like tele consultation, tele surgery, tele education, tele monitoring, tele pharmacy, tele nursing etc. Improved technology and use of simple gadgets have contributed to its utility even in remote areas. Hence telemedicine is not confined to big cities only. It is being used remote towns and villages also. It may not be possible for everyone, especially belonging to remote areas, to visit at higher centers regularly because of distance, money and time factors. Telemedicine plays very important role in such scenarios where it not only helps patients by providing benefits of specialist's consultation but also it prevents the progression and complications of the disease by reducing the visit gaps. Through this article we highlight the use of telemedicine in saving time and money of the patient with improved outcomes.

**Keywords:** Telemedicine, Time, Money.

### Introduction

Telemedicine is defined as the use of telecommunication and information technologies to provide

clinical health care at a distance. It improves the access of medical facilities to the remote areas and hence eliminates the distance barriers. As a result of advance technologies it has become easy to make communications and share images or data from remote sites to the higher centers. The first interactive telemedicine system, launched by an American company, MedPhone Corporation, in 1989 in order to remotely diagnose and treat cardiac patients [1].

Use of telemedicine was initially restricted to telephone and radio services, developments in mobile technology has changed the scenario. Now healthcare professionals can share informations quickly and discuss with the patient and relatives as if they were doing actual consultation. Telemedicine is helpful for the patients of remote areas, who can receive quality care from specialists without travelling to the centers.

Other advantages of telemedicine are to facilitate medical education, sharing the knowledge, reduction of possible transmission of infectious diseases in population, reduction of possible transmission of infection among medical staff and to other patients who are already immunocompromised, avoids white coat syndrome, facilitation of services to sick or home bound patients, reduces crowd in opd (outpatient department) [2,3].

Recent versions of smart phones and improvement in mobile technology has made the telemedicine easy to practice. Doctors and patients can communicate anytime and anywhere through any mode like voice calls, video calls, Skype calls, whatsapp chat, whatsapp call, mail etc. surgeon or patients are no longer needed to sit in front of desktop or laptops which makes its utility restricted to some extent.

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**Methodology**

The study was conducted in the department of plastic surgery in a tertiary care institute. The duration of study was from June 2014 to January 2015. A series of 18 patients who attended the opd were included in the study. Informed consent was taken from all the patients or guardians to avail the telemedicine services.

All patients were given a telemedicine number for their easy identification. Record of patients were maintained on both hard and soft copies, which include date of visit, consultant's name, patient's telemedicine number, contacts details ( mobile number/ land line number/ email address/Skype id etc), diagnosis, workup and planning (Figure 1, 2, 3). As per hospital protocol routine OPD was conducted twice a week which was followed by telemedicine OPD in the evening to interact with other patients who already attended the OPD and were in follow up. Apart from that all patients were given a land line number to contact any time with the doctor which was available 24 hours in the hospital. All patients were seen in OPD and followed up in telemedicine clinic.

The study include those patients also who were discharge after operation and those who were seen in emergency. Both pre operative and post operative consultations were given and if needed, they were called in hospital. Enrolled patients were followed for 6 to 8 months in telemedicine clinic regularly. Patients were followed up by means of voice calls, email, video calls, whatsapp etc (Figure 4, 5, 6). Questionnaire survey was done by other doctors of the department in a blinded manner who was not

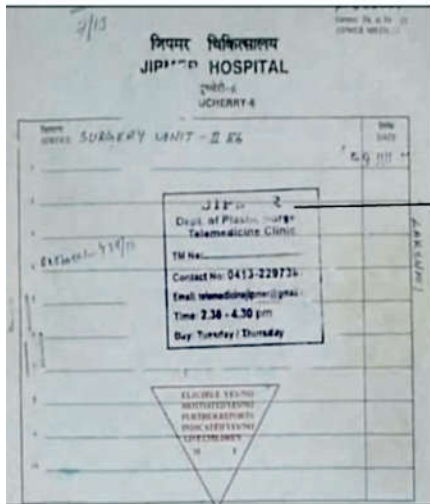


Fig. 1: Showing front page of patient's case sheet with telemedicine stamp

OPD	Bhaskar Kumar 28/11 + 907071	962636723	Right ear defect tip of D. Pinna finger	loose approxi- mate
OPD	Bhaskar Kumar 20/11 + 907146	965228396	Right ear defect pinna chiloloesalpinx simplex, amnioe	short approxi- mate absent
OPD	LAKSHMI 19/11 + 859651	95001056 94	Left Ear Defect Sprengel(R) Phonology, Post Surgery	Follow up.

Fig. 2: Showing patient's details recorded in telemedicine register



Fig. 3: Showing patient's details recorded in telemedicine folder on desktop



Fig. 4: Showing telemedicine consultation being performed by voice call



Fig. 5: Showing telemedicine consultation being performed by video call

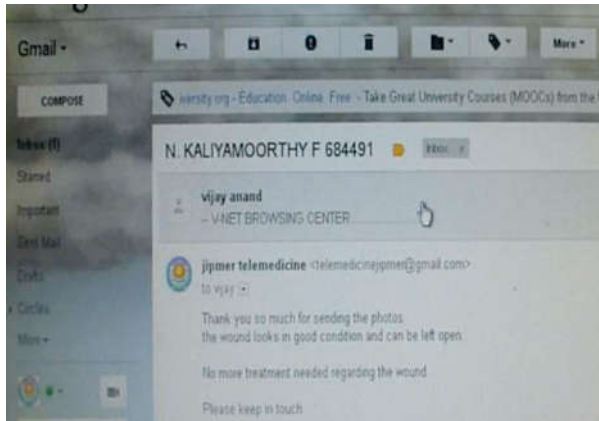


Fig. 6: Showing telemedicine consultation being performed by email

involved in the treating team Doctor and the supporting staffs were also kept unaware of the survey.

The questionnaire involved measurements of seven core dimension [4].

1. Accessibility of health care facility
2. Perception of waiting time
3. Availability of basic amenities
4. Satisfaction with cost of services
5. Relationship between patient and health providers
6. Availability of laboratory, radiological and pharmacy facilities

7. Information and communication.

Observation was done on five points scale. Level of satisfaction of patient's was recorded by selecting responses ranging from poor=1, fair=2, good=3, very good=4 and excellent=5.

Point 1 and 2 was considered dissatisfied while points 3, 4 and 5 were considered satisfied.

Result

Total 18 patients were studied over a period of 8 months. Mean age was 31.94 years. Male to female ratio was 3:1. Various modes of communication used were, voice call, e-mail, whatsApp and video call. Voice call was used for all (100%) patients. Email was used for 1 (5.55%) patient. WhatsApp was used for 2 (11.11%) patients. Video call was used for 1 (5.55%) patient. All patients were followed up weekly in telemedicine clinic. None of the patient was dissatisfied in dimension 1 (accessibility of health care facilities). In dimension 2 (perception of waiting time), 6(33.33%) patients were found to be dissatisfied (score ≤ 2) while 12 patients were satisfied (score ≥ 3). In dimension 3 (availability of basic amenities), 1(5.55%) patient was dissatisfied while 17 (94.44) patients were satisfied. In dimension 4 (satisfaction with cost of services) all patients were satisfied. In dimension 5 (relationship between patient and health providers) all patients were satisfied. In dimension 6

Table 1: Case Summary

S.No	Age	Gender	Occupation	Mode of TM	Diagnosis	Score of Dimension 1	Score of Dimension 2	Score of Dimension 3	Score of Dimension 4	Score of Dimension 5	Score of Dimension 6	Score of Dimension 7
1.	25 yr	M	Student	Email	Hand Injury	3	5	2	4	3	4	4
2.	24yr	M	Labourer	Voice Call	Hand Injury	4	4	5	5	4	5	4
3.	35yr	F	Labourer	Voice Call	Thermal Burn	4	4	3	4	4	4	4
4.	28yr	M	Student	Voice Call	Hypospadias	3	5	4	4	3	4	4
5.	40yr	M	Govt. Job	Voice Call	Diabetic foot	3	2	4	5	5	4	3
6.	32yr	F	Job	Voice Call	Thermal Burn	4	3	4	5	5	3	4
7.	25yr	F	Student	Voice Call, Whatsapp	Secondary nasal deformity	4	2	5	5	4	2	2
8.	2yr	M	Nil	Voice Call	Cleft Palate (Post op)	3	3	3	5	5	3	3
9.	27yr	M	Job	Voice Call	Zone 6 extensor Tendon Injury	4	2	4	4	5	3	4
10.	19yr	M	Student	Voice Call	Hand Injury	5	3	5	5	5	4	2
11.	9yr	F	Student	Voice Call, Whatsapp, Video Call	Post burn Scarring face	4	2	5	4	4	3	3
12.	35yr	M	Job	Voice Call plus E-mail	scald burn	3	2	4	5	5	4	2
13.	43yr	F	Housewife	Voice Call	Thermal Burn	5	3	5	5	5	3	4
14.	45yr	F	Housewife	Voice Call	Lobuloplasty	3	4	4	5	3	4	3
15.	34yr	M	Job	Voice Call	Gynecomastia	3	3	4	4	4	3	3
16.	53yr	M	Business	Voice Call	Raw area left	4	3	5	5	4	3	3
17.	44	M	Job	Voice Call	Hand Injury	4	2	4	5	4	3	4
18.	40	M	Labourer	Voice Call	Foot Injury	5	3	4	5	5	4	4

(availability of laboratory, radiological and pharmacy facilities), one patient (5.55%) was dissatisfied while 17 (94.44%) patients were satisfied. In dimension 7 (information and communication), two (11.11%) patients were dissatisfied while 16 (88.88%) patients were satisfied. None of the patient experienced suboptimal evaluation of their complaints in telemedicine clinic as compare to previous visits in outpatient departments. All patients experienced this as time and cost saving modality (Table 1).

## Discussion

Historically African villagers were using smoke signals to warn the people in case of serious diseases. In early 1900s people of remote areas used two-way radios to communicate with Royal Flying service of Australia. While first interactive telemedicine system was launched in America, which was performed to diagnose and treat patients requiring cardiac resuscitation.

Telemedicine can be broadly classified into three main categories: store-and-forward, remote patient monitoring and real-time interactive.

Store and forward method involves use of medical data and transmitting to doctor at convenient time for assessment offline, it does not require the presence of both doctor and patient at same time [5,6]. Remote monitoring involves self monitoring and testing, doctor can monitor a patient remotely using various technological devices. These services are primarily used for monitoring chronic diseases like, diabetes mellitus, heart disease, hypertension or asthma [7].

Real-time interactive telemedicine services provide real-time interactions between patient and doctor. , real time interactive telemedicine services may be less costly than in-person clinical visit. Apart from broadly divided three categories telemedicine can further be subdivided in to Emergency telemedicine, Telenursing, Telepharmacy, Telerehabilitation, Teletrauma care, Telecardiology, Teletransmission of ECG, Telepsychiatry, Teleradiology, Telepathology, Teledermatology, Teledentistry, Teleaudiology, Teleophthalmology, Tele education and Telesurgery.

### *Advantages of Telemedicine*

- Telemedicine communication may encourage long term relationship of doctor and patients.
- Healthcare professionals get opportunities for case-based learning that can be applied in the treatment of future patients [8].

- Connecting multiple remote sites via telemedicine may prove to be a cost-effective when compared with the alternative of constructing facilities and hiring clinicians [9].
- Telemedicine offers the ability to organize and collect patient data.
- Telemedicine provide more coordinated care.
- Facilitates the potential for more patient follow-up and evaluation.
- Telemedicine tools and technology can help epidemiological surveillance by assisting in identifying and tracking public health issues and illustrating trends [10].
- Telemedicine allows for the monitoring of disease evolution which can support communication to plan and mobilize vaccination teams [11].
- Basic store-and-forward e-mail-based telemedicine requires minimal investment in hardware and software where network connectivity is available, and allows for detailed exchanges by enabling the transfer of images as attachments, making it an effective solution for low-resource settings [12].
- Better management of scarce medical resources and day-to-day activities in the developing countries.
- Telemedicine is time saving for patients, it can save the travel time, and also avoids the need and dependency on attendant, especially if patient is home bound and not able to travel.

### *Barriers of Telemedicine in Developing Countries*

- Lack of Infrastructure.
- Inadequate access to computing or cyber cafes.
- Instability of electric power supplies.
- Unavailability of Internet connectivity outside the city.
- Unreliable connectivity.
- Computer viruses and limited bandwidth.
- Internet congestion can lead to delayed imaging and poor image resolution may limit the efficacy of remote diagnosis.
- Slow bandwidth can prohibit the use of real-time videoconferencing [13].
- Limited funding for the implementation and maintenance of telemedicine initiatives [14].

## Conclusion

Telemedicine services saves patient's time and money. It is considered to be an easy and cost effective means of patient doctor interaction, follow up and monitoring.

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