

Telemedicine

S. Saradhadevi S.¹, V. Hemavathy²

¹Assistant Professor, Sree Balaji College of Nursing

²Principal Professor, Sree Balaji College of Nursing

Abstract: *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. Patient consultations via video conferencing, transmission of still images, e-health including patient portals, remote monitoring of vital signs, continuing medical education, consumer-focused wireless applications and nursing call centers, among other applications, are all considered part of telemedicine and telehealth.*

Keywords: Tele education, tele health, video conference

1. Introduction

1.1 Definition

Telemedicine is defined as the use of telecommunications to deliver health care expert sharing of medical knowledge with persons at distant locations. Telemedicine has been defined in general terms to be medicine practiced at a distance and as such it encompasses both diagnosis and treatment, as well as medical education.

It is transfer of medical data for:-

- Consultation
- Diagnosis
- Provision of and support for clinical care Continuing medical education
- Medical data such as:-
- High resolution Photography
- Radiological Images
- Sound and patient records.
- Electronic signals via the internet
- Internet
- Personal Computers (PLS)

1.2 Telemedicine Applications

- Emergency Healthcare
- Video consulting
- Telepathology
- Telecardiology
- Teledermatology
- Teleoncology
- Telepsychiatry
- Teledentistry
- Distance hearing
- Medical education and the transfer of medical data.
- Medical care delivery, diagnosis, Consultation and treatment at a distance.
- Nursing homes or retirement centers
- Home monitoring for patients.
- Health care in the aftermath of disasters.

International Journal of telemedicine and application publishes two types of issues

- Regular issues and
- Special issues
- Regular Issues: Regular issues publish collections of papers without special solicitation.
- Regular papers can be submitted at any time.
- Special Issues: Special issue papers can be submitted only based on planned schedules and submission guidelines of the Call for papers.
- Proposals for special issues can be Submitted directly to the editor-in-chief.

1.3 Scope of Telemedicine

Telemedicine, not only provides consultation but Also education, monitoring and more. Telemedicine falls in four categories

- Tele consultation
- Tele education
- Tele monitoring
- Tele Surgery

a) Tele Consultation

A Doctor or a paramedic or even a patient himself in remote area can have a consultation with a specialist.

b) Tele Education

The use of Telemedicine technologies makes it much better than just surfing websites for information. Doctors can attend clinical meetings at remote places and also participate and present cases in them. Some projects such as Health Net Project of Africa uses both internet and satellite communications for doctors in remote area. Tele Consultation, video conferencing on surgery, online clinical audit and continuing medical education are just some of the education applications of tele education

c) Tele Monitoring

Monitoring is the remote monitoring of patient data. The patient's status can be monitored.

- These can be transmitted using telephone lines or through wireless with the use of appropriate devices that can transmit these data over phone.

- These devices are commercially available and can be attached to any telephone line.

d) Tele Surgery

- It actually means tele presence surgery where robotic arms carry put the surgeons instructions.
- It ensures tremor – free surgery. Tele surgery, where a surgeon directs surgery in a remote place is still to come

e) Benefits of Tele Medicine

- Resource utilization
- Early intervention
- Avoids unnecessary transportation
- Community based care
- Medical education and Research
- Cost saving
- Improved patient Documentation
- Increased Range of care and education.

f) Cost Saving

- Technology is becoming increasingly cheaper and the cost of telemedicine has gone down considerable.
- It has been worked out that tele medicine has resulted in considerable savings more So in tele radiology and in home care of clinically ill patient.
- In India use of telemedications is expected to reduce the cost considerably with the investment of around 200,000 for telemedicine in a primary health center.

g) Improved Patient Documentation

- Use of telemedicine ensures that patient data is stored electronically and digitally.
- Previous medical history of patients, X-rays, test, results and notes are transmitted using standard protocols.
- This ensures better documentation, which is more accurate and complete.

h) Increased Range Of Care And Education:-

- When health care institutions implement telemedicine technologies they create a system by which they can service and needs of the local, regional, national and international Communities.
- Audio-electronic Stethoscope, with file size of around 10kb.
- Still image x-rays which are still images having a size of around 1 MB.
- Video movie – ultra sound / patient visualization – movie
- Images have a size of 10 MB or more. The patient can

i) How this data can be transferred

This digital data can be transferred via ordinary telephone lines (PSTN or Publics service telephone network) een by a doctor at a remote place using cameras

j) Telemedicine Technologies

(A) Store and forward technology

(B) Real time telemedicine

(C) Video conferencing

Store and Forward Technology

In store and forward technology an event is captured as Single image and stored. Then this single image or series of

images along with voice, text and data are forwarded to a specialist through e-mail or modem. This store and forward technology is commonly used in radiology, pathology, and dermatology. Most common use of store and forward technology.

Real Time Telemedicine

The telemedicine transaction in process as soon as it is received. That is, a direct link is established between the remote patient and the health expert.

This is of great value in emergencies where store and forward will have little applicability. This requires real time equipment and telecommunication facility for transmission of text, images, audio and video images video conferencing is the technology, which is used mostly for Real-time telemedicine.

Video Conferencing

Here there are two locations on one side is patient and local health provides and on other side is specialist. These two sides are linked by putting video conferencing instruments at both locations so a real time consultation take place between specialist and patient and local health provides.

k) Telemedicine Devices

(A) Video conferencing system

- (i) Roll about systems
- (ii) Set top system
- (iii) Desk top system

(B) Peripheral Devices

- (i) Medicals Peripherals
- (ii) Non medical peripherals

(A) Video Conferencing System

There are various types of video conferencing systems.

(I) Roll About Systems

There are self contained mobile units comprising of a monitor, camera and associated hardware and can go to any site where it is required.

(Ii) Set Top System

There are compact systems that sit on top of conventional computers and provide the telemedicine service.

The Equipment Required For Video Conferencing Includes The Following

Digital camera having the zoom and micro facility to access any part of patient and also the facility of video recording. This needs to connected to the computer for processing the image processing software which can compress the image and aid in its onward transmission.

(B) Phripheral Devices

These are those pieces of equipment or hardware that allow for the imaging of events or the collection of data.

These peripheral devices are divided into to categories.

- Medical Peripherals
- Non medical Peripherals

Medical Peripherals

- Medical peripherals can be used only for medical purposes.

- They either collect medical images such as those captured by an otoscope (for the ears) Ophthalmo scope (For the eyes) derma scope (for the skin) or any other kind of medical imaging device. Other devices may amplify bodily sounds.
- The most common device is electronic stethoscope by which specialist can listen to heart, lung and bowel sounds while conducting a telemedicine examination over a video conference system.
- Then there are medical peripherals used to collect biometric data of patient like pulse, BP etc.,
- Images from imaging devices like echocardiogram, ultra sound, microscope and surgical devices laparoscope, endoscope etc., also can be transmitted using telemedicine x-rays need to be digitized. Hence the need for digital x-ray processing machines.

Non Medical Peripherals

Many devices and instruments are used in conjunction with video conferencing to assist in communication of information and ideas.

- Many institutions use inexpensive, commercially available video cameras as an essential part of their telemedicine network. Another non-medical Peripheral is the video tape recorder.
- A video can be made of specific patient or procedure that would not be available at the time a consultation is scheduled.
- Scanners to scan x-Rays are also another such devices.
- A video presentation stand, similar in design to an overhead projector, can be used to collect an image of document or other object and send it across the video connection.

2. Limitations to Spread of Telemedicine

- 1) Poor patient – Doctor Relationships
- 2) Patient Acceptance
- 3) Fear of Technology
- 4) Low Rates of utilization
- 5) Infrastructure

1) Poor Patient- Doctor Relationships

This is most likely when paramedical staff or patients directly use telemedicine to get consultation and there is no direct contact. But this can be corrected by making the interaction real time and with adequate follow-up with the consulting doctor using email telephone etc.,

2) Patient Acceptance

Patient acceptance can be improved by adequately educating the patients and other users about the aims and benefits of the new technology.

3) Fear of Technology

The technology is new and there will be apprehensions. Hence, all persons using this will need to be with the persons operating it. They are adequately confident in using the machines.

4) Low Rates of Utilization

Initially there may be a low rate of utilization and if run commercially may not be viable. But, with increasing use as with anything new, the user base will pick-up.

5) Infrastructure

Very costly equipment needs to be put in place for starting telemedicine. That too in places where basic medical facilities do not exist. This will be the picture in developing countries. This is a big hurdle that needs to be crossed. National policy and government support for use of telemedicine will need to be formulated. In India this has not been put in place. Such policies exist in USA, UK, Malaysia and Australia.

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