

Telemedicine

Dr. Upeksha Ganegoda
Department of Computational Mathematics

Outline

- Definition of telemedicine
- Difference between telemedicine and telehealth
- Advantages & disadvantages
- Ten critical steps for a successful telemedicine program
- Confidentiality, and legal components of telemedicine
- Essential parts of telemedicine
- Information capture
- Types of telemedicine

- Telemedicine was originally created as a way to treat patients who were located in remote places, far away from local health facilities or in areas of with shortages of medical professionals.
- It reduce cost to the rural patients and reduce professional isolation of the rural doctors. Furthermore, it enable ordinary doctors to perform extra-ordinary tasks.
- While telemedicine is still used today to address these problems, it's increasingly becoming a tool for convenient medical care.

Difference between telemedicine and telehealth

- telemedicine is really a subset of telehealth. Whereas telehealth is a broad term that includes all health services provided using telecommunications technology, telemedicine refers specifically to clinical services.

- “Telehealth is a collection of means or methods for enhancing health care, public health, and health education delivery and support using telecommunications technologies.”
- Telehealth may involve more general health services, like public health services, whereas telemedicine is a specific kind of telehealth that involves a clinician providing some kind of medical services.

Advantages

To Rural Physicians and clinics (spoke sites):

- Receive education from the specialist/provider
- Better health outcome for their patients
- Enhanced community confidence in local healthcare
- Attend continuing medical education courses from their clinic

To patients:

- Loved ones remain in their community with family support
- Cost savings from not having to travel extensively
- Immediate urgent care
- Confidentiality of specialty examination or visit (Because the patient visits the general practice doctor, he can be seen for any specialty care without anyone else knowing)

- Patient education courses (nutrition, oncologie, etc.)
- Properly stabilize patient prior to transport
- Early Diagnosis prior to escalated medical episode
- Patients that routinely travel to visit doctors in large urban areas tend to purchase their goods and services from those cities, Telemedicine keeps save their money and time.

To Telemedicine Providers (hub sites):

- Expand patient outreach
- Major surgical procedures resulting from the initial telemedicine consultation
- Reduction in ER visits
- Promotion of Hospital
- Charge tuition for clinician education courses (CME, CNE, etc.)

Disadvantages

- Requires technical training and equipment
- Some telemedicine models may reduce care continuity
- May reduce in-person interactions with doctors
- Navigating the changing policy and reimbursement landscape can be tricky

Ten critical steps for a successful telemedicine program (management point of view)

- **Step 1: Establish a Vision**

The first step in setting a program vision is to identify and understand the strategic and tactical objectives and vision of your overall organization. It is helpful to know what objective the organization wants to use telemedicine to accomplish. This depends on the business model or motivations the organization is pursuing.

- **Step 2: Building a Long Term Financial Plan**

- **Step 3: Create a Convenient and Effective Work Environment**

Telemedicine must be available where it is needed. The equipment must be available at or very near to where care is provided and where the consulting physician works.

- **Step 4: Mainstream Telemedicine into the Standard Care Process**

Delivering care with telemedicine should be the same as delivering care without telemedicine. The more different it is, even in minor issues, the more change that has to be accepted. A simple rule to keep in mind is that “The more change that must be adopted the higher the likelihood of failure.”

- **Step 5: Plan and Assure Effective Training**

Training is critical. Successful programs plan for it and deliver well-defined training in layers. Timing is often as important as content.

- **Step 6: Make Sure You Have a Full Time Coordinator(s) and an Effective Leader and Cheerleader**

A frequent mistake programs make is that they underestimate the personnel requirements of implementing telemedicine. Many struggling programs can be linked to a focus on the technology and not on the work it requires to implement both technology and change

- **Step 7: A Project Plan = Manageable Milestones = Reasonable Expectations**

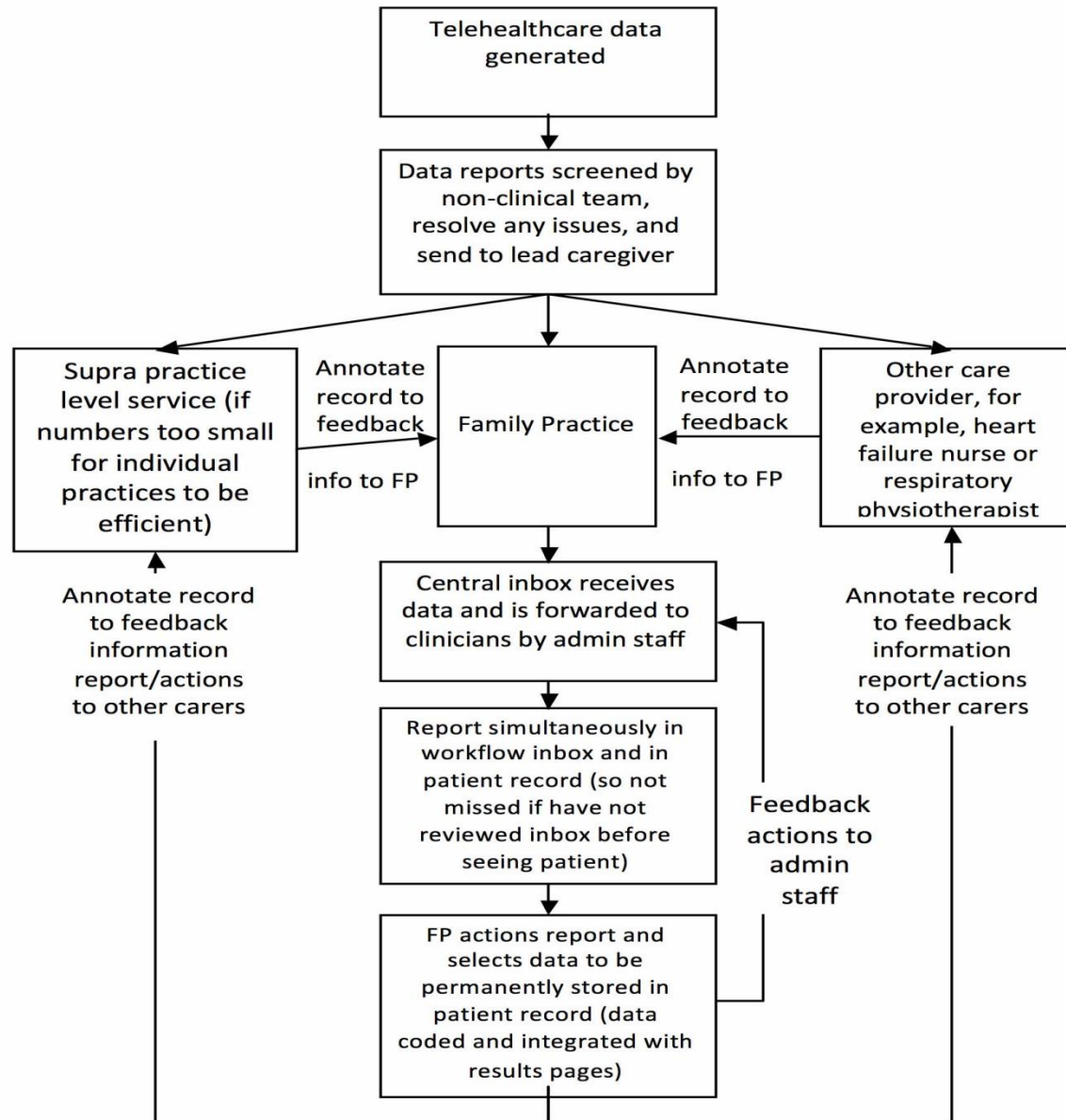
Start with a solid, well-defined plan. Include all the steps to completion and understand the “critical path” issues.

- **Step 8: Horizontal vs. Vertical Implementation**

Some programs start by providing as many sites as possible with a very limited amount of capability in each site. This addresses the widest “horizontal” audience. Other programs start with very few sites with very extensive capability in each site. This gives one or two initial sites exceptionally broad “vertical” capability.

- **Step 9: Good Marketing is Critical**

- **Step 10: Publish or Perish?**



Consider for workflow ...

Here are just a few example questions to guide your workflow discussion:

- What information do you need to gather from the patient to start this visit (i.e., health record questions)?
- When do you want to offer telemedicine visits (i.e., on-demand, after-hours, a specific time during the day, provider's office hours, etc.)?
- Who will be doing the remote visit (i.e., provider, extender, etc.)?
- Where will the provider initiate the visit (i.e., in his personal office, in a community space, etc.)?
- Do you have a computer with working speakers, microphone and camera in that space?
- Who will schedule the appointment?
- How will you remind patients of their scheduled virtual appointments? How will patients access the platform?
- Will you have a staff member verify all needed information before starting a visit (check the patient is enrolled, that they have all needed equipment, verify insurance)?
- Will you transfer visit documentation into your EMR?
- Who will take care of billing each visit?

Confidentiality, and legal components of telemedicine

- With medical tele-diagnosis, the spreading of medical liability is the main risk. How can a clear identification of the medical liabilities involved be ensured in cases where damage occurs? From a legal point of view, the spreading of the liability is not allowed and the use of tele-diagnosis must ensure a total transparency. As the cost of a medical act based on the cost of the image records and the cost of image interpretation cannot at present be estimated, it is necessary to establish a contract.
- In a telemedicine consultation between general practitioner and hospital specialist, the referring doctor must give an accurate history (note that a video record would provide retrospective proof).

- Staff credentials, at necessary intervals, are essential to ensure that quality services are being provided through optimal use of the equipment.
- The patient is uncertain as to how to protect her/his rights in the use of telemedicine. The issue of litigation is also unclear as to where the physician is practicing when he/ she uses telemedicine. Is she/he practicing in the country where the patient is or is the physician practicing in the country of her/his origin? These issues require to be addressed urgently so that telemedicine will have standards of ethical practice and the patient's rights and confidentiality are protected.

Essential parts

- The personnel
- The technology
- A liberal measure of perseverance

Personnel

- In a real clinical situation – suitable, committed personnel are essential. People with the necessary skills to undertake the clinical components are required at both ends of any telemedicine link.
- Use of a telemedicine system will decrease if the patient information is available but the link is unusable, either for technical reasons or because the appropriate staff are not available at the diagnostic end. It is essential to ensure that there are sufficiently trained personnel and the schedules are carefully planned to enable links to be used with minimum delays, even in emergencies.

Technology

- Much of the equipment required may already be available for other functions, and can be shared if planned properly. Reliability is a requirement for all medical equipment and telemedicine equipment is no exception. For telemedicine, all the equipment needs to function properly, since any malfunction will break the chain required for a successful link.

- Three types of technology categories:
 - (1) equipment to capture the clinical information at each site
 - (2) the telecommunications link needed to transmit this information between the sites
 - (3) equipment to display the information at each site
- Factors to be considered include:
 - (1) the types of information to be transmitted
 - (2) the quantity of information to be transferred
 - (3) security and privacy

Perseverance

- At least one dedicated and committed individual is needed with the perseverance to overcome the inertia inherent in all established clinical routines, and the commitment to champion the new system until it can demonstrate its usefulness.

Information capture

- The types of information that are relevant to telemedicine can be divided into five broad categories:
 - Documents
 - Electronic medical records
 - Static images
 - Audio
 - Video

- Documents

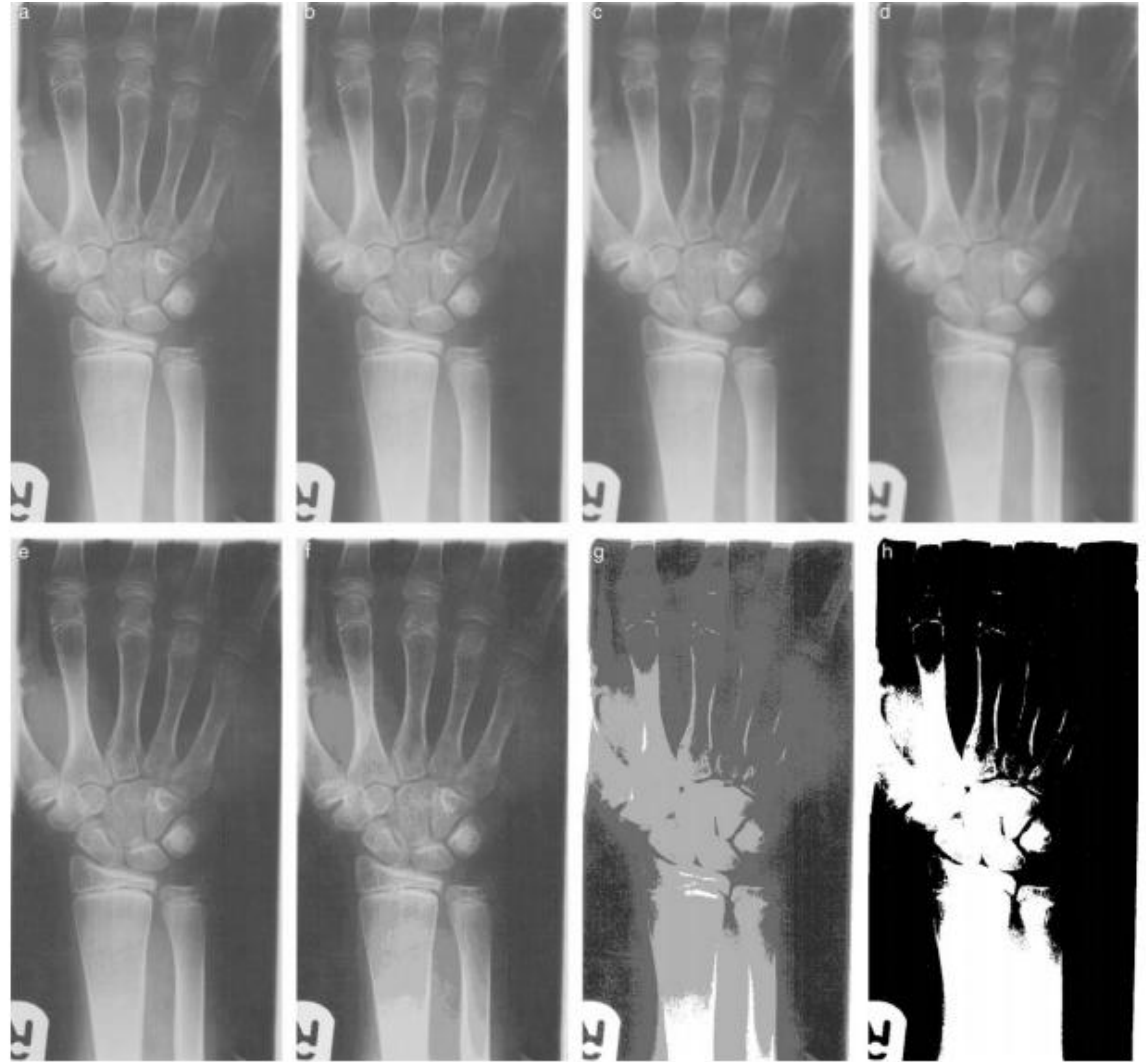
Documentary information (e.g. reports, letters or static medical records) can be transmitted in digital form, if the information already exists as a computer text file. Alternatively, paper documents can be digitized using a flatbed scanner or a document camera, and then transmitted as still images.

- Electronic medical records

Traditional paper-based records are gradually being replaced by electronic medical records (EMRs). EMRs will allow instant access to a patient's record, including the business operations such as billing and reimbursement.

- Static images

Diagnostic needs dictate a particular image quality. A photocopy may be perfectly legible and acceptable for many purposes, but fine detail present in the original may have been lost. For some types of image this can be crucial, and the requirements have been particularly well studied for radiographs.



- Audio

Analogue transmission (telephones), susceptible to noise and loss of quality, particularly over long distances. But, digital signal transmission offers many advantages, particularly since digital signals can be transmitted over networks for long distances without degradation.

- Video

Real-time video images, transmitted between remote sites for the purposes of consultation between a doctor and a patient. Majority of applications, commercial videoconferencing units provide the most straightforward solution to the problem of transmitting video pictures for telemedicine.

Different Types

- Tele-consultation
- Tele-diagnoses
- Teleneurology
- Telepsychiatry
- Tele-treatment
- Tele-training & Tele-education
- Tele-monitoring & Tele-support

- Tele-consultation

It can be generally defined as a (audio-) visual communication link between health professionals. Tele-consultation enables the virtual communication between doctors of different disciplines or with specialists in other health care institutions like hospitals.

- Tele-diagnoses

A diagnosis that is made at a remote location and is based on the evaluation of data transmitted from instruments that monitor the patient and a transfer link to a diagnostic center.

- Teleneurology

Uses e-mail and videoconferencing, so that a neurologist can diagnose at a distance. Teleneurology is also making referrals using e-mail. Video can be used to study gait.

- Telepsychiatry

Is used where there are few psychiatrists but is not appropriate for all conditions. Remote monitoring devices make it possible for patients to be monitored at home.

- Tele-treatment

Provide treatments for a distances patients by using data transmission techniques.

- Tele-education & Tele-training

Provide proper training and educational feed back should be giving to the prospective users with regard to the telemedicine system.

- Tele-monitoring & Tele-support

In order to streamline the telemedicine system, the system need to be monitor and provide consist support within specified time.

Mobile Telemedicine

- Designed to respond to emergency and disaster situations. It brings the expertise of a critical care center to patients that may be cut off from access from any hospital or medical care. By utilizing telemedicine technology, the mobile telemedicine brings the expertise of any specialist to the patient's side.

Real world examples

- Telemedicine supports maternal and newborn health in Mongolia
- Breast cancer screening for rural Mexican residents
- <http://www.sightcall.com/telehealth-consultation/>
- <http://searchhealthit.techtarget.com/definition/Electronic-Intensive-Care-Unit-eICU>