Telemedicine

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Abstract

This chapter deals with the history and definition of telemedicine, which is followed by a discussion on the newly and rapidly becoming fashionable term "digital health" that includes telemedicine as one of its main components (eHealth and mHealth being the other two). A section on the social media and another on social networking have been added to address aspects that are specific to them.

History

Ever since the spouse of a pre-historic man visited a pre-historic healer to report that her man was hot as fire while speaking deliriously and the healer sent her back with a concoction for her to feed him and inform if he does not become better, telemedicine is being practised.

Formed by the combining the Greek word "τελε" (tele which means "distance") and the Latin word *mederi* (which means "healing") to form the term "telemedicine" that literally translates into the phrase "distance healing". Readers will do well to note that the practice of telemedicine (and for that matter anything beginning with the word "tele") does not necessarily need computers. Any "technique"/"technology" that facilitates a clinician to deliver care to a patient is "telemedicine". However, to correctly appreciate telemedicine in all its glory, it is necessary to look at the evaluation of the technology through time.

Telemedicine, as we currently know it, began its journey when NASA concluded that the best way to continuously monitor the health of their astronauts from ground was to appropriately harness telecommunications technology and various health monitors. Needless to state, it was quite a resounding success. Encouraged by this, various medical institutions began running experiments of their own, for example,

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Harvard Medical School set up a teleradiology referral centre in collaboration with Logan Airport. Results of the experiment were encouraging enough for other entities to conduct more ambitious ones.

This evolved into the concept of telemedicine as we know it today.

Definition[1]

WHO defines telemedicine as "the delivery of health care services, where distance is a critical factor, by all health care 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 the continuing education of health care providers, all in the interests of advancing the health of individuals and their communities".

It states that the following four elements are germane to telemedicine:

1. Its purpose is to provide clinical support.
2. It is intended to overcome geographical barriers, connecting users who are not in the same physical location.
3. It involves the use of various types of ICT.[2]
4. Its goal is to improve health outcomes.

The author however prefers the following definition that is simpler and easier to remember.

> *Telemedicine is the technology that permits delivery of care anytime anywhere to anyone irrespective of the physical location of the parties involved.*

"Telehealth" is a new term that has since arrived on the scene. From a conceptual point of view however, this term "telehealth" subsumes the term "telemedicine", since medicine is a part of health. From a technological point of view, however, they are synonymous. In order to clarify, the term "telehealth" would normally refer to areas of preventive care and wellness management, thereby implying that it is more in line to serve the purposes as underlined by WHO's definition of health, which happens to be "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity" as per its constitution adopted in 1948.

[1] The material for this section has mainly been sourced from Telemedicine: opportunities and developments in Member States: report on the second global survey on eHealth 2009 (Global Observatory for eHealth Series, 2). World Health Organization 2010 www.who.int/goe/publications/goe_telemedicine_2010.pdf.

[2] Information and Communications Technology.

Digital Health

"Digital health" is a new term that is increasingly being heard all over and rapidly catching the imagination of the concerned stakeholders. Simply put, it is an overarching term that includes all aspects of IT-enabled healthcare like eHealth, mHealth, telemedicine, medical devices, biosensors, bio-monitors, etc.

While it has become fashionable to stick as prefix the letter '*e*' to anything to indicate that the referred domain is "electronically enabled" and it is definitely debatable whether this is a good thing or bad, the practice itself does make sense. E-enabling a process definitely brings certain advantages to the stakeholders. For one, it makes things happen in quick succession regularly like clockwork, without exceptions, unless something happens to go wrong when the entire experience is likely to be more of a killjoy than anything else. Moreover, as the entire process life cycle is auditable, it becomes both transparent and optimisable.

These tools, like e-enabled monitors, IT systems, e-enabled mobile devices, etc., enable things to be done. The e-enablement of the care delivery process is what telemedicine accomplishes.

Telemedicine thus promises to make things happen not only from a distance but allows rapid intervention, almost on a one-to-one constant vigil basis even for non-critical care patients, while simultaneously ensuring that every step is audited and all deviations recorded for future reference, evaluation and process optimisation.

Medicine as a discipline exists because there are people with problems arising out of diseased conditions and state of unhealthiness when they get classified as patients. Once they become patients they need to be taken care of in a methodical scientific manner to ensure that their problems and diseased states are either eliminated in entirety or at least contained within manageable boundaries. Without the presence of a patient, there is no medicine to be practised. Now, a patient is a living, breathing, feeling being who is not at all happy with his condition—he is in torment, suffering. It is the job of the clinician to address the issues as effectively as possible to the patient's satisfaction—the higher the level the better.

Without continued access to the patient's past medical records, it is just not possible to provide the best of care. Thus, for any telemedicine encounter to take place, an EHR system containing information from the patient's medical past needs to be available on demand.

Therefore, as a minimum, the following four components are required for any telemedicine encounter:

1. Device(s) to generate data and interact (audio-visual) at the patient's end
2. Device(s) to display data/information and interact (audio-visual) at the clinician's end
3. Connectivity to link up the devices
4. Electronic health/medical record, preferably linked to the devices at the patient's end

Item numbers 1, 2 and 3 are mandatory. Item 4 is preferable but not mandatory and largely dependent on the needs and wants of the clinician. When item 4 is present, it should ideally be able to display the latest patient's clinically relevant information. This would mean that it is linked to the various devices that generate data at the patient's end and also recording the items of information that are exchanged between him and the attending clinician during any telemedicine encounter.

In the opinion of the author, having an EHR/EMR system is a great value addition. With all the various healthcare "things" (medical devices) and overreliance on investigation reports, many gathered using monitors of all sorts, shapes and sizes; it goes without saying that it becomes necessary not only to view the data but also analyse the time series trends and past records to decide on what would be the most optimal course of action when tackling a clinical situation. To facilitate this, it is vital that one has continued access to an EHR/EMR system.

Based on the encounter context, the different devices will be needed at either end. However, an indicative list of the various devices would be as follows:

1. For interactive teleconsultation sessions:
   (a) Patient's end:
   - Video-enabled messaging app
   - Chat-enabled messaging app

   (b) Clinician's end:
   - Video-enabled messaging app
   - Chat-enabled messaging app
2. For a noninteractive telemonitoring/remote care sessions:
   (a) Patient's end:
   - Wearables
   - Biosensors
   - Monitors

   (b) Clinician's end:
   - Data display unit
   - Data analytics-based alerts and warnings system (remote care only)
3. For an interactive telemonitoring/remote care session
   (a) Patient's end:
   - Wearables
   - Biosensors
   - Monitors
   - Video-enabled messaging app
   - Chat-enabled messaging app

   (b) Clinician's end:
   - Data display unit
   - Data analytic-based alerts and warnings system (remote care only)
   - Video-enabled messaging app
   - Chat-enabled messaging app

Although somewhat over-simplistic as a list, it fairly outlines the various components that are generally required and mostly suffices. Some of these will be elaborated in later chapters.

Social Media and Networking

Telemedicine is considered to be that which takes place between a person seeking medical advice and a person dispensing that advice. A third person or a group thereof can be involved provided they can be classified as either carers or other clinicians. Thus, the use of any social media should not be considered as telemedicine. The following is provided here for information and due caution should be exercised when using this medium for any health-related interactions.

Social networking is conducted using social media comprising of websites and applications that enable users to create and share content with like-minded individuals for literally anything. Special purpose groups, like focus groups, can be created, and matters are posted for others to view and comment upon. All such posts are not one-to-one but are one-to-many instead. This creates its own set of privacy- and confidentiality-related issues.

Messages and the information they contain can be used and misused in a variety of ways with little or no control, and containment being only possible after the fact when most of the damage has already occurred. Privacy is severely compromised as every available content are open to public scrutiny of the most minute kind, both warranted and unwarranted. People have suffered severe emotional trauma for even their most innocuous of posts, with the occasional tragic consequences.

People using such vehicles for information dissemination would do well to remember that they should not post anything that they do not want the rest of the world to know, for the next moment may already be too late.

The author is of the opinion that the use of such mediums for any healthcare-related discussions, let alone telemedicine, is best avoided. The risks outweigh the accrued benefits by quite a distance.

Telepresence

A new solution introduced in the mid-2000s called "telepresence" has begun to replace the traditional videoconferencing. This is an experience that creates a feeling as if one is actually physically present at a remote location, using technology, even when in reality they are not. While popular applications are found in telepresence videoconferencing, technical advancements in mobile collaboration have also extended the capabilities of videoconferencing for the use with handheld mobile devices, making it possible to be present in the same cyberspace independent of location.

Needless to say, this is what is required for any telemedicine interaction of any type between various stakeholders (patient, clinicians, doctors, dentists, nurses, paramedics, care providers, professional colleagues, etc.).