

Telemedicine: a health strategy for the 3rd decade of the 21st century

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Although Telemedicine (TM) is still associated with the idea of providing exclusively care services, in its broader sense, TM uses interactive, information, and telecommunication technology to provide services in four branches: (1) Teleassistance and Epidemiological Telemonitoring; (2) Interactive Teleducation; (3) Multicenter Research (Telescience); and (4) of Health Promotion.

TM is a disruptive innovation based on interactive technologies that allow for the restructuring of health processes associated with the use of computational and biotelemetry processes outside the clinical-hospital environment. It offers an opportunity for a closer relationship between health professionals and their patients by eliminating geographical and time barriers. With increasingly cheaper connections and of better quality, it will be possible to offer health services that go beyond the diagnosis and treatment of diseases, such as health monitoring services and increased resources to reach an early diagnosis of diseases in general.

Although TM systems make the exchange of patient data and information easier between the different levels of health care (primary, secondary and tertiary), thus favoring the optimization of resources

available in the healthcare network aiming at improving the quality of the services provided and, consequently, the benefits to the patients, the systems must have a series of digital characteristics, such as guarantee of confidentiality, privacy, integrity, authenticity, irrefutability, amongst others.

Soon, a series of services that are now considered a specialized activity or armed propaedeutics will become mandatory and routine. Some examples of medical devices include: (1) Portable ultrasound that communicates with a tablet or smartphone; (2) ECG equipment for smartphones, with individual electrodes, integrated to smart watches or smart clothes or coupled to mobile phone covers; (3) Devices and adapters to perform dermoscopy and external ocular photography using smartphones; (4) Ophthalmoscopes coupled to smartphones; (5) Otoscope and adapters for rigid or flexible endoscopes for performing examinations of the ear and throat; (6) Portable optical microscopes for smartphones, with capacity of magnification between 60 and 200 times; (7) Colposcope for smartphones: are accessories that allow performing the cervix examinations; (8) Digital stethoscopes that can be coupled to smartphones for recording auscultation sounds or small devices that,

when coupled to smartphones, can function similarly to a stethoscope; (9) digital oximeter for smartphones; (10) Smartphone-based electroencephalogram; (11) Fetal Doppler Monitor for auscultation for smartphones; (12) Smartphone-based spirometers; (13) Smartphone-based glucometers; (14) Biochips that will allow for laboratory exams with a drop of blood; (15) Other devices.

Despite knowing that the current knowledge on TM is still ongoing due to the continuous emergence of technologies, our current stage already requires an update of the regulations that establish the ethical standards for its use. Various aspects related to TM still need to be organized and discussed, such as the creation of compliance, legal and ethical aspects (systematics for teleassistance, approval of services by the Ethics and Bioethics Committees of the institutions, communication to State entities responsible when remote support is provided to other states etc.), appointment of a clinical director responsible for the Teleassistance/Telediagnosis, provision of an Informed Consent Form, Form of Legal Joint Responsibility and "Solidarity", training of professionals from both sides (client and service provider), the definition of the minimum qualification of the professional service providers (for example, the amount of practical experience in the services rendered), among others. Also, it is necessary to establish rules for quality control (regular clinical team meetings and sampling audits), record keeping, storage and confidentiality of digital data. It is worth mentioning that once there is the solidarity of responsibility, it may be necessary to keep proper records of the data for purposes of forensic audits.

Unlike the assumption that TM could compete with traditional medical activities, making dehumanizing them or causing a devaluation of professional services, it is important to realize that Telemedicine, in reality, is an innovation that can improve the systematic implementation and provision of services, increasing the efficiency, extending the coverage to users and the creation of new services that can improve the integrated chain of processes, all of which would be impossible by conventional methods. The same ethical problems related to face to face care are present in TM.

Telemedicine is currently at a crossroads that some economic sectors of society have already faced and surpassed, over a decade ago, using organized and systematic actions. For its effective consolidation

as an effective resource that allows for the broadening of the spectrum of medical and health services, TM needs to be seen as an extension and expansion of conventional health services.

If doctors focus on maintaining a good doctor-patient relationship, protecting the privacy of the patient, promoting equity in access and treatment and seeking the best possible results, Telemedicine can improve medical practice and patient care. To do this, it is necessary to structure and disseminate a responsible and effective Telemedicine, which we can define as the exercise of medicine using devices with interactive technologies to provide integrated and humanized care to patients, increase the access and efficiency of the health care system, promote health and prevent diseases.

The world population is aging, and increasingly more people will need medical assistance. If medicine continues to be practiced only in hospitals and private clinics, the demand will just not be met. However, the scenario might change, according to the analysis of a group of experts from Ernst & Young, an international consultancy agency that assists companies interested in medical market trends. According to the survey, an important part of medical assistance in the future will take place in what Ernst & Young called a "third place" (the other two are the hospital and the clinics). Such third place could be, for example, the home of patients with chronic diseases such as diabetes, obesity and respiratory problems, or where ever they are located. The key innovations in the health area will come from technologies that facilitate remote assistance, such as apps for tablets and smartphones that remind people to take medicines, for example. It is estimated that 75% of healthcare costs come from chronic diseases and this number is expected to increase. These patients would not need to be in the hospital, but require medical follow-up, which might be provided by new means. This will cause a change in the behavior of both physician and patient.

There are academic studies of meta-analysis that demonstrate the effectiveness of TM in monitoring chronic diseases in the elderly, with the following results: (1) reduction by 15% in emergency visits; (2) a reduction by 20% in hospital admissions ; (3) a reduction by 14% in elective admissions ; (4) a reduction by 14% in the number of days spent in hospital; (5) reduction by 8% in taxes expenses; and (6) reduction by 45% in mortality rates .

TM can be understood as a logistics strategy that enables processes to be optimized, health logistics improved, diagnoses streamlined, problems solved (hospitals and connected services), waste during care reduced, a multi-professional and multi-institutional approach offered, and educational activi-

ties (training and continued professional education in service), among others. It is one of the areas with the most significant growth worldwide that soon will become a valuable resource to offer services in education, assistance, and multicenter studies on a large scale.

REFERENCES

1. Bashshur RL, Reardon TG, Shannon GW. Telemedicine: a new health care delivery system. *Annu. Rev. Public. Health* 2000; 21:613-37.
2. Chao LW, Cestari TF, Bakos L, Oliveira MR, Miot HA, Böhm GM. Evaluation of an Internet-based teledermatology system. *Journal of Telemedicine and Telecare*, 2003; 9:S1:9-12.
3. Frenk J, Chen L et al. Health professionals for a new century: transforming education to strengthen health system in an interdependent world. *The Lancet Commissions*. *Lancet*, Dec 4, 2010. vol.376, p.1923-58.
4. UK Government, Department of Health: Whole system demonstrator programme: headline findings. 2011, [<https://www.gov.uk/government/publications/whole-system-demonstrator-programme-headline-findingsdecember-2011>]
5. Reducing Emergency Department Utilization Through Engagement in Telemedicine by Senior Living Communities. Gillespie SM, Shah MN, Wasserman EB, Wood NE, Wang H, Noyes K, Nelson D, Dozier A, McConnochie KM. *Telemed J E Health*. 2016 Jun;22(6):489-96. doi: 10.1089/tmj.2015.0152. Epub 2016 Jan 7.
6. Chao LW. Telemedicine, eHealth and Remote Care System. *Global Health Informatics - How Information Technology Can Change Our Lives in a Globalized World*, 1st Edition, Editora Elsevier, 168 – 194, 2016.

