

EDITORIAL

Telemedicine: brief history before exponential growth during Covid-19 pandemic

Telemedicina: um pouco de história antes do crescimento exponencial durante a pandemia de Covid-19

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“The year that has not ended”. This is how the year of 1968 may be called, since it was when several political events in the world, such as the assassination of Martin Luther King Jr. and President Robert Kennedy, the Vietnam War, institution of AI-5 in Brazil and many other political events that ended up obscuring the enormous technological development resulting from the space race and advances in satellite telecommunications. In the 1960s, the first records of the use of information technology for commercial purposes emerged, the launch of the chip by IBM and the ARPANET (Advanced Research Projects Agency Network), the embryo of the current internet¹.

Driven by the famous cartoon “The Jetsons”, set in 2062 and showing flying cars, cleaning robots and many video calls, researchers Raymond Murphy Jr. and Kenneth Bird, from Harvard University, were the first to demonstrate at scale the potential of video based telemedicine as an alternative way to assist patients². From August 1968 to December 1969, a thousand patients (yes, 1000 patients!) were seen at a medical facility at Boston’s busy international airport, in the United States, and underwent remote consultations using an ancient internal TV circuit connected to the Massachusetts General Hospital, three miles distant, assisted by a registered nurse on site.

The article reporting the experiment, published in 1974, is emblematic. It describes in detail the characteristics of the physical examination performed by video, the high diagnostic accuracy in low acuity situations and high patient satisfaction. They conclude that telediagnosis is feasible and that “the technology required is currently available. This kind of system can help bring special knowledge and skills to remote as well as less remote but medically disadvantaged areas”². It should be noticed that the image resolution was 480 x 320, less than 25% of the worst HD resolution today, and was in black and white (!).

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More than 50 years have passed and the implementation of similar projects, of larger scope and scale, proved to be more complex than initially imagined. The cost of implementing TV circuits at the time did not justify the investments, and allowed only two-way communication, without the possibility of call transfers. In the 70's and 80's the world has seen only local scale experiments, with technological evolution hampered by successive financial crises.

In the 1990s, Georgia, a state in the southeastern United States with a predominantly rural economy, financed a major telemedicine pilot project to expand access to health care. Eleven of its 159 municipalities had no doctors and more than 50% had no pediatricians³. In partnership with telecommunications companies, the project gained scale in mid-2006 and in 2010 it had already served more than 30 thousand patients and generated invaluable knowledge for the advancement of telemedicine worldwide⁴.

Despite teleconsultations between doctors and patients, mediated or not by other health professionals, are being carried out by radiofrequency or telephony since the beginning of the 20th century, video communications shift a new paradigm in diagnostic accuracy and doctor-patient relationship. In fact, classic studies conducted since the 1960s show that analyzing facial expressions and obtaining non-verbal visual elements are revealing and can be responsible for up to 55% of the components of communication between human beings⁵. In medicine, non-verbal communication is an important element of the doctor-patient relationship⁶ and the medical history taking alone can contribute to more than 80% of diagnostic and therapeutic propedeutics⁷, and a good visual physical examination could possibly add a significant part of the contribution of the clinical examination, which has not yet been objectively quantified.

The development of the internet, digital media and, more recently, a larger availability of broadband access have provided many advances in forms of audiovisual communication. From 2005 to 2017 the number of telemedicine visits has grown 52% year on year⁸, and it is estimated that in 2019 it may have reached the mark of 50 million teleconsultations in the United States alone.

Although used in the most diverse medical specialties, the greatest advances are observed in primary care, in chronic or routine follow-ups, and in the evaluation of low acuity acute clinical situations. And the latter is specifically responsible for the tipping point observed in March 2020, along with the Covid-19 pandemic, initiating an exponential cycle of technology adoption worldwide. Forecasts estimate that the number of medical telemedicine interactions in 2020 could reach more than 1 billion, including 900 million consultations related to Covid-19⁹.

Consequently, numerous questions arise regarding the quality of care provided at a distance, over the internet, including potential impair to diagnostic accuracy, doctor-patient relationship and adequate case management, which could harm the prognosis. It turns out that many studies and meta-analyses have shown that telemedicine consultations bring results comparable to face-to-face appointments, high patient satisfaction and can resolve up to 80% of cases without the need for an in-person evaluation. Such comparability is accompanied by numerous benefits, such as lower costs, long commuting rides, greater access to a logistically disadvantaged population and, obviously, a safe contagion barrier when indicated social distancing¹⁰.

Diagnostic reasoning, a fundamental component of medical thinking, usually begins with "listening to the patient", which implies the development of initial probabilities. The extraction of other information in history taking, whether through pattern recognition or deductive technique, provides elements that will positively or negatively influence the initial probabilities or, in other words, originate post-test probabilities. Sequentially, new information modifies those probabilities, until one or greater diagnostic alternatives remain, or better, one or more diagnoses are assumed.

The physical examination and diagnostic tests are not a mere bureaucratic part of the medical action, but steps that provide new information for the sequence of the exposed thought. Numerous diagnostic hypotheses have their probability little influenced by physical assessment and other diagnostic tests. More important than the dogma of face-to-face evaluation is medical thinking. If the clinical judgment of a remote evaluation implies a high diagnostic probability without the need for further exams or tests, it is a situation in which telemedicine has the same presumed benefit as a face-to-face evaluation. It is noteworthy that the quality of the diagnostic reasoning by remote evaluation may have other advantages, such as a more comfortable and less stressful environment. For both patient and medical staff, reducing discomfort and distress from commuting and waiting rooms is likely to increase the diagnostic accuracy of the history taking, as well as allow the professional to make greater bonds of trust with the patient, demonstrate empathy and have more time to explanations, without several types of interruptions.

Teleconsultations do not intend to replace the traditional evaluation and, obviously, several situations -

mainly those that are life threatening - whose hypotheses and / or treatments are certainly not established only with the information obtained by history taking and visual assessment, should be referenced to face-to-face evaluation and, possibly, further diagnostic tests. One cannot emphasize less an interesting potential of telemedicine: disseminating quality information easily and at a low cost, information issued by health professionals who regain a social protagonism, greater welcoming and insertion of patients in the health system, increasing the doctor-patient partnership and probably pursuing rational use of resources.

However, there are still many challenges to be overcome. The exact limits of the technology are still being defined and a huge amount of data will be generated, analyzed and published by telemedicine services that are growing worldwide. A quick search on the Internet shows dozens of articles already published in the last few weeks, reviewing the potentials of distance care, in multiple specialties, during the epidemic. And, outside this epidemiological moment, the amount of quality evidence is already extremely vast, showing the safety and efficacy of telemedicine in the most varied scenarios.

It is already generally agreed that the adoption of telemedicine has reached a new level and that, even with the end of the pandemic, the use of electronic means for the relationship between doctors and patients, in addition to all other professionals involved in health care, will grow significantly and will be sustained in all areas of medicine. The spreading that telemedicine is effective and the better understanding of its limits, as well as greater integration of the digital world with physical health structures, will bring greater access to healthcare for all and will guarantee greater sustainability of health systems around the globe.

The year of 1968 may have changed the world forever, but it was over a long time ago. The science fiction of videocalls shown in “The Jetsons” is already a reality accessible to a large part of the population and is being successfully applied to healthcare. The primary objective of good medicine is, and always will be, the patient’s well-being, safety and quality of care, based on science, practiced with humanism and empathy. No new technology will change that fact. Telemedicine does not alter that goal; in fact, it helps to achieve it.

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