EVOLUTION AND DEVELOPMENT OF TELEMEDICINE

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Telemedicine, telehealth, and e-health have the capacity to increase access to quality, timely, and cost-effective specialty health care. Telehealth or telemedicine? Health informatics (also called health care informatics, healthcare informatics, medical informatics, nursing informatics, or biomedical informatics) is a discipline at the intersection of information science, computer science, and health care. These technologies may not only revolutionize the way physicians care for patients but also change the way clinical care is structured with changes in workflow, quality management, and transmission of patient data. And major goal of telemedicine is to eliminate unnecessary travelling of patients and their escorts. Telemedicine is an upcoming and an important tool for providing efficient healthcare. There have been numerous efforts to define the term telemedicine. In simple terminology, it can be defined as the use of communication networks for the exchange healthcare information to enable clinical care. People have been communicating over considerable distances by sounds or visible signals for centuries. Drums, horns, and other instruments have been used - and are still used in some places - to send messages using certain sound patterns that correspond to prearranged codes. In one of the greatest of the Greek tragedies, Agamemnon, Aeschylus begins his drama with word of beacon fires carrying news of the fall of Troy and the return of the king-news that set in motion Clytemnestra's plan to kill her husband in long-delayed revenge for his slaying of their daughter. These signal fires would have required a series of line-of-site beacons stretching 500 miles across the Aegean Sea (Encyclopedia Britannica, 1989). Today, some 2,500 years after Aeschylus and 3,000 years after the events of the legend, line-of-sight transmission remains important as a critical element of modern microwave relay systems.

Not until the 1700s and 1800s, however, did a series of electrical inventions make possible a subsequent, dramatic expansion in the availability of near-instantaneous communication across long distances. This expansion began in the United States with the inauguration of intercity public telegraph services between Washington and Baltimore in 1844. During the Civil War, the military ordered medical supplies and transmitted casualty lists by telegraph, and it seems probable that some uses of the telegraph in its early decades involved medical consultations (Zundel, 1996).

In 1876, Alexander Graham Bell patented the telephone, a device for electronic speech transmission. Bell's investigations arose, in part, from experiments to develop multiplex telegraphy that would allow several telegraph messages to be sent simultaneously over the same wire.

Commercial applications quickly followed Bell's patent, and long-distance telephone links began to appear in the 1880s. Since then, a continuing stream of technological innovations has improved the usefulness of telephone communication. These innovations include manual switchboards to connect multiple telephone lines, loaded circuits to reduce distortion over long distances, vacuum tube amplifiers to boost signals, and automatic switching systems, to name just a few. Telephone circuits can also carry still and video images, as well as, audio signals and data, and radio signals have been used to extend the reach of telephone communication.

These technical advances significantly extended the foundation on which telemedicine could build. Furthermore, at least five generations of users have created and passed on a legacy of technologies, behaviors, and expectations that make telephone communication commonplace. Parents give children telephone toys and let them answer real telephones at an early age; adults who find a child answering their calls generally tolerate and even enjoy participating in this early education in telephone technology. The other technologies on which telemedicine relies, such as the personal computer work station, are at varying stages of integration into everyday personal life or health care delivery.

Telemedicine has been a technological takeaway for the developed world. Since the first documented use of

telemedicine at the University of Nebraska College of Medicine in 1959, telemedicine has been growing progressively. Telemedicine, a term coined in the 1970s, which literally means "healing at a distance", signifies the use of ICT to improve patient outcomes by increasing access to care and medical information. Recognizing that there is no one definitive definition of telemedicine – a 2007 study found 104 peer-reviewed definitions of the word – the World Health Organization has adopted the following broad description: "The delivery of health care services, where distance is a critical factor, by all health care professional 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".

Once telemedicine system is deployed and is placed, then there is a need of project champions, who will implement the telemedicine program. The three major champions are clinical champion, IT champion, and telemedicine champion. Success of any telemedicine program depends on these champions but these champions are very few in developing countries, so most of the deployed telemedicine program die very soon after their piloting. The many definitions highlight that telemedicine is an open and constantly evolving science, as it incorporates new advancements in technology and responds and adapts to the changing health needs and contexts of societies. Some distinguish telemedicine from telehealth with the former restricted to service delivery by physicians only, and the latter signifying services provided by health professionals in general, including nurses, pharmacists, and others. However, for the purpose of this report, telemedicine and telehealth are synonymous and used interchangeably.

Four elements are germane to telemedicine:

➢ It is purpose is to provide clinical support.

➢ It is intended to overcome geographical barriers, connecting users who are not in the same physical location.

➢ It involves the use of various types of ICT.

➢ Its goal is to improve health outcomes.

Telemedicine results from the contribution of Information and Communication Technology (ICT) towards heath care, and the improving health and welfare of society. This is achieved by providing ubiquitous health care services to remote regions. Telemedicine has many advantages. The biggest considerable advantage of telemedicine is the savings of time (travel to appointments, requirements for both patient and professional to be available, administrative tasks, etc.), cost (organizational work load, administrative resources, reduced travel, utilization of consultation services at a distance, etc.), and effort for a patient. Telemedicine can be extremely beneficial for people living in isolated communities and remote regions and is currently being applied in virtually all medical domains. Patients who live in such areas can be seen by a doctor or specialist, who can provide an accurate and complete examination, while the patient may not have to travel or wait the normal distances or times like those from conventional hospital. Specialties that use telemedicine often use a 'tele-prefix'; for example, telemedicine as applied by radiologists is called 'teleradiology'. Similarly, telemedicine as applied by cardiologists is termed as 'telecardiology', etc. Telemedicine can be used as a teaching tool, by which experienced medical staff can observe, show and instruct medical staff in another location, more effective or faster examination techniques. It improved access to healthcare for patients in remote locations. "Telemedicine has been shown to reduce the cost of healthcare and increase efficiency through better management of chronic diseases, shared health professional staffing, reduced travel times, and fewer or shorter hospital stays."

Effective telemedicine will dramatically improve the ability of mid-level providers (e.g. physicians assistants, nurse practitioners, etc.) to participate in healthcare delivery to underserved populations. Developments in telemedicine should recognize this important link and fully develop its potential.

Although comprehensive telemedicine research and evaluation still is lacking, examining the history of telemedicine reveals a number of lessons. Applications seem to have fluctuated between complex technologies and

applications and extremely simple ones. Fully integrated telemedicine will require high bandwidth and robust technologies. Store-and-forward applications transmitted through the Internet appear elegantly basic. The same societal challenges to implementation remain, regardless of technology.

Telemedicine also provides opportunities for learning and professional development by enabling the provision and dissemination of general information and the remote training of health-care professionals. "Telemedicine creates a university without borders that fosters academic growth and independence." The knowledge sharing that occurs as a result of inter-site collaboration may be formal or informal and has shown to aid health-care professionals in overcoming the professional, and to improve their skills and the services they offer.