

# Telemedicine in Healthcare Organisations

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## INTRODUCTION

Diminishing funds from the government and cost control led many health care providers across the globe to search for alternative and more cost-effective means of providing care (*Edelstein, 1999; Neame, 1995*). In many cases, this has become necessary for survival (*Edelstein, 1999*) in order to sustain the increased competition as well amongst health care providers. The business of health care has become so competitive that many small rural hospitals are trying to align themselves with larger tertiary care centres in a community health information network, a telemedicine network, or some other type of partnership in order to survive and to retain their local patients (*Huston & Huston, 2000*).

Telemedicine means medicine from a distance where distant and dispersed patients are brought closer to their medical providers through the means of telecommunication technologies (*Charles, 2000; Noring, 2000; OTA, 1995; Perednia & Allen, 1995; Wayman, 1994*). *Noring (2000)* provided an interesting comparison between the former definition of telemedicine and tele-health, where the term tele-health is defined as expanding the capacity of telemedicine to provide the full continuum of care, from health promotion and disease prevention through curative treatment and terminal care. Tele-health also implies including non-physician based health care providers.

Some researchers even envision telemedicine to be an important building block in the strategic plan of many health care organizations (*Charles, 2000*). Within these challenges, telemedicine emerges as one possible solution to health providers in reaching out to rural patients (*Charles, 2000; Harris, Donaldson & Campbell, 2001*), to areas where patient volumes for certain services are limited (*Edelstein, 1999*), to conduct administrative and clinical meetings, and to conduct different training courses to: patients (smoke treatment centres), doctors, nurses, and other medical staff (*Perednia & Allen, 1995; Wayman, 1994*).

This research is interested in introducing the concepts underlying the telemedicine technology. The research will highlight the different advantages/disadvantages of this technology, and hence project different motivators and inhibitors to the adoption and use of this innovative technology in health care delivery.

## BACKGROUND AND IMPLICATIONS

The first telemedicine initiative emerged in 1959 by employing video conferencing (VC) sessions for medical purposes by using microwave link for telepsychiatry consultations between the Nebraska Psychiatric Institute in Omaha and the State Mental Hospital 112 miles away (*Perednia & Allen, 1995*). Since then, telemedicine started to grow in different parts in the world. For example, in the late 1980s telemedicine was being used routinely to deliver general health services to remote regions of Norway (*Noring, 2000*). In the 1990s, telemedicine started to emerge in New Zealand and to be used successfully in Australia. In the United States, interest in telemedicine was initially focused on its use in the military, in space programs, on offshore oilrigs, in prisons, and in rural areas (*Noring, 2000*).

Telemedicine covers a wide spectrum of benefits through its use in areas such as consultations, diagnostics, therapeutics, transfer of patient related records, case management, training, and meetings. In a rural setting, telemedicine could help health care providers in supplying quality, fast, and economical medical services to rural patients, and hence saves doctors and patients valuable time wasted in commuting large distances. Specialists could utilise this extra time in seeing more patients at the main hospital.

The applications of telemedicine vary from full-motion and interactive video consultations to “store and forward” technologies where static images or audio-video clips are electronically captured, stored, and transmitted to a remote server such as electronic mail (e-mail) using public or private communication channels. The advantage of store-and-forward technology is that it prevents the need for simultaneous availability of the consulting parties. Radiology, dermatology, and pathology are especially suited to a store-and-forward format. Let’s not forget that the earliest form of telemedicine technology was the telephone system, where physicians used to call their patients (e.g., psychiatry) to follow-up a treatment or to check whether they are taking their medicine on time.

However, the telemedicine technology was not successful in its initial stages. *Perednia and Allen (1995)* reported limited telemedicine growth and pointed to the fact that only few telemedicine projects were instituted in

the 1970s and 1980s at several sites in North America and Australia. They confirmed that none of the programs begun before 1986 has survived. Although data are limited, the early reviews and evaluations of those programs suggest that the equipment was reasonably effective at transmitting the information needed for most clinical uses and that users were for the most part satisfied. However, when external sources of funding (donations) were withdrawn, the programs disappeared, indicating that the single most important cause of their failure was the inability to justify these programs on a cost-benefit basis and the failure of these hospitals in addressing the importance of the telemedicine technology as one important tool amongst the other important medical tools in the hospital. Other issues, such as limited physician acceptance, played a less significant role in their downfall (Perednia & Allen, 1995).

However, there are other reasons that affect telemedicine success in health care organisations. Technological limitations were one of the major impediments. For example, until recently, transmission of a high-resolution, real-time video signal was possible only through the use of expensive equipment such as satellite systems and microwave towers. Recent developments in digitisation and data-compression technologies allow transmission of enormous amounts of information needed for video with much less bandwidth at a much lower price. While the equipment cost for video conferencing systems is relatively high, decreasing costs of hardware, software, and transmission suggest that high-resolution, full-motion VC may soon be available to medical clinics and offices at very economical prices. The wide diffusion of wired and wireless telecommunications infrastructure in rural areas has assisted many rural health care centres to interlink with speciality hospitals very easily.

Due to such technological facilitations and enhancements and increased awareness and knowledge about telemedicine technologies and applications, telemedicine witnessed another growth-phase in the 1990s. The innovative return of telemedicine since the early 1990s inspired many innovative ideas. For example, BMI British Midland has become the first airline to install telemedicine technology on planes making long-haul flights to the U.S. Virgin Atlantic has also purchased the system and will start installing it in long-haul aircraft this year. The device monitors blood pressure via a wrist cuff, pulse rate, temperature via an ear probe, electrocardiogram, blood oxygen and carbon dioxide levels. Using a modem, these are sent to physicians who can advise the crew on what action to take (Anonymous, 2002).

However, this growth was not in a straightforward manner and the telemedicine technology started to face different forms of complications. As the technology penetration in health care increases, different organisational,

technological, environmental, political, individual and economical factors started to surface and to influence its success. Initially, the views about VC effectiveness in the medical area vary from one adopter to another. Depending on one's viewpoint, VC can be seen as a valuable tool for providing immediate specialty care services to rural areas, a more efficient use of existing medical resources, a way to attract patients living outside a hospital's normal service area, and a way of bringing international health care dollars. On the other hand, others could see it as a serious misallocation of increasingly scarce health care dollars (Perednia & Allen, 1995).

In review of the literature it was observed that despite the rapid growth and high visibility of VC projects in health care (Grigsby & Allen, 1997), few patients are seen through the VC for medical purposes. In almost every VC project, tele-consultation accounts for less than 25% of the use of the system (Perednia & Allen, 1995). The majority of the online time is used for medical education and administration (Hassol, 1996; Perednia & Allen, 1995; Wayman, 1994). Such result eliminates one of the most important functions of the telemedicine technology in health care delivery. The low level of usage can be explained in part by the federal government's position on reimbursement for telemedicine consultations (Hassol, 1996). However, Hassol (1996) pointed to other issues that need to be resolved first before the significance of VC could be realised. The important unresolved issues revolve around how successful VC can be in providing quality health care at an affordable cost and whether it is possible to develop a sustainable business model that would maintain profitability over time. This depends on (Perednia & Allen, 1995):

- i. Clinical expectations: health care organisations need to be clear about the intended use of the telemedicine technology in their organisations; for example, will telemedicine be used for medical or administrative purposes; will it be used for general medical purposes or in certain medical specialities.
- ii. Matching technology to medical needs: upon satisfying the preceding condition, the telemedicine technology needs to be integrated in the health care area in the sense that telemedicine is being seen as an integral medical tool, not an optional one. A complete protocol needs to be devised that could oversee the effective integration and use of the telemedicine technology in the health care area.
- iii. Economic factors like reimbursement are major issues in countries such as the U.S. with vast geographical areas and different interstate laws and regulations. Accepting telemedicine encounters by health insurance companies could assist in increasing telemedicine success and diffusion.

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