



## Global Telemedicine and the Elderly

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### Introduction

Health and well being are predominant concerns among the elderly. In fact, the elderly face the full drama of life. After gaining experience, knowledge and skill, they face the prospects of declining health, diminished resources, and an inevitable end drawing nearer.

The purpose of this paper is to examine the potential for telemedicine to address health concerns among the elderly on a global basis. Of necessity, the global position of the elderly must first be briefly addressed here, as well as their basic needs that might be particularly relevant to their health status and social well being. Once these issues have been clarified, the potential role of telemedicine to address these basic health and social needs can be articulated, including a proposed typology of global telemedicine programs as well as significant issues facing their development. The paper concludes with a discussion of an agenda for action and the human dimensions that must be considered in developing global telemedicine programs for the elderly.

### The Position of the Elderly

The problem of defining the elderly aside, a trend of increased longevity is one of the characteristics of today's world. About one of every ten persons is now 60 years of age or older; and by 2050, one out of five will be 60 years or older (UN 1998A). Moreover, within the older population, persons who are 80 years of age or older constitute the fastest growing age group in the world. Indeed, the aging of populations, already much in evidence in developed countries, is becoming a reality, though to a lesser extent, in lesser-developed

countries. For many countries, for example, those in the Eastern Mediterranean, the aging of the population is a comparatively new trend. In 1997, the United Nations estimated that by the year 2025, over 70 percent of the world's older (defined as age 60 years or older) population will be living in developing countries.

Despite these positive trends, it must be realized that actual longevity is far from geographically homogeneous. The AIDS pandemic is taking its toll on the life expectancy in some developing countries, and the economic instability and political upheaval experienced by other countries are having adverse effects on the health and survival rates of their populations. The latter is particularly evident in some countries emerging from post-cold war period. For example, the United Nations has identified the following problems in relation to aging in some central and Eastern European countries: **1)** decreasing life expectancy, particularly for men, **2)** malnutrition, manifested in some countries from hunger, **3)** deteriorating housing conditions, including homelessness, **4)** decline in provision of health and social care, particularly noticeable in the lack of preventative and rehabilitative services; the underdevelopment or absence of geriatric-specific medical and social care; and the diminishing ability of families to care for their older members, **5)** increasing need for financial support among a growing number of people in retirement and at the pre-retirement age; and, inefficient pension schemes leaving large numbers of people on limited pensions.

Though the health, lifestyle and service requirements for the elderly vary from country to country, as well as within sections or re-

gions of the same country, the older populations are particularly vulnerable in unstable economies. This is true in both developing and developed countries. Of course, this heterogeneity has important implications for the elderly's health and well being as well as their ability to obtain needed health care. Hence, it is apparent that the context and process planning and implementing global telemedicine programs for the elderly are highly complex.

### **Health Needs of Older People**

The United Nations International Plan on Aging includes a number of recommendations pertaining to the health and well being of the elderly that are instructive for developing a framework for global telemedicine programs to address these needs (United Nations, 1998 B). In many countries, studies have revealed that successive cohorts of the elderly arriving at the same age have better levels of health as compared to their predecessors. Nonetheless, the aging process is typically and universally associated with a decline in health and a greater need for health services, including ameliorative, restorative, preventive, and therapeutic services, as well as social support. Indeed, both the incidences of various forms of pathology and degenerative processes are concomitants of increasing age in later life. Conditions related to chronic illness, disability, and serious mental health problems such as dementia and depression tend to increase in older age. And, from an economic point of view, the "elderly" manifest a disproportionate share of need for health care, and the attendant costs of this care are disproportionately large.

All these occur while the elderly face declining financial resources. Given this situation of increased needs and reduced resources, a number of general recommendations related to the health and well being of the elderly are contained in the United Nations Plan. Among the specific recommendations were: **1)** care should be designed to alleviate the handicaps, re-educate remaining functions, relieve pain and maintain the lucidity, comfort and dignity of the elderly, **2)** care of the elderly persons should go beyond disease orientation and should involve their total well being, taking into account the interdependence of physical, mental, social and environmental factors, **3)** early diagnosis and appropriate treatment are required, as well as preventive measures, to reduce disabilities and diseases of aging, **4)**

particular attention should be given to providing health care to the very old, and to those who are incapacitated in their daily living because these may be among the least mobile and in need of care from facilities located close to their residences and/or communities, **5)** health and health-allied services should be developed to the fullest extent possible in the community, and the necessary health infrastructure and specialized staff to provide complete geriatric care should be made available, **6)** there should be international exchange and research cooperation in conducting epidemiological studies of local patterns of health and diseases and their consequences together with investigating the validity of different care delivery systems.

While these recommendations are laudable, they remain idle promises until appropriate and effective instrumentalities for achieving them are developed and implemented. In most countries, majorities of the elderly are faced with declining financial resources and increasing dependency on public assistance programs and/or the extended family. In the latter instance, however, the changing nature of the family structure in many countries, in the aftermath of urbanization and industrialization, is curtailing this source of support. Additionally, from a U.S. perspective as well as that of several other countries, the recognition of increased numbers and needs of the elderly, in comparison to the remainder of the population, have accelerated pressures for cost containment strategies in health care expenditures. Hence, the challenge is to devise systems that can address the multi-faceted needs of a growing segment of the population, which is faced with declining health and dwindling financial resources, and to do so within severe budget constraints. These goals are elusive, and there are various factors which inhibit their achievement. These factors include inefficient modalities of care, geographic location and distance, time to accomplish tasks, separation of people from resources, and outdated organizational structures.

### **A Global Telemedicine Typology**

If designed and implemented properly, telemedicine can provide a low cost alternative and a supplemental source of care and support for the aging population in various countries. Indeed, if designed and implemented properly, telemedicine holds substantial promise for improving the health and well being of the

elderly on a global basis at reasonable cost. It can do so in several different ways, which will be explained later. It is, therefore, instructive to consider the types of systems available that can be utilized for this purpose. The typology presented here demonstrates the range of systems available and, importantly, the flexibility possible in designing regionally and needs-based telemedicine programs.

Essentially, telemedicine programs can be classified into two types of systems on the basis of communications linkages, namely, *dedicated systems* and **web-based systems**. Dedicated systems provide linkages between a specified set of partners that are reasonably, though not totally, secure. Within dedicated systems a number of options are available in terms of connectivity, partners and functions. Connections may be point to point (e.g., hospital to hospital) or point to multi-point (hospital to remote clinics). And, connections' partners may be institutions (e.g. hospitals, clinics) or provider networks (e.g., tertiary hospitals, secondary hospitals and clinics). Dedicated systems can perform several clinical, educational and research functions. These include teleconsultations for the remote diagnosis and treatment of various health problems; second opinion for critical or high risk cases; the development of uniform treatment protocols; joint interactive educational activities for providers; and multi-site clinical trials for clinical interventions, procedures and medications.

The other type of telemedicine programs consists of "web-based" or Internet systems. The connections in web-based systems are multi-point, and they can be designed to connect all participants within a network to each other (an intranet), or to connect participants from several different networks (an Internet). A global term is now used to refer to the network that connects all countries through its web of networks, the World Wide Web (www). Because of the universality of the Internet and the way it is designed, information that travels on its links is highly exposed. Although firewalls have been developed to protect information traveling on the Internet, including password and encryption, web-based systems are not fully secure, as indeed are other wireless systems. To be sure, dedicated systems can be breached as well.

Currently, web-based systems can be classified into two types: formal and informal, depending on their links to institutional

frameworks. The partners in formal web-based systems are either institutions or providers who collaborate in any number of clinical, educational, and/or research activities. Essentially, these types of systems are very similar to dedicated systems in terms of functions. The major difference is the type of communication link being utilized. Hence, web-based formal systems are capable of essentially the same functions as the dedicated systems, including clinical consultations, second opinion, uniform treatment protocols, education, and clinical trials.

Typically, informal web-based or network systems are not based on affiliations or partnerships, and they tend not to be exclusive. Nonetheless, the participants in informal networks may interact with each other on a regular basis. Often they exchange unfiltered information (i.e., it may or may not be scientifically valid), and they initiate and/or receive help from volunteers. They may place questions to a worldwide audience without knowing in advance the identity or the credentials of the respondents. Information may be placed on the Internet, and users can interact with other users as individuals or members of special or ad hoc groups, by sharing information or providing support to each other. Some users in these kinds of networks may simply seek information without trying or wanting to interact with other individuals. Hence, it is not necessary for participants to interact with each other in these kinds of systems, and participants can be individuals, institutions, professional providers or other caregivers. Informal web-based systems are especially suited for virtual self-help groups who provide social support for individuals with specific health or social needs, or for individuals suffering from specific diseases. In addition, they serve informal referral networks, and they provide information on health promotion/disease prevention, diagnoses and treatment of various diseases.

### **Legal and Regulatory Constraints**

Regardless of the systems being considered, however, developers of telemedicine programs are likely to be faced with a number of potential legal and regulatory impediments or constraints. These constraints vary from country to country, and they become quite complex when crossing national boundaries. They include issues of individual autonomy,

specifically privacy, confidentiality and informed consent; legal liability issues such as jurisdiction and venue in cases of litigation; and other significant constraints related to intellectual property rights, professional licensure and credentialing, as well as reimbursement when professional or consultative services are rendered and fees are indicated. These constraints apply differentially based on the type of system employed, the partners, and the functions provided by the system. Nevertheless, the wide range of legal and regulatory constraints must be taken into consideration when developing any telemedicine system in which sensitive information is exchanged or patient care is involved. And, the region within which a system is developed largely determines the degree to which these legal and regulatory constraints influence global telemedicine development. In other words, ideally telemedicine programs would start out nationally, and then disseminate internationally. This way, they will have national roots and international branches.

Though global recommendations have been made for improving the health and well being of the elderly, the needs of the elderly vary widely from place to place, and the programs to meet these needs are a national responsibility. Interestingly, identifying the "elderly" and the "aging" in a population is largely determined by the demographic measurement selected for use. Therefore, identification of the elderly may be purposive and vary even within a country depending on the measurement function employed. Acknowledging the measurement and identification problem, there is little doubt that the needs of older people vary widely from place to place around the world. For example, health needs of the older people in Africa south of the Sahara are largely related to infectious and acute diseases, while those of Western Europe pertain to chronic diseases. Among countries in transition in central and Eastern Europe, the health of the elderly may be largely related to problems of nutrition and diminished resources.

In each area, the problems facing the elderly in cities related to accessibility to care and to health programs may be quite different from those of older people living in rural areas. Thus, the development of global telemedicine programs for the elderly is a complex process that must necessarily rely on country and even

sub-country epidemiological information. Such information would not only identify the specific health needs that must be addressed, but must also form the basis for designing the appropriate technological solutions that might be implemented. In brief, the concept of a global telemedicine system for the elderly must consist of a regionally and functionally hierarchical system capable of handling a wide variety of problems. Some of the problems may best be handled within the same country or region utilizing its own resources, whereas certain problems may be uniquely suitable for cross-national programs.

### **The Human Dimension**

Issues pertaining to type of telemedicine system and the level of technology to be employed, as well as various legal and regulatory constraints from region to region and country to country, have considerable impact on the potential to develop and implement a global telemedicine strategy to serve the elderly. To these constraints must be added another very important dimension, namely, the human dimension. Despite recent statements pertaining to the emergence of a "global village" and the increased interaction, integration and even homogenization of regional societies and cultures, important human differences do persist. And, as fast transportation and efficient telecommunications have brought the world closer together, so too would telemedicine diminish the disparities in health care systems across countries. Nonetheless, the cultural, linguistic, and other differences in human factors from place to place still constitute formidable barriers to the development of true global telemedicine programs for the elderly.

While English is spoken by some of the people in many parts of the world, the trend is not universal. Language remains a significant challenge to the concept and reality of global telemedicine. Beyond the ability to communicate in a common language, however, there are significant differences that relate to the conception of health and disease, including the reporting of symptoms, clinical protocols, and health seeking behaviors. For instance, illness behavior varies from culture to culture and even between social groups within the same culture. Thus, the medical care delivered in a global system must take into account the wide variety of illness behaviors as well as what is believed to be appropriate care. Generally, this

means that the "Western model" of medical care may not be appropriate in certain parts of the world, and it will have to be modified or adapted to the regionally specific concepts of illness behavior (Groves, 1996). In other words, the health care delivered in a global telemedicine system for the elderly must be "filtered" through the specific medical or health culture of a region, and some new common ground will have to be established. Without a common frame of reference, communication and mutual understanding will be difficult if not impossible, and neither health providers nor the elderly themselves are likely to accept the innovation. If they are to succeed, global telemedicine programs must necessarily develop common frames of reference and common standards of communication that are culturally sensitive. They must be designed to incorporate different concepts of illness. At the same time, they must develop standardized protocols for reporting clinical symptoms, medical history, exchange of other health information and imaging, and clinical decision making.

Despite substantial and dramatic improvements in human factor engineering in the design of basic telemedicine technology, these issues continue to be of critical importance. Emphasis must be placed on making elements of the system even more "user friendly." In brief, telemedicine technology must be developed such that it can be used and maintained with a minimum of training and sophistication. At the same time, health providers and technicians must be able to use telemedicine regardless of location. The human-technology interface must be simple, direct and understandable.

On a global basis, issues regarding human factor engineering are closely intertwined with the availability and accessibility of technological resources in each country. The distance of countries from and the position of countries along the information highway make the concept of a truly global telemedicine system for the elderly formidable. At one end of the spectrum, some developed countries are situated on the information highway and have a comprehensive infrastructure capable of supporting "state of the art" telemedicine technology. However, many countries are located some distance from the information highway and, at least in the foreseeable future, will remain isolated from it. Put simply, some countries cannot afford sophisticated telemedicine tech-

nology and are not prepared for it. Therefore, a global telemedicine system must be capable of adapting to the level of technological infrastructure available and affordable from place to place.

### **Agenda for Action**

Telemedicine has been proposed as a feasible solution to various problems facing the elderly. Yet, telemedicine is not an antidote to aging. It offers some unique opportunities for re-distributing health care resources; for providing ready access to health information, health support and technical expertise; and for expanding the reach of individuals (both clients and providers) beyond their geographic and time constraints.

As the preceding discussion suggests, the challenges facing the development of global telemedicine programs for the elderly are many and complex. The challenges are made even more sobering by the fact that telemedicine itself is in its infancy. We must develop an agenda for action to begin the process of developing global telemedicine programs. Obviously, the programs themselves cannot be developed and deployed "overnight" as a total package. And, yet it may be sub-optimal to develop them in "piece meal" fashion.

A comprehensive survey of the telemedicine experience of various countries would be an appropriate starting point. It would document the different types and applications of telemedicine, the technologies used, costs and benefits, trends, and prospects for global standards. Uniform and standardized guidelines and recommendations to developing countries for the implementation of telemedicine services are needed as well. And, a set of pilot telemedicine projects for developing countries should be put in place.

Meanwhile, in developed countries, the extension of telemedicine for the care and well being of the elderly should be explored further. For example, while the clinical effectiveness and cost effectiveness of home health care for the elderly remain to be fully demonstrated, a variety of technologies have been tested including monitoring devices and interactive video (via cable systems) that can help reduce visits to the emergency room, hospitalization, or clinic visits. And, home-based telemedicine could be particularly effective for post acute hospital care, post-operative care, and for monitoring chronically ill patients with such

conditions and disabilities as diabetes, congestive heart failure, high blood pressure, asthma, or physical limitations in activities of daily living. In-home monitoring also allows preventive measures to be taken before problems get so severe that hospitalization becomes necessary. This could be particularly helpful to people whose mobility is limited or who may not be well enough to travel. Telemetric devices for providing in-home electrocardiograms, weight, glucose measurement and blood pressure readings could prove to be a cost-effective method of care by reducing medical visits for conditions that are not severe but require on-going monitoring for optimal outcomes.

Access to a range of medical specialties can be provided cost effectively by telemedicine to residents of long-term care facilities. Travel time, cost, and inconveniences are avoided by eliminating or minimizing travel except in cases where the consultative diagnosis shows that it is necessary for treatment, thereby improving the quality of care and reducing patient risk. However, the electronic transmission of patient records, including digital images, would be more economically supportable in a managed care environment, which is not concerned about reimbursement for each unit of service.

Family members who serve as caregivers for residents in long-term care facilities as well as elderly individuals living independently can benefit as consumers of health education delivered via communication networks, expanding their knowledge of topics related to their relatives' or their own problems. Primary care physicians and other caregivers could learn from increased direct interaction with specialists located in various countries, and from formal educational programs and materials originating from various locations.

Although telemedicine is not a panacea or a universal solution to health care delivery problems of the elderly, it provides an important enabling technology, which is fast becoming ubiquitous. Ultimately, the potential of telemedicine to make a meaningful contribution to the health and well being of the elderly on a global scale will depend upon: **1)** existing and emerging telemedicine technologies becoming less expensive, compatible with each other, scalable in complexity and size, and more widely deployed, **2)** demonstration of appropriate health care applications uniquely

suitable to serve the health and health care needs of the elderly, **3)** development of "user friendly" technologies, culturally sensitive systems, and universal standards and protocols, **4)** determination and dissemination of results about the real benefits (and costs) of implementing telemedicine in its various forms and configurations, particularly as they relate to the elderly, **5)** development of integrated regional strategies for supporting the health and well being of the elderly in their home communities.

The question then is not whether we can afford to use telemedicine to improve the health and well being of the elderly on a global scale. Rather, if we are to improve the health and well being of the elderly in the 21st Century, the question is, can we afford not to use telemedicine?

### References

1. Groves, T (1996), "SatelLife: Getting Relevant Information to the Developing World," *British Medical Journal* : 1996:313
2. United Nations (1998 A), Department of Economic and Social Affairs, Division for Social Policy and Development, "Launch of the International Year of Older Persons, " *Newsletter*, Issue 9, November, 1998.
3. United Nations (1998 B), Population Division "The Sex and Age Distribution of the World Populations," Adapted from the Fourth Review and Appraisal of the International Plan of Action on Aging, 1998.

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