INTERNATIONAL TELECOMMUNICATION UNION

**TELECOMMUNICATION
DEVELOPMENT BUREAU**

ITU-D STUDY GROUPS

**Document 2/061-E
31 May 1999
Original: English**

SECOND MEETING OF STUDY GROUP 1: GENEVA, 30 AUGUST - 3 SEPTEMBER 1999
SECOND MEETING OF STUDY GROUP 2: GENEVA, 6 - 10 SEPTEMBER 1999

FOR INFORMATION

Question 14/2:   Fostering the application of telecommunication in health care. Identifying and documenting success factors for implementing telemedicine

STUDY GROUP 2

SOURCE: RAPPORTEUR FOR QUESTION 14/2

TITLE: SUSTAINING TELEMEDICINE PROJECTS IN DEVELOPING COUNTRIES

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Abstract:

After giving some background on the history of telemedicine, this document relates the benefits gained from telemedicine, as well as some important issues to be taken into consideration when implementing telemedicine projects. It explains in particular how these "may stand on their own feet" after having been put into operation, that they need not depend on outsiders for support, and that they are seen as building local capacity.

Introduction

Although there are many definitions of telemedicine, it generally means the delivery of medical or health care services over distance by means of telecommunications. Some distances have truly been extraordinary. Telemedicine has been delivered to climbers of Mt. Everest, to researchers in Antarctica, to crew aboard ships and to passengers aboard aircraft.

The functionality and portability of telemedicine equipment were put to the test in May 1998, when a team of climbers and physicians began their ascent of Mount Everest and used satellite communications to monitor for the first time the physiology of the climbers from base camp.[1] The task was to push the limits of experimental biosensors and state-of-the-art computer and telemetry

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[1] "Taking telemedicine to the extreme 4 climbers seeking the summit of Everest will be linked by satellite to doctors in the USA" by Tim Friend in *USA Today*, 21 April 1998.

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hardware. The four climbers wore sensors that monitor oxygen in the blood, heart rate and temperature.

The French Polar Research and Technology Institute (IFRTP), the St-Anne Military Hospital in Toulon and the French Austral & Antarctic Territory (TAAF) administration have collaborated in putting in place and assessing an operational medical tele-expertise system to improve health care for those at polar scientific stations on three islands in the Kerguelen archipelago, New Amsterdam Island and Crozets Island in the southern Indian Ocean and the Dumont-D'Urville station on the Antarctic continent. People in charge of scientific programs or logistic support live there for periods ranging of up to 18 months. They use satellite communications to exchange radiological, pathological and other medical and patient data between the doctors and psychologists at St-Anne hospital and the remote bases more than 12,000 km away.

In September 1997, during the flight test of a MD-11 aircraft, prior to its delivery to Saudi Arabia, medical data was transferred via an Inmarsat satellite to several ground-based locations. EKG electrodes attached to a person in the aircraft were linked to a monitor with an RS232 output which in turn was linked to a standard PC. Containing EKG graphical display software developed by DRS Imaging, the PC was linked via modem to a Honeywell satellite terminal. The real-time EKG data was transferred to several cardiologists in the Winterhaven Hospital in Florida, and to the Yuma, Arizona, flight test facility. In Yuma, a video camera captured the data transferred from the aircraft to a PC, including one transmission of a digital image of an eye taken on board the aircraft using a high resolution medical camera.

Bringing the benefits of health care to rural areas in developing countries is no longer held back by the limitations of technology. Satellites and other means of communications enable links between continents as well as between cities and rural areas.

While most of the experience of telemedicine has been gained in the developed countries, the developing countries have begun some pilot projects. In early 1998, a telemedicine link was inaugurated between Beira and Maputo, the first such link in Mozambique and one of the first in Africa. The central hospitals in the two cities have received telemedicine work-stations designed for exchanging medical documents of patients such as radiographs, laboratory results, spoken or written messages. Doctors at the hospital of Beira are now able to refer cases to Maputo for a primary or second opinion. The equipment makes it possible to send a patient record in advance of hospitalisation in order to check if a transfer of a patient is necessary. The establishment of a link between the two sites is also beneficial for clinical and educational purposes.

Jordan initiated a telemedicine pilot project in 1997, which was believed to be the first instance of a remote electrocardiogram (ECG) monitoring service in the Arab World. Normally, ECGs are carried out hospitals or clinics where the patient is physically attached to an ECG machine and the doctor simultaneously diagnoses the patient's condition. By using a small, portable monitor, subscribers can transmit an ECG via telephone, air-to-ground radio, ship-to-shore radio or a cellular phone. The transmission is received at a medical centre which has a cardiologist who can interpret the results and provide a diagnosis of the distant patient.

Telemedicine is often equated with expensive equipment and bandwidth-hungry delivery systems in America, Europe and Japan. However, the deployment of telemedicine technologies in developing countries need not cost the moon, as a recent WHO report noted: "Information and communications technologies are evolving rapidly. The costs of both equipment and use are falling. The growth in use of the Internet continues to be exponential. Many countries now recognise the importance of telecommunications for social and economic development. Consequently, significant new

investments are being made in telecommunications to extend and improve networks in many countries."[2]

With the rapidly declining cost in hardware and telecommunications, the level of interest and the corresponding activity in telemedicine is rising rapidly.

Benefits

Financing telemedicine, as with other public services such as tele-education and environmental protection, is likely to depend on the expected benefits or revenue forecasts . Among the benefits of telemedicine are these:

- savings from reduced travel costs of patients and/or doctors;

- savings on hospital accommodation of patients who can be treated remotely;

- savings from avoiding the need to expand or build new central hospitals when health care can be delivered remotely (i.e. the difference in the construction and running costs of facilities);

- centralisation of specialist resources – i.e., specialists are not needed in all regional or secondary hospitals.

Some benefits have a perceived value but the actual value is somewhat more difficult to determine. Such intangible benefits include:

- better opportunity for consultations and second opinions resulting in avoidance of delays or costly mistakes;

- reduced loss of income for patients who need not travel;

- reduced expenses for family members who might otherwise accompany the patient;

- improved effectiveness of specialists: more patients can be reached without the need for the specialists to travel;

- improved overall health-care management;

- improved availability and reduced cost of training of local medical specialists.

The ITU Rapporteurs Group on telemedicine has identified some benefits which are particular to developing countries. In their view, telemedicine could

- be used to broaden and improve the quality of health care;

- improve the motivation of health care professionals who might otherwise feel isolated from others in his profession or discipline; the high turnover of health care professionals in rural areas has been noted;

- provide distant training;

- help with research;

- contribute to regional development

- stimulate not only North-South collaboration, but also South-South collaboration;

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[2] *A Health Telematics Policy*, Report of the WHO Group Consultation on Health Telematics, Geneva, 11 - 17 December, 1997, p. 3.

- improve sharing of resources;

- improve diagnosis and transfer of information; some information was specific to developing countries, for example, traditional medicine;

- help in the creation of epidemiological databases and in particular early warning systems to help deal with the break-out of new and unexpected diseases (e.g., the Ebola break-out in the former Zaire)

- help improve the motivation of paramedics; providing telemedicine services would give a higher social status to paramedics.

While telemedicine has important benefits for the health care sector, it also has benefits in the telecom sector. It could

- generate new traffic and revenues for operators;

- stimulate the upgrading of telecom networks in order to accommodate new, broadband data networks;

- stimulate the creation of information technology jobs;

- serve as a catalyst for the creation of new markets.

Most of these relatively well recognised benefits involve *saving* money, as opposed to *making* money. In the least developed countries, where medical services and rudimentary, even these postulated savings may be debatable. In the those countries, traditional practices and healers are often more likely to be used, thus it is difficult to quantify the savings from using telemedicine since it may not be serving as a substitute for second opinions, nor contributing towards centralisation of specialist resources, since these countries may not be making any but the most negligible expenditures on health care. Thus, in spite of the significant *potential* advantages and benefits from telemedicine, the evidence of its cost-effectiveness and sustainability is meagre. Consequently, financing telemedicine remains a significant problem, especially but not only in developing countries.

Pilot projects as case studies

The Development Sector of the International Telecommunication Union has focused on this issue. It produced a *Report on Telemedicine and Developing Countries*, published as a special supplement to the *Journal of Telemedicine and Telecare* in February 1998 and sent to all Ministers of Health around the world. At the ITU's World Telecommunications Development Conference (WTDC) held in Malta in March 1998, delegates approved a new study Question which is expected to result in a report on telemedicine pilot projects in developing countries. The pilot projects, some of which are supported financially by the ITU, are intended to serve as case studies for other developing countries interested in the possibilities of extending health care to remote and rural areas by using telecommunications.

Participants in the new Question are also expected to produce a global directory of suppliers of telecommunications and health care technologies appropriate for developing countries. The emphasis will be on low-cost solutions which recognise the realities of telecom networks in developing countries.

The new Question is also expected to consider the policy requirements for implementing telemedicine in developing countries and, especially, the issue of how to make telemedicine services sustainable.

Financing telemedicine

There are many different telemedicine projects taking place around the world, including those funded by:

- government subsidy or grant;

- a university or hospital subsidy or grant;

- a telecommunication operator directly or undertaken in a joint venture with an equipment manufacturer or other service provider;

- commercial or semi-commercial organizations such as Inmarsat, Intelsat or SatelLife;

- the military, as in the United States, the UK and Spain.

- pharmaceutical companies, who might wish to provide some training or information to doctors in regard to their products;

- insurance companies, which might be able to avoid the costs of unnecessarily transporting ill or injured clients in some cases;

- private hospitals in developing countries as well as those in developed countries which might want to provide a service to developing countries. The "rich" hospital might provide the capital investment for some equipment in exchange for use of their service;

- local communities;

- privatisation of telecom operators, where some of the proceeds could be used to finance telemedicine projects;

- social security and health ministries – in the case of the former, some social security costs could be avoided if patients did not need to be transported to distant hospitals; the case of the latter, construction and funding of at least some additional hospitals might be unnecessary if telemedicine services were provided;

- multilateral sources, such as the ITU, the World Bank, the International Development Research Centre (IDRC, Canada), etc.

However, to finance even small pilot projects, especially those that depend on support from commercial enterprise, will be a challenge, as is all too evident from the initial pilot projects which are being supported in part by the ITU. The ITU cannot and should not fund the whole of a pilot project. ITU funding – and this is true of projects supported by the European Commission, the World Bank and other development agencies – typically depends upon the commitment of others, especially telecom carriers and/or satellite operators and/or manufacturers and others from the private sector. The importance of a multidisciplinary collaborative approach was emphasised in the WHO report. "By seeking collaboration with the telecom community, health care professionals will improve their chances of getting the facilities they need for health telematics. The two communities can gain greater political support and strengthen applications to international development agencies if they work together." [3]

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[3] *A Health Telematics Policy*, Report of the WHO Group Consultation on Health Telematics, Geneva, 11 - 17 December 1997, p. 3, 1997, p. 5.

The chances of a telemedicine project or service continuing will most often be greater if the project is able to obtain financing from both public and private sources. Avoidance of a single source of funding minimises the risk of discontinuity.

What is sustainability?

The term sustainability needs some clarification, at least as used in this paper. Sustainability has become something of a buzz word. "Sustainability" evolved from the concept of sustainable development which first appeared in the 1987 report of the United Nations Bruntland Commission entitled "Our Common Future".[4] It has been said that making health care sustainable has much to do with deciding what services can and should be sustained in a given local situation. "Health care is sustainable when, in a given context, there is a long-term ability to mobilise and allocate sufficient resources (manpower, technology, information and finance) for producing a desired set of services, and these services are demanded and used."[5] In this text, it means that the provision of service initiated during a pilot project is able to continue and to be affordable after the sponsors (those who are not from the area in which the telemedicine project is based) have left, after their funding has come to an end. To be colloquial, it means the project is able to "stand on its own two feet", that it is not dependent on outsiders for support, that it is seen as building local capacity.

Factors affecting sustainability

Lessons learned from various telemedicine fora such as the G-7, the European Commission, the Midjan Group and the ITU Rapporteurs Group on telemedicine have identified other critical factors for sustainability, principally the following:

- *Confidence between users* – Telemedicine services can only operate if users at each end of the line are confident in their respective expertise, and mutually agree on using technology for medical purposes. The ideal situation comes when physicians, as potential users, originate the need for a telemedicine system.

- *Political will* – Combined with user requirements, a clear statement from high level officials to implement telemedicine projects is necessary. Telemedicine should be the subject of national policy and strategy which recognises that people in rural areas should not be disadvantaged by the cost of health care.

- *Sensitisation of policy-makers* – It is important to raise the awareness of decision-makers and public authorities about the benefits of telemedicine. Information about the pros & cons of telemedicine should be provided to potential users (physicians, hospital managers), governments, telecom operators and IT managers.

- *Commitment* – The active involvement of all these players is necessary if a telemedicine project or service is to get off the ground. Desirably, it is useful to have a "contract" or unambiguous agreement between the participants, between users and providers, before the project starts. Also desirable is leadership of the project by a local "champion" who understands the importance of building self-reliance among the local partners. Local people have to be committed. A

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[4] "The call for sustainability" by Dr Sigrun Møgedal, *Contact*, publication of the World Council of Churches, No. 158, Dec 1997 - Jan 1998, p. 3.

[5] Ibid., pp. 3-4.

telemedicine project has to evolve from local needs. The telemedicine project should not be parachuted into a community.

- *Anticipating legal barriers* – Legal and regulatory obstacles are now identified sufficiently well so that project managers can now what to expect or what they must deal with well before their project gets underway.

- *Learning from experience* – Until the mid-1990s, most telemedicine activities were demonstrations or experiments. In the last couple of years, however, a market-driven approach toward telemedicine is emerging, which relies on methodologies and evaluation developed as a result of experience. Some applications of telemedicine will be more cost-effective and appropriate than others in particular countries.

- *Return on investment* -- Many telecom operators have undergone privatisation which means they may be less interested in supporting telemedicine projects unless they expect those projects to contribute to bottom line profits. The whole picture needs to be taken into account. Telemedicine services will generate increases in telecom traffic. One telemedicine application may generate interest in other applications and generate more traffic than originally foreseen.

- *Training* -- crucial to the success of telemedicine projects.

- *Ability of users to pay* -- Users must ready to contribute to the cost of the service they consume.

The need for pilot projects

In developing countries, few individuals will be able to pay for a telemedicine service. Hence, the introduction of telemedicine will probably require active support by governments. Before developing countries can be expected to devote any percentage of their constrained budgets to such services, they will need to be convinced of demonstrated cost-effectiveness – and that is why pilot projects are important.

The private sector, commercial operators and equipment suppliers will also need to be persuaded to invest in a pilot project. How persuasive telemedicine enthusiasts can be will depend on the perceived sustainability of the project. Or to put it another way, the sponsors of pilot projects will want to have some assurance that the project will be able to continue after the sponsorship comes to an end.

Nevertheless, pilot projects should be seen in the first instances as learning experiences, as tests in terms of design, operational robustness and adaptability to local circumstances. To advocate that they should also be sustainable may overload them. They are primarily exercises in investigating and verifying the appropriate combination of essential structural, operational, staffing and financing features to achieve sustainability.

Unfortunately, the provision of telemedicine services in remote and rural areas is almost always not going to be a profitable service. The spend per person on health care in developing countries is very low – for some, it is less than $40 a year according to the WHO. How, then, can developing countries sustain a telemedicine service in remote and rural areas without some subsidy by the government which usually will not be able to afford the subsidy?

Achieving sustainability

The implementation of telemedicine services should be as cost-effective as possible, with the aim of making access to quality health care as affordable as possible, comparable to the provision of health care in urban areas.

Developing countries can improve the prospects for sustainability in several ways.

Universal service obligation (USO)

The cost of telemedicine could be offset somewhat if its provision were funded by the USOs imposed on telecom carriers. Needless to say, telecom operators tend not to favour such a strategy, as evidenced by those carriers in the United States which have protested the imposition of the USO "tax" levied on them by the 1996 Telecommunications Action and used for funding telemedicine in rural areas.

A variation on the use of USOs would require the active co-operation of the ministries of health and communications and a policy endorsement by the regulatory authorities. This approach would imply competition in the provision of telecommunications – i.e., the regulator would tell a prospective service provider that it could provide competitive telecom services throughout the country on the condition that it provide a free or subsidised service for some number of regional health care clinics.

There are differing views about government support for telemedicine and whether telemedicine services should be given special tariffs. Telecom operators should not be constrained by undue obligations. For those already privatised, they must make a profit to survive. One view is that government subsidies should be avoided. Another is that a subsidy could be given for the initial capital costs.

Removal of regulatory barriers

The costs of equipment and services are often higher in developing countries than need be. Regulatory barriers, high licence fees, customs duties and non-tariff barriers (such as type approval) have restricted the benefits offered by new information and communications technologies in many developing countries.

In order to attract foreign investment in a pilot project – e.g., from a foreign equipment supplier or telecom operator – it may well be necessary for the developing countries to reach some agreement whereby the supplier or operator is granted improved access to the market. Customs duties may need to be lowered for the products of the foreign suppliers. These should not be preferential to a particular supplier, rather they should be to a class of products or services. Such improved access could also result in the removal of or removal of licence fees.

*Shared use of facilities*Another approach would be to make the telecom facility used for the telemedicine application available to other people in the rural community. The charges those other people pay for use of the telephone when it is not being used by the health care professional might generate sufficient revenues to cover the cost of the telephone and telemedicine equipment in a reasonable period of time, say one year.

The ITU's BDT has been investigating and supporting the introduction of the concept of multipurpose telecom facilities or "tele-centres" which can serve several distinct user groups, including those providing health care. Such "tele-centres" are a somewhat more sophisticated version of the village telephone concept. It transports the urban public telephone or call shop to a rural area, where local people can go to place a call or send a fax or whatever.

In October 1998, the ITU and the Secretary of Communications of Argentina, H.E. Mr German Kammerath, signed a $20 million agreement, financed by the government of Argentina, for the establishment of telecentres throughout the country to be implemented by the ITU's Telecommunication Development Bureau. Under the agreement, a wide range of services, including telemedicine, will be offered. At the signing of the agreement, the Argentine Secretary of Communications said, the telecentres "provide a wide variety of information and communication services to a population that otherwise would not have access to these facilities."

Trust funds

Another approach is to establish a health trust, where the return on capital is used to sustain specific health care activity.[6] The snag is finding the capital to initiate the trust.

Other methods of making telemedicine pilot projects and services sustainable can be contemplated too. For example, the government could auction trading licences to foreign as well as indigenous medical suppliers and contractors, with the funds from the successful bids being directed towards designated pilot projects. The "champions" of the pilot projects could organise fund-raising events and invite NGOs, banks, industry and users. Funding from external donor agencies may well be necessary for telemedicine, but local commitment and participation in pilot projects is essential if the project is to have a chance of success.

Sustainability of pilot projects is an issue which demands careful thought and brain-storming among potential participants before the project is initiated. There may not be a single formula for achieving sustainability in all telemedicine projects in developing countries, but the champions of telemedicine projects should have a clear idea of how to continue the service before the project gets underway. In this way, the risk of disillusionment can be avoided when the initial sponsorship comes to an end.

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[6] The Royal Government of Bhutan (RGoB) has a Health Fund Trust with the target aim of $24 million. The RGoB says in a glossy brochure about the fund that it will match dollar for dollar any contributions to the fund. According to the brochure, "The primary objective of the fund is to ensure the sustainable and timely availability of resources for the highest priority health care service components. By ensuring the financing of these crucial components through a trust fund, the RGOB can re-direct the national health budget to other key areas." The brochure goes on to say that "it is expected that the fund will generate roughly 10% interest each year. Of this, 5% is proposed to be used as income and the remaining will be reinvested to protect the capital and to increase the Fund capital to meet the rising costs." The brochure says the fund will be managed by a "reputable international investment firm". The brochure is entitled Health Trust Fund: a one-to-one partnership for sustainable Primary Health Care".