Health informatics and telemedicine

Report by the Director-General

The report presents a brief analysis of the recent developments and uses of informatics and telematics in health, including “telemedicine”. Document EB99/INF.DOC./9 highlights activities of the WHO programme. The Executive Board may wish to consider the conclusions contained in this report.

INTRODUCTION

1. This report is concerned with computing, “networking” and communications used in health care, referred to as “informatics and telematics in health”, excluding clinical applications (but several factors which influence clinical applications are discussed); it also excludes the development of the WHO global management information system.

INFORMATICS AND TELEMATICS IN HEALTH

2. The uses of computer-based information systems (informatics) and computer-based networking and communications systems (telematics) in health cover various types of health data, which may be divided into five groups:

   (1) management information for the day-to-day needs of planning, programming, budgeting, managing, monitoring and evaluating, for example, a health care institution (hospital, health centre, laboratory), or services for a community, a geographical area (province, district, city) or a nation;

   (2) clinical information to support functions such as diagnosis and treatment (including imaging);

   (3) surveillance and epidemiological information, on the patterns and trends of diseases and related health care measures;

   (4) formal publications and other documentation - unpublished reports, “grey” literature;

   (5) other technical information for a technical task, such as the diagnosis of a medical problem, the conduct of a laboratory test, and related treatment.
3. The sources of these types of data are located within and outside the health care infrastructure, at varying distances from users, who generally require them in different combinations at differing stages of their tasks. Thus the collection, flow, processing and distribution of health and health-related data are key factors in the operation and development of health care services, influencing their efficacy, efficiency and economy.

**Electronic liaison and cooperation**

4. E-mail is being extensively used in direct links between individuals and institutions sharing professional interests and projects, and for the establishment of electronic bulletin boards, discussion groups and conferencing. It is the least costly computer application, messages being "stored and forwarded" without time-consuming processing.

5. In the past five years there has been exponential international growth in e-mail, particularly through the Internet and networks of a simpler technology connected to the Internet. This growth has included many developing countries in Africa (at least 30 of the 49 countries), Asia, the Eastern Mediterranean and South America where the communications infrastructure is broad and reliable (it is anticipated that reliable e-mail links will be operational in parts of every African country within the next two to three years).

6. Experience has shown that the installation of a networking and an e-mail facility in a single site vigorously stimulates national and international links, even using simple and relatively cheap radio contact or local telephone lines, as in Kenya and Zambia. E-mail services are not to be confused with the multimedia services on the Internet, which require "online" links that are more demanding to establish (see relevant section of document EB99/INF.DOC./9).

**Access to literature and information services**

7. Many libraries in developing countries are the victims of economic and hard-currency problems. Many university and medical libraries have had drastically to reduce their acquisition of journals and publications of foreign medical societies. The use of CD-ROM to list foreign libraries' holdings may alleviate the search problem, but the acquisition problem remains.

8. The dire paucity of scientific literature was the main motivation for the international scientific community to collaborate and seek affordable means of giving scientists in developing countries access to information and literature services through international networks. The health sector is a major beneficiary of such collaboration. There is, however, a growing gap where the Internet is concerned (see the relevant section of document EB99/INF.DOC./9).

**Epidemiological surveillance**

9. Epidemiological surveillance requires the collection and analysis of relatively large amounts of varied data from and about the locations where diseases and related health problems occur and where patients present themselves, as in urban and rural health centres and hospitals.

10. Health statistics and epidemiology are perhaps the earliest and commonest applications of informatics and telematics in developing countries, and call for the most improvement; certain routine data-collection methods could be replaced by more economic computer-assisted sampling techniques, and relatively simple computer support to patient admission, discharge and transfer in a hospital or health centre could replace or improve manual operations, while communications satellites can provide essential intelligence for surveillance. The Onchocerciasis Control Programme (OCP) in West Africa used a mixture of satellite and ground radio communications for epidemiological surveillance and modelling, which facilitated technical operations such as insecticide spraying, and programme coordination and management for the 11 countries involved.
11. The developments in informatics, and particularly telematics, thus challenge traditional methods for surveillance, early warning and sentinel systems, especially for communicable disease control.

"Knowledge-based" services

12. Knowledge-based systems - also known as "expert systems" and "decision support systems" - provide expert advice on medico-scientific issues, for example, in diagnosis, other tests or treatment, given a patient’s coordinates and symptoms.

13. A few such systems are in use, on an experimental basis, in many developing countries; some have been devised by institutions and groups in the developing countries themselves. Certain major problems not unique to such countries remain to be resolved. For example, quality control of the system by a recognized authority, its validity in different settings; and the lack of legislation concerning the respective responsibilities of the developers, users and intended beneficiaries. Nevertheless, they can be valuable sources of expertise, especially as they also serve education and training purposes, and may be particularly useful to physicians and other health workers in remote areas, depending on the availability and type of telecommunications services (see also below, "telemedicine").

Technological facilities

14. The minimum facilities for national and/or international connectivity are: a microcomputer; a modem to link the computing and telephone systems; communications software; and a telecommunications medium (see below). The cost varies with the type of data and the speed and volume of processing. Data that include images, particularly dynamic or video images, demand powerful computing facilities. But for applications such as e-mail (text messages, statistics, finance and administration) the basic equipment would today cost less than US$ 1000.

15. The “telecommunications medium” is the most crucial for many institutions in developing countries, as it is often the main obstacle to informatics use. Public data networks (PDNs) are networks developed and operated by telecommunications authorities or services for communicating data. The health sector in most Asian, Eastern Mediterranean and South American countries already has access to and has begun to use PDNs. They are already operational in the main cities of an increasing number of African countries. The National Cancer Register of Egypt uses “EgyptNet” - the PDN of Egypt - to link up the National Cancer Institute in Cairo with all the regional cancer institutions that already have computing facilities and that are located near to an EgyptNet node.

16. The cooperation, and often the authorization, of the national telecommunications authorities are required for telecommunications links other than terrestrial (such as telephone lines). Radio-frequency links over short distances, and low earth orbit (LEO) or geo-stationary satellite earthstations, which often require special licences, are being used in the health sector in many developing countries (see document EB99/INF.DOC./9).

TELEMEDICINE

17. The following definition for “telemedicine” has been accepted and used in various international fora on the subject.

Telemedicine is the practice of medical care using interactive audio, visual and data communications; this includes medical care delivery, consultation, diagnosis and treatment, as well as education and the transfer of medical data.
18. The health sector, in nearly all countries, is facing two demands that appear to be contradictory: first, to provide equitable access to quality health care services and, secondly, to reduce, or at least control, the increasing costs of health care services. Telemedicine may help meet both demands by optimizing the use of existing resources (expertise and equipment) through telecommunication links in four ways.

19. First, a general practitioner in a rural setting might seek and obtain a second or expert opinion anywhere else in the world. Secondly, a health worker, say in a remote area, might obtain the technical guidance of a physician in attending a patient. Thirdly, a physician might treat by remote means a patient at home in another country. Fourthly, it might be possible to share pooled equipment, centrally located, often not affordable for smaller health care institutions.

Requirements of telemedicine

20. What are the main requirements of a telemedicine service that would fulfil the scenarios cited in paragraphs 18 and 19 above? Telemedicine links services over any distance, within a nation or between nations. At each end, the requester and the provider, for example, of a medical consultation need a telemedicine infrastructure relying on a telecommunications infrastructure. The power and speed of the telemedicine equipment and the telecommunication lines determine the extent of the medical care. The telecommunications infrastructure comprises the communications software and the communications “medium” which may require narrow or broad band, standard or high-speed telecommunications depending on the telemedicine services to be supported.

21. Telemedicine infrastructure is the means by which medical data and any subsequent remote medical analyses are exchanged between the requester and the provider of the service. The infrastructure could be simple or complex, more or less costly, depending on the types of service to be provided. For example, for a physician working with a radiologist, it might comprise the facility, at both ends, to scan and transmit the image accurately and to permit the radiologist’s interpretation and comments on the image, with or without a separate report. In pathology special cameras are needed to digitalize the slides; and in psychiatry the two-way or multiple exchange would require interactive video-conferencing equipment.

Issues and trends

22. Valuable experience is gradually being built up in many institutions in a number of countries. Where WHO is concerned there is the PAHO technical support to the Caribbean and Latin American Action group, and direct support from WHO headquarters to Kuwait and South Africa for the evaluation of requirements and the acquisition, essentially for pilot trials, of telemedicine services in South Africa and between Kuwait and the United States of America, as well as WHO participation at major telemedicine events in and for Africa, Asia, Canada, Latin America, the Scandinavian countries and the United States of America. International consensus is needed on a “minimum data set” for reporting and describing experiences with telemedicine; there is an extremely high level of acceptance by patients for whom it represents savings in transport costs and in working time, but less by physicians. Fees-for-service are very rarely applied to telemedicine and the majority of health insurance schemes do not refund the costs. In parts of industrially developed countries there is growing concern that it will favour specialist centres to the detriment of rural services. There is thus a need for a set of principles to ensure equitable, controllable payment for telemedicine; ethical and legal questions remain to be resolved, such as those concerning the respective responsibilities of the requesters and providers of services.

23. After years of differing national telecommunications regulations and standards (e.g., for television and digital clinical images) improvements are still needed, as also in telecommunication pricing according to distance, where charge by “bandwidth on demand” is proposed.

24. Commercial telemedicine services have been offered notably for links between a few of the Arab Gulf countries and university hospitals in the United States of America. A WHO investigation forming part of
another study (see document EB99/INF.DOC./9), shows that telemedicine could become a significant area of international cooperation; several experts and institutions in North America and Europe have indicated their willingness to contribute some hours per week to provide free telemedicine consultations. Similar offers may be expected from other parts of the world. WHO could promote the establishment of pooled services and schedules for consultation.

25. Such cooperation constitutes a challenge to the industry to offer more than the initially conceived "packaged" products for the market and to draw from the lessons of the computing industry, offering independent components permitting the development of flexible and affordable solutions.

ACTION BY THE EXECUTIVE BOARD

26. The Executive Board may wish to note the following:

- It has become widely appreciated, especially in conferences and other meetings on development, that the poorest countries need the technology for informatics and telematics most, to bridge the gaps they cannot bridge with existing or conventional technology (see also EB99/INF.DOC./9).

- Health care is "information-intensive"; logically, it should make great use of and draw benefit from information processing and communications support. In reality, the health sector is lagging behind other sectors in acquiring such benefits, although in recent years there has been a significant increase in their appreciation in WHO and its Member States.

- This report and document EB99/INF.DOC./9 draw attention to a number of issues. The development of national policies and strategies on health informatics and telematics is slow, and sometimes totally lacking, often because the tremendous potential of advances in technology to improve cost-effective approaches to health care are not recognized or given priority. Educational and training programmes of health workers, and of medical education should be reoriented to include the relevant and cost-effective uses of informatics and telematics.

- The Executive Board may accordingly wish to discuss and provide guidance on the need for more services to Member States and for a greater international role for WHO in informatics and telematics as a support to health care.

- WHO is uniquely equipped to fill the obvious need for an international technical and independent body to promote the uses of available and proven tools for informatics and telematics in health, and to shape the trends in the design of new, appropriate and cost-effective tools. In this role it can expect to be readily supported by national and international professional societies and by the informatics industry.