Medical Education

ICTs Application for Better Health in NEPAL

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Abstract
Technologies with the ability to send information in a fast, efficient and cheap fashion- such as the Internet- can provide dramatic improvements in access to information, advice and care. This article explores the strengths and weaknesses of Internet to augment traditional health services and supply new ones. In doing so, it presents concrete cases in the developing world, with reference to Nepal, where Internet is being used for health-related activities- ranging from patient/doctor consultation through database services, to the management of epidemics.

Developing nations have been well aware that meeting basic needs – such as health and education-is not only essential to the well being of their population, but also a prerequisite to any economic development effort. The ICT to its peculiar technological and economic features- efficient digital technologies can deliver in an interactive and asynchronous fashion data, text, images and video at a low cost-brings new hope to developing countries.

In most developing countries, given the poor infrastructure and inadequate access to computing at both homes and public institutions, the likelihood of patient/doctor and/or patient/Internet-site consultation is slim. What is instead viable, and could have a major impact on health services provided in developing countries, is consultation among health professionals over the Internet and access by health professionals to Internet-site consultation.

Information poverty is one of the most serious obstacles facing health professionals in the developing world. The Internet not only significantly shorten this time-lag, but it can also open up a whole new range of information resources to health professionals in developing nations.

Poor sanitary conditions in many developing countries contribute to the emergence and spread of infectious diseases. The information exchange via the Internet not only allows monitoring of the disease evolution, it also provides essential communication support for planning and mobilization of vaccination teams to be deployed in affected areas.

The future of health services through ICTs depends heavily on overcoming a number of infrastructural, regulatory, economic barriers. In developing countries, regulatory matters are still far from being a pressing issue in their health agenda. For many of them, having access to the necessary communication infrastructure at a reasonable cost, and taking the initial steps to set up telemedicine pilot projects are of most importance.

2. Poor information, poor health, poor development

Nepal has one of the lowest GNP (US $200) per capita and literacy rate (36.9%) in the South Asia Region. These factors have contributed to the prevalence of communicable, respiratory and nutrition deficiency diseases. In the mid 1990s, for example, there was an average of one physician for every 400 people in high income economics, while there was only one physician for 6,000 people in Nepal. Life expectancy in Nepal is 58 years, while in industrialized countries people are expected to live, on average 74 years old. Of the 52 million deaths which occurred worldwide during 1996, over 40 million of them occurred in the developing world. More than 12 million of them were children under the age of five, most of which died of preventable causes.

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Many of these deaths could have been avoided and several of the problem faced by health professionals could be overcome if the adequate information was at hand when needed.

The networking of health resources in low income communities is certainly a more timely and cost-effective solution in the short term, than attempting to build hospitals or health clinics in each locality. Through low-cost networks, doctors are able to 'visit' patients in remote locations, thereby also contributing to a strengthening of preventive health care. Information and communication technologies can provide improved access to specialists, for rural populations, who are now concentrated in tertiary care and teaching institutions, in urban centers, without replication of infrastructure.

The low cost technologies of ICTs in rural areas for preventive care and health care services may be community radio, CD-ROM in telecentres and schools, public library, etc.

3. Consultation over the Net

One of the most common examples of the use of Internet for health purposes is in the area of doctor/patient consultation. The reason is two fold. Firstly, most of the examples are from developed nations. Secondly, doctor/patient consultation over networks has great potential to reduce health care cost, currently a major concern in industrialized nations.

To profit from electronic consultation, Asia health Online, a local provider of medical information and service in Singapore, launched in May 1998, a trial of medical assistance services that will allow people to consult their neighborhood doctor for advice on minor ailments.

Aside from institutionalized initiatives like the one in Singapore, people are using the Internet to seek health information and advice. A recent survey shows that 93 percent of those consulting the Internet on medical/health matters found useful information. Most of the consultation is done from home.

In Nepal, people are habituated to consult the doctor in question answer column of health. In the same way consultation can be done with doctor through chat. In many communicable diseases like AIDS, sexually transmitted diseases, family planning, people hesitate to

consult doctor. The consultation with doctor over the net will be an alternative means to provide useful information sources to the general public. Similarly, discussion group can be opened by non-profit organizations and government department responsible for preventive health care.

In Nepal, however, given the poor infrastructure, literacy rate and inadequate computing at both homes and public institutions, the likelihood of patient/doctor and/or patient/Internet-site consultation is slim. What is instead viable and could have a major impact on health services provided in developing countries, is consultation among health professionals over the Internet and health professionals to Internet site consultation.

It is estimated that there are 8,000 illnesses whose symptoms and treatment are unknown to most health professionals. In those cases, communities that face the problem for the first time have, through the Internet, a unique opportunity to have access to a wealthof information in medical databases (such as Medline, POPLINE, HSBN) but also have the chance to access a diverse and widespread network of specialists able to provide guidance on the matter (in discussion groups such as PROME, AIDS digests, WHO digests and in news groups such as sci.med, sci.med.telemedicine, sci.med.informatics and others).

4. Accessing Medical Publications and Databases

Information poverty is the most serious obstacle facing health professionals in the developing world. A typical medical school in the United States subscribes to more than 11,000 periodicals while similar institutions in developing nations, have access to less than five percent of that figure.

Medical knowledge is evolving rapidly. Historically it has taken up to five years for new knowledge to trickle down, even to those in the general profession who are reasonably well connected to international flow of information. In the developing nations like Nepal, leading journals published in overseas countries takes 4 months to reach the library. Computer and telecommunication networks has made possible in reducing the distance and time lag in accessing information. Not only does the Internet shorten this time lag significantly, but it can also

open up a whole new range of information resources to health professionals in developing nations.

4.1.1 International resources

To cope with this situation, academic libraries started providing electronic resources to their patrons. However, electronic resources have the following problems:

a. expensive subscription fees;
b. complicated licensed agreements; and
c. Scarce technical staff for solving network and computer related problems.

These issues could not be solved by any single library in least developed countries, international organizations like WHO, Geneva, INASP, UK and SatelLife, USA started thinking about the possibility of providing electronic resources cost effectively. Attempting to achieve its goal, the following international organizations has adopted the strategies under the following programmes:

4.1.2 Health Inter Network Access to Research Initiative (HINARI)

HINARI is a new initiative to provide free or nearly free access to the major journals in biomedical and related social sciences, to public institutions in developing countries. Starting in Jan 2002 with over 2000 journals from the world's leading biomedical publishers. HINARI provides access to some 1500 journals from 6 major publishers: Blackwell, Elsevier Science, the Harcourt worldwide STM Group, Walters Klumer International Health & Science, Springer Verlag and John Wiley, and will continue for at least 3 years. Twenty-two additional publishers joined in May 2002, bringing the total number of journals to over 2000.

4.1.3 INASP, UK

INASP is a cooperation network of partners. It's mission is to enhance the flow of information within and between countries, especially those with less developed systems of publication and dissemination. Under the PERI program, it provides access to scientific and scholarly information through electronic means. Includes over 10,700 full text online journals, current awareness databases. In Nepal, it was started from July 2003. The publishers are Blackwell EBSCO, Emrald, Cochrane Library and Oxford University Press.

4.1.4 SatelLife Inc, USA

Over the past fourteen years, SatelLife is involved in developing solution to the everyday information needs of health professionals working in communities where AIDS and malaria are common place, but medical journals and the Internet are an unaffordable luxury. It provides network facilities and information resources through its project HealthNet. HealthNet Neal was established in 1995. It provides access to locally generated information resources, electonic conferences and website hosting. SatelLife provides its information content through 40 peer-reviewed journals through HealthNet News complied weekly, Health News, AIDS compiled bi-monthly, and HealthNet News-Community Health complied monthly. Apart from this it provides disease specific links and 5 discussion groups.

4.2.1 Locally Generated Resources

The considerable amount of information produced in Nepal related to its own development is not consistently collected or made available to its users. The majority of development programs and R&D projects report their results in very limited quantities. These documents which accurately chart Nepal's development efforts experiences and priorities need to be preserved. Since these documents are not indexed in international journals and are not available through commercial channel, as a whole, much valuable, locally produced information goes uncaptured and is irretrievable.

To provide locally generated resources HealthNet Nepal does the following:

a. Provide free space to medical journals published from Nepal;
b. Preparing and hosting Health Science Bibliography of Nepal in collaboration to Institute of Medicine
c. Providing full text theses, reports and statistics of health

In spite of the fact that searching in the Internet is time –consuming and therefore, an expensive activity, the availability of free health/medical information can still constitute a low-cost deal compared to the high cost of annual subscription to medical journals or commercial databases.

5. The Electronic file: Medical Records Online

In an emergency, rapid access to a patient's records can be a matter of life or death. It is vital, for example, to know a patient's allergies or blood type. The benefits of a database of virtual medical records accessible on the Internet are quite clear and countries that have the technological capability and the required know-how are moving in that direction.

In Nepal, this area is far behind the reach. The availability of a quick and efficient response mechanism to health threats posed by epidemics and natural (or man-made) disasters are certainly far more important.

6 Responding to Epidemics and Natural Disasters

Poor sanitary conditions in many developing countries contribute to the emergence and spread of infectious diseases. In some circumstances these diseases can rapidly reach epidemic proportions causing high morbidity and mortality and stressing already fragile health systems. International organizations like the World Health Organization (WHO) and other have invested considerable effort and resources to improve the surveillance and monitoring of infectious diseases, with the ultimate goal of prevention and control. Over the past decades, there has been considerable progress in this area: smallpox has been eradicated; poliomyelitis has virtually disappeared from the Western hemisphere.

Handheld computers are powerful tools for data collection, providing rapid access to information that policy makers and health planners need to respond to and prevent disease outbreaks, practice sound resource management, and track public health issues.

In Nepal, PDA is being used as a pilot project in two health sectors for collecting data: NFHP (Nepal Family Health Project) for monitoring tools and NTAG (National Technical Assistance Group) for collecting data of Vitamin A Survey. If the pilot project is succeeded it will be expanded to other health areas. For, NFHP, database used is in English Language and for Vitamin A Survey, it is in Nepali language. This project is handled by HNN/SatelLife with funding from USAID.

7 Health Education

Electronic health information may help address three sets of problems that have plagued health care system of Nepal for years: high costs, uneven quality, and gaps in access to information. The public expenditure for health in Nepal (including donor expenditure) was US$ 3.10 per person per year, whereas the estimated amount is US $12 per capita level (1993-1995 prices)- needed to provide a basic package of health care services in a developing country. Maternal mortality remains very high in Nepal (5.4 per 1000 live births). Service delivery data indicate that only one out of five pregnant women receives prenatal care and only a tenth of pregnant women receive tetanus immunization. Infant mortality rate is 79 per 1000 live births; mortality among children under 5 is 118 per 1000. In addition, about half of children under 5 suffer from under nutrition. Among the five most populous countries of South Asia- Bangladesh, India, Nepal, Pakistan and Sri Lanka - Nepal ranks last or next to last on every important indicator.

Information strategies may offer a solution to these problems. It will provide opportunities for acquisition of knowledge for individuals and communities to prevent a wide range of diseases that has the greatest potential to improve health status. Such actions include the Expanded Program of Immunization (EPI) and improving domestic hygiene, access to safe drinking water, and disposal of human waste. This prospect arises from three distinct trends, all of which involve information. First, medical researchers are generating information that promises to improve the quality of care. Second, policy makers are looking to inform consumers to use their buying power to produce a more responsive and effective health care system. And third, consumers themselves are using information to assume more direct responsibility for their own health (Conte (1), pp.3). A brief description of each one is given below:

7.1 Effective Medical Care. The medical community is moving towards evidence-based for all their actions. This involves systematic searching and critical appraisal of the research literature to identify findings that can be applied to a clearly defined clinical problem. This approach goes beyond the narrative review articles occasionally published in leading clinical journals. It employs systematic review of the literature in which specific items of information

are extracted from each work and compared across works using structured methods. This has made the practice of medicine more based on evidence than experience. Its tools range from randomised clinical trials to statistical analysis of outcomes of different medical treatments. Already, it has profoundly affected the health care system. It has demonstrated, for instance that preventive care such as immunization and early screening procedure and early screening of chronic illnesses leads to better health care and lower medical costs at the same time. To help medical practitioners keep abreast with the current information explosion in their various clinical areas. Clinical practice guidelines are available on the Internet for use by doctors along with abstracts, summaries and comparisons.

The other area in which Internet can make a difference is in the support of medical research and the training of health professionals. This research study indicates that 83.8% doctors were of the view that they update knowledge through continuing medical education. Among the surveyed respondents, 62 % are from academic institutes. After all, Internet was until recently a purely academic/research network and this function still holds a strong solid presence among academics and researchers among developing countries.

On research-related activities, with the Internet it has become so widespread and easy that many are starting to take it for granted. This research study indicates that 92.3% health professionals use Internet for communicating among professionals within the country and 80% health workers use Internet for communicating expert professionals outside the country.

7.2 Enlightened Consumers

A relatively untapped resource - patients themselves - may prove even more important for health care in the Information Age. Policy makers increasingly hope that educated consumers will become a driving force for improvements in the quality of health care. If consumers are equipped to choose between competing health plans and providers, the theory goes, they will flock to those who provide the best care at the lowest price. Numerous health plans themselves, responding to demands from consumers (and in some cases pressures from doctors), are expanding the choice of doctors and hospitals available to their customers (Conte (1), pp.5).

In Nepal, private sector spending on health services is significant. Of the Rs. 10.9 billion spent on health in 1995/96 more than 70% was private. More than two thirds of this figure represents private out-of-pocket spending. The percentage of urban population using private facilities is double than that of the rural population (World Bank (7), pp.25). This fact indicates that systematic information on the training, specializations of physicians and review of hospitals, nursing homes using a variety of standards relating to patient care and management helps to assess the individual providers.

7.3 Increased Self-Reliance.

Many people want to be more than passive consumers of health services. They want to be active participants in their own care. Consumers Internet site offers tips on such topics as when to be immunized or screened for cancer, what to expect before and after surgery, how to conduct a breast self-examination, and what should be included in a proper diet. With the beginning of websites for medical information, patients started to read the information provided to them as well as the information provided to professional health workers. There is nothing really new about patients playing a leading role in their own care. Even today in a joint family system in Nepal, women are primarily responsible for caring for the sick, if families need help, they turn to networks of kin and community. This research study indicates that physicians (91.5%) were of the view that public health could improve considerably if information and knowledge could be widely disseminated, in a timely fashion, among the population. Majority of the physicians agreed to recommend the web sites (86%) for general public. They were also of the view that use of web sites by general public will improve the following factors during consultation:

    (i) patient becomes more knowledgeable (81.5%);

    (ii) consultation is more constructive (75.4%); and

    (iii) communication is more improved (82.3%);

This study also posed questions negatively i.e. the reasons for not recommending websites to patients. Overall 16% respondents told that it will lead to risk of patient self-treatment followed by loss of physician control (10.8%), create mistrust (6.9%), and waste of time (7.7%). The table A indicates that the top ten diseases

prevalent in Nepal were communicable and preventable diseases. Skin diseases (6.30%) were the most prevalent diseases followed by diarrhoea (3.30%) and Acute Respiratory

Infection (2.80%). All these diseases were preventable and caused by contaminated water, lack of proper housing, and education.

Table A
Top Ten OPD diseases in year 1997/1998

S. No.	Disease	Percent
1	Skin disease	6.30%
2	Diarrhoea	3.30%
3	ARI	2.80%
4	Worms	2.70%
5	Pyrexia	1.90%
6	Gastritis	1.80%
7	Ear Infection	1.40%
8	Chronic bronchitis	1.00%
9	Abdominal pain	0.9%
10	Anaemia	0.9%

Source: Ministry of Health, Nepal

With the development of web, new opportunities are available for the consumers such as electronic chat groups, online forums and discussion groups. Another benefit of Internet is its storing capability. The information is used only when need arises. Although there is widespread presence of television and radio, but Internet has the storing and retrieval capability.

Telemedicine

Another area of application of Internet is telemedicine. Telemedicine can be broadly defined as the use of information technology to deliver medical services and information from one location to another. Telemedicine functions can include patient consultations when the main health care provider is in one location and the patient is in another; consultations and mentoring between health care providers at a distance; medical procedures at a distance, for example, remote surgery, the use of peripheral equipment to collect patient information such as blood pressure and body temperature; the forwarding of medical images and other data; and distance continuing medical education. In a developing country like Nepal, Telemedicine may be proposed as a pilot project, perhaps in collaboration with other sectors of economy, which face similar problems of service delivery and may wish to become partners. The real-time telemedicine is expensive and developing countries like Nepal cannot afford. Apart from the infrastructure, the minimum cost of

equipment for basic real-time telemedicine is estimated US $ 50,000.

An e-mail link with the facility to send high-resolution digital images is a cheap and uncomplicated telemedicine method. The Swinfen Charitable Trust helped establish such a link in Patan Hospital Kathmandu, Nepal in March 2000. Over 12 months using this link 42 telemedicine referrals were sent to specialists throughout the world. Referrals were: 36% respiratory medicine; 21% neurology, 21% dermatology; 14% cardiology; 5% nephrology; and 3% radiology--28 had digital pictures attached, of which 96% were of high enough quality on which specialists were able to comment. Thirty-nine replies were received. The average time for a specialist reply was 2 days, and 45% were answered within 24 hours. All replies were judged by independent assessors to be helpful or very helpful for diagnosis, management and education. The assessors decided that in 50% of cases the advice if acted upon would have shortened hospital stay. This pilot study has shown that a low-cost telemedicine link is technically feasible and can be of significant benefit for diagnosis, management and education in a developing world setting.

Conclusions

The use of information technologies in the medical world continues to grow in acceptance, future trends will include the use of mobile terminals to provide healthcare from remote locations, or to provide speedy on-the-spot responses to medical emergencies, along with the increase in the use of Internet and Intranet technologies.

Embracing and promoting Internet for health, however, is no panacea. The system provides an essential pre-condition for a number of matters to be tackled more efficiently. Knowing through the Internet about a recently released drug that cures a serious illness, or the adequate treatment for a rare disease, is not of much help to a doctor in a developing country if those affected cannot afford the drug or the resources required for the treatment. On the other hand, knowing about these alternatives is already a step forward towards resolving the problem.

Finally, it is worth pointing out that much of the advancement of health services online relies on some basic preconditions-such as adequate communication infrastructure and reasonable prices for communication services-that are not in the hands of the medical community. For that reason, it is crucial that medical professionals join the ranks of those that are contributing from their camps to move forward the building of and adequate national infrastructure in their countries.

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