Past, present and future: experiences and lessons from telehealth projects

Laurent Elder is the Pan Asia Networking (PAN) Programme Leader with the International Development Research Centre, Ottawa, Canada. Michael Clarke is Director, Information and Communications Technology for Development, International Development Research Centre, Ottawa, Canada.

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Correspondence: Laurent Elder, IDRC, 150 Kent Street, Ottawa ON K1G 3H9; www.idrc.ca/pan; Skype: laurentelder

Past: the difficult work of pioneers

One of the authors of this article (LE) was involved in a pioneering project on telemedicine in Uganda in 2000. This aim of this project was to enhance access to health services using telemedicine, such that consultations with doctors who worked in larger hospitals in Mulago and Butabika could be obtained for patients who did not live near a hospital. The project focused on cholera, malaria and HIV/AIDS. Further goals were to disseminate health information and build a continuing medical education program. Finally, the project was meant to document lessons on these different activities.

Nevertheless, the project did offer some valuable lessons for future e-health projects. It was in many respects ahead of its time, and set the stage for more successful e-health projects in Uganda, such as the Uganda Health Information Network and a subsequent telehealth project in Mengo. Indeed, with the support of Memorial University in St. John's, NL, the project helped train and mentor numerous staff in telehealth activities; it further helped focus the attention of the government on rural health problems and potential solutions; and it developed educational materials that are in use today.

The project provided significant insights and learning. First, it helped the organization better understand the challenges of supporting telehealth projects in Africa and helped define some of the key questions it would try to answer. Key among these was a better understanding of how appropriate local capacities, both technical and institutional, should be built, Second was the need to focus on the "e-readiness" of the country, particularly with regard to the availability of equipment, cost of access and an enabling regulatory environment. (E-readiness refers to the state of a country's ICT infrastructure and the ability of consumers, businesses and governments to use ICT to their benefit.) Finally, this experience prompted greater consideration about the key underlying question: Is telehealth a viable means of solving health problems in developing countries?

In this case, cost–benefit analyses had not been done and health outcomes had not been measured, in large part because these efforts had been lost in the challenges to implement the pilot project. All these lessons helped shape future thinking about supporting the development of effective health applications. However, it is also of interest to examine some of the lessons from programming in Asia on telehealth to demonstrate how lessons coalesced from one region to the other, despite having been implemented through separate programs.

The objectives of the *Impact of Remote Telemedicine in Improving Rural Health* project in India, part of the Pan Asia Networking (PAN) project, were to study the impact of remote telemedicine in selected villages in India. The activity specifically aims to conduct, with the help of n-Logue, an Internet service company in India (www.n-logue.com), a low-cost medical kit called ReMeDi, which the manufacturer describes as a "Medical Data

Laurent Elder, Michael Clarke

INFORMATION COMMUNICATIONS TECHNOLOGY HAS been a focus of the work of the International Development Research Centre (IDRC) since 1970, when this organization was founded in Canada with the goal of helping to improve the health of people in developing countries. As typical of early telehealth projects in Africa, the project was faced with

Acquisition Unit that captures multiple parameters," i.e., temperature, ECG readings, blood pressure, pulse rate, heart and lung sounds and oxygen saturation (www.neurosynaptic.com/telemedicine.htm).

The telemedicine program can work in conjunction with a rural kiosk and transmit medical information remotely to a doctor in an urban centre. Once the service was launched, there was a spike in the number of visitors to the kiosk. After the initial interest, however, the number of visitors dropped precipitously to a few regular, repeat visitors. The drop was explained by the following factors: "Kiosk Operator's ability to administer the kit properly, acceptability by the villagers, identification of the Kiosk in a place where medical care is already dispensed, lack of awareness of the service, distance of the doctor from the village, and availability of competing services such as Registered Indian Medical Practitioners Primary Health Centres, local doctors, etc."[1] Although the project faced challenges with respect to sustainability, it was, contrary to the Ugandan experience, able to function as a working telemedicine project. However, despite the activity's stated objective of understanding telemedicine's "impact," no findings were documented with regard to health outcomes.

In Indonesia, the *Development of ICT-based Telemedicine System for Primary Community Health Care in Indonesia* project used existing Internet technology to enhance PC-based medical stations and pilot-tested a telemedicine application. The pilot network consists of six medical stations within community health centres and a station for each referral hospital, health office and test laboratory. The pilot found that human resource capacity-building — in particular, training to facilitate the adoption of computer and telemedicine technology — required significantly more time than expected. The project therefore demonstrated the important role that human resource development plays in the sustainable implementation of ICT-based telemedicine systems. However, as before, no findings were documented on the actual effect the pilots had on people's health or on health systems.[2]

Textbox 1: Acacia-supported cellphone-enabled health applications

- knowledge production: any type of publication
- research targeting capacity-building and absorption: follow-on research, training of staff
- e-health solution adoption or integration: expansion or adoption of e-health solutions
- informing policy: policy documents, meetings with government officials
- broader community, institutional or country benefit: including social and economic benefit
- health benefits to individuals or the population: more effective health care

Present: from adversity come ideas

Understanding the needs of the local environment is crucial to successful, sustainable projects. The IRDC's *Application of ICT in the HIV-AIDS response in Eastern and Southern Africa* project (www.idrc.ca/en/ev-87732-201-1-DO_TOIC.html) illustrated this. This project studied how ICTs had been used in Uganda, Kenya, Tanzania, South Africa and Botswana to address health and development challenges brought about by HIV/AIDS. After having done an extensive literature review, the project proponents undertook a wide-scale electronic survey of individuals and organizations involved in HIV/AIDS issues. Of particular interest was an in-depth impact assessment undertaken in Tanzania and South Africa with 990 respondents.

Moreover, according to the survey, illiteracy was the most important barrier to the use of ICTs in both South Africa and Tanzania. The results echo previous research that showed that illiteracy and localization issues are among the most important factors challenging the more widespread use of ICT solutions.

According to the survey on the effectiveness of ICTs, it was perceived that radio, print and television, as well as face-to-face meetings, were

What parameters were to be used for evaluating programs? Textbox 1 lists those factors that were felt to be relevant and important according to a report, commissioned by IDRC, that unfortunately ranked all projects "low" with respect to demonstrated health benefits. Common deficiencies included a lack of planning and health needs assessment, a need for sustainability planning, difficulty in the management of change, and a need for better

A comparison of respondents from the two countries showed, as expected, that most received information on antiretroviral treatment (ART) from traditional media. However, increased access to information technology in South Africa resulted in 39% of respondents receiving information from cellphones (versus 10% of respondents in Tanzania). Hence the assumption is that, as access to mobile telephony and the Internet rises in Africa, so will the number of people accessing health information through these technologies

"extremely effective" media. The majority of respondents "didn't know" whether computers, email and the Internet could be effective. Strangely, almost 9% saw the Internet as "harmful" (the highest percentage in that category). Although one can question the methodology of a perception questionnaire as well as the terms used —What do "harmful" or "extremely effective" actually mean? — one cannot deny that conventional communication methods are still perceived as the most widely used modes of information transmission.

According to the Pan Asia Networking Prospectus, health is the area where ICTs are likely to have the most direct positive impact in improving the well-being of Asian communities (www.idrc.ca/uploads/user-S/11700792731prospectus_final.pdf). However, the prospectus also affirms that the first generation of largely donor-driven "telemedicine" projects has generally had only a marginal impact on people's health. Indeed, many of the technologies previously developed and tested were too expensive to be widely adopted in resource-poor settings. Much like Acacia, PAN sees the advent of more pervasive technologies, such as mobile phones and PDAs, as a new generation of health applications that have actually made a demonstrable difference. As mobile telephony use in Asia is more widespread than in Africa, it is clear that the potential for these types of applications is significant in Asia.

Textbox 2: Potential health applications of cellphones[2]

- automation of demographic surveillance activities such as those at the core of pioneering health care initiatives, e.g., the Tanzanian Essential Health Interventions Project
- testing of the use of SMS (short message service) reminders in the treatment of tuberculosis in Cape Town, South Africa
- delivery of continuing medical education and professional development via PDA
- delivery of time-sensitive alerts to patients and health care workers
- maintenance of patient records for HIV-positive patients' lifelong drug treatments
- management of specific health care initiatives such as the roll-out of antiretroviral therapy and tuberculosis treatment initiatives

PAN's strategic document also emphasizes that more research is needed to gauge which applications and projects in the area of health have made a difference, to understand why they have or have not been successful and, when warranted, to scale them up. However, the fast pace of innovation in both ICTs and health research means that there is also a need to develop, implement and evaluate new applications, particularly in the area of demographic surveillance of disease incidence and medical compliance, using new technologies such as mobile phones. According to the prospectus, another area that has recently come to the forefront in Asia is the issue of pandemics. First severe acute respiratory syndrome (SARS) and now the potential for an Avian flu pandemic are perceived as serious threats to the health of Asian populations as well as the rest of the world. A key to mitigating the spread of these infectious diseases is to ensure that data on outbreaks are captured and communicated to the relevant experts in real time. ICTs can play a critical role in helping to prevent or control pandemics, although more research and experimentation need to be done to identify the most appropriate and cost-effective means of developing health communications processes in rural and remote areas, where many of these outbreaks start.

We believe that telehealth and e-health solutions can have real, short-term benefits at many levels, including a direct benefit to patients. Reductions in medical error, the realization of costs savings, real-time monitoring of public health incidents and the provision of validated data and information for health systems decision- and policy-making are just some of these benefits.

The authors of the AfriAfya (African Network for Health Knowledge Management and Communication) study conducted an ongoing effort to demonstrate the best practices within the framework of developing using ICTs in the fight against HIV/AIDS were (1) use of mobile phones and specifically SMS; (2) ICTs for up-to-date HIV management information; (3) telemedicine and mobilization; (4) combination of different ICTs; and (5) telephony using VoIP. They also pointed out that the use of "modern" ICTs is still very limited, but that there is huge potential; that because

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