

## Assessing Needs for Use of Communication Networks for Continuous Improvement of Primary Health Care Services

Azza Abul-Fadl<sup>1+</sup>, Ali Abu-Zeid<sup>2</sup>, Mohamed Beshar<sup>2</sup> and Azima E. Sarhan<sup>3</sup>

<sup>1</sup> Pediatric Department Faculty of Medicine Benha University,

<sup>2</sup> Pediatric Department Faculty of Medicine Zagazig University, Egypt,

<sup>3</sup> Communication Engineer, American University in Cairo

**Abstract.** Background: Telecommunications is a cost effective and simple method for teaching and medical consultations. However its use for improving service delivery in remote and isolated regions served through primary health care (PHC) centers has not been evaluated. Aim: A pilot study was done to identify the acceptability, accessibility, affordability and efficiency for use of information technology (IT) for tele-health care networks in PHC. Methods: An IT solution for networking was installed in three major Universities in three different regions of the country and linked with 6 remote primary health care units serving underprivileged populations. The assessment involved interview of 51 University staff, 40 residents, 100 PHC staff, and 130 medical students (total 321) in Cairo to study their access, skills and practice in using the two-way IT in PHC centers in the rural regions of Sharkia and Qalubiya in Egypt. Findings: University teaching members had very high positive attitudes towards this technology but two thirds lacked training and access to e-learning technology. The staff in PHC were more hostile to this technology and lacked training. The commonest health problems that needed immediate consultations included accidents, emergency conditions, rheumatic fever, chronic renal failure and mental health problems. Conclusions and recommendations: The pilot networking solution linking universities with PHC centers for teaching, training and consultation purposes depends a great deal on its administration, the band width used and the infrastructure of the telephone lines in the regional areas where the PHC centers are located. Telecommunications can upgrade the health care service delivery in PHC and improve outcomes in a cost effective manner.

**Keywords:** Education, Telecommunications, Networking, primary health care, Distance learning, Information technology, E-learning.

### 1. Introduction

Worldwide telecommunication networks (using satellites, cable) are now facilitating the global pooling of healthcare information and medical knowledge independent of location. The development of multimedia information and communication systems demands cooperative working teams of authors, who are able to master several areas of medical knowledge as well as the presentation of these in different multimedia forms. The combination of new and rapidly developing interactive multimedia computers and applications with electronic networks will require a restructuring of our traditional approach to strategic planning and organizational structure. The assemblage of telematics and services offers a base for multimedia applications, for example teleteaching, telelearning, telepublishing, teleconsulting, tele-conferencing, telemedicine etc. The expansion of the internet will also lead to the formation of interdisciplinary "Global Education Networks". The theory and practice of education are undergoing dramatic changes. Lifelong learning and adaptation of medical practice to new knowledge and new techniques will be even more important in the future (Matthies et al., 1999).

---

<sup>+</sup> Corresponding author: 26B Algezira AlWosta, Zamalek, Cairo, Egypt. Mobile: 01223494183  
E-mail address: azfadl@yahoo.com

However, these modes of communication when used in place of traditional classroom instruction lack the interactivity among students and between the students and the instructor that would be achieved in the ideal classroom setting. Internet teleconferencing, however, appears to offer the opportunity for real-time, interactive class meetings on the Internet. Sear and Douglass (1998) examined the use of the Internet for real-time teleconferencing as a substitute for classroom meetings at the graduate University level. They offer insights into the quality and usability of Internet teleconferencing given currently available hardware, software, and communications links.

Over 50 million people in the Egypt (about 60% of the population) live in rural areas, but less than one third of the nation's physicians practice in rural communities. It is difficult to recruit and retain rural health care practitioners, partly because of issues relating to professional isolation. They also face conditions that need immediate consultations and management. New and enhanced telecommunications links between community and academic hospitals show promise for reducing this isolation and enhancing lifelong learning opportunities for rural health care providers.

This study was conducted in order to assess the needs for teaching primary care medicine using the distance learning technology and two-way telecommunications via an advanced WebCam technology by networking of universities with primary health care centers for reinforcement of teaching in primary health care settings.

## **2. Methods**

A live conferencing was established between faculty staff in the University hospital and MOHP rural health unit from the other side, in which the doctor in the rural healthcare unit will be examining the patient. Accordingly, the doctor in the rural healthcare unit will act as a presenter for the patient case using live conferencing media technology through audio, video and text communications to present his case and to take an accredited consultancy from the professors in the universities who will act as participant; but will have the capability to comment and interfere by voice and text during the presentation.

The project will have two main objectives:

### **2.1. Health Consultation Objectives**

through assisting doctors in rural healthcare units to examine their patients professionally, and to allow medical consultants from various institutions to share in diagnosis procedures and final recommendations and medications.

### **2.2. Health Educational Objectives**

Through allowing various students in the University to monitor this live event to leverage their practical capabilities and enhance their professional experience.

This pilot project was implemented in 4 universities and 6 primary health care units affiliated to MOHP. These include Zagazig, Cairo and Mansoura University hospitals, Benha Children Specialty Hospital and 6 PHC centers of MoH.

In each institution, three units were installed with PC's, hardware devices and Software. They consisted of: a conference Room, a computer Lab and an administration Unit.

### **2.3. The Conference Room**

In each institution was equipped with all needed hardware devices, equipment and software to allow medical consultants to monitor all what is going on in one of the remote locations where the patient is being examined.

### **2.4. The Computer Lab**

(Named as the IT Training Unit) in each institution was equipped with all needed hardware devices, equipment and software to allow continuous training in IT and support as a maintenance unit to ensure continued care of the equipment and upgrading the skills of the staff (medical consultants, doctors, post graduates, under graduates and technicians) generally in the internet and IT technology.

## **2.5. Assessment Procedures**

A Total of 321 Subjects Including 130 students 40 residents and junior staff, and 51 teaching staff in the seven pediatric units of the pediatric department and psychiatry department, and 100 MOHP/PHC physicians working in medical centers in five regions covering Cairo and Qaluibiya namely: Helwan, ElSharabia, Madenat El Salam, ElBasateen, Shoubra ElKhemia district regions and the mothers/clients attending these centers and clinics inside the hospital.

## **2.6. Tools**

Consisted of questionnaire sheets for assessing common child health problems and pediatric specialty **problems** and the knowledge, attitudes and practice towards IT and e-learning.

## **3. Results**

Our findings showed that despite the general increase in the interest in IT for communication and education still there is a considerable gap in the usage, skills and application of this technology for teaching and learning and education purposes. The gap varied according to the target assessed. Students had high skills and poor accessibility. University staff demonstrated high accessibility but less application and usage rates. Residents and junior staff had high skills and accessibility but low usage of the technology. Staff from MOHP had low accessibility and usage but high attitudes towards the IT technology (Table 1). Only one third to one fourth was using two telecommunication for consultations, teaching or research with their colleagues, students or clientele (Table 2).

The commonest problems encountered were related to the respiratory tract, gastrointestinal diseases, hepatic, cardiac and renal diseases. Emergency states, surgical problems as well as chronic diseases and neurodevelopment and psychiatric conditions are also common presentations to the primary care setting. The latter were identified as priorities for teaching PHC staff and medical undergraduate students as these students will be the first contact physicians on graduation from their medical schools (Figures 1 and 2).

The teaching setting that was seen as ideal for primary care teaching is the outpatient which was hospital based (57.8%) probably because its accessibility to the teaching staff. Hospital based inpatients was mentioned in 53.3%, as this was where most of the clinical teaching already took place and what staff are used to. However about 44% of staff mentioned that ideally teaching should take place in primary health care centers or in family health centers.

## **4. Discussion**

New and enhanced telecommunications links between community and academic hospitals show promise for reducing the isolation of physicians working in remote primary health care units. These will enhance lifelong learning opportunities for rural health care providers in advancing and improving their clinical competence (Laurillard, 1999 and Albritton and Wagner, 2002).

Our study shows that teaching and learning using the IT networks is possible but is challenged by the poor skills of health workers in this technology and the problems related to band width. Zollo et al., (1999) introduced the use of interactive video (telemedicine) networks to transmit continuing medical education programming from an academic center to multiple rural hospitals in the USA.

Allen et al., (2002) applied videoconferencing to provide distance education for medical students, physicians and other health-care professionals, such as nurses, physiotherapists and pharmacists. In Island countries, geographic context creates isolated working situations for rural health practitioners, with difficult and limited communications. So in order to improve educational opportunities for nurses in the Solomon Islands, the distance learning model was implemented by Ministry of Health in five post basic nursing certificate courses for health workers (Kenyon et al., 2000, Dever, 2000). Innovative IT based program using interactive multimedia curricular intervention designed for pediatric residents increased their knowledge about common lactation issues, the management skills from 22% to 65%. Other workers conducted similar innovative programs to increase residents' knowledge and skills in breastfeeding management (Freed, 1995, Matthies et al., 1999, Haughwout et al, 2000, Mash, 2001, Taveras et al., 2004).

Applying this technology can allow a two way benefit for students and University staff to be exposed to rare and authentic cases presenting to PHC, while PHC staff are able to refer such cases based on an established preliminary diagnosis from the experts working in the University hospitals. Emergency cases can receive life saving consultations in diagnosis and management. While chronic conditions can benefit by early diagnosis and timely confirmation of the diagnosis of screening tests, as well as training in clinical guidelines in the management of these cases. Priority conditions identified were asthma, rheumatic fever and rheumatic heart disease (RHD), renal disease and diabetes mellitus as well mental health problems (Pryor et al, 2000, Person, 2004).

RHD stands out as a rising chronic condition in PHC settings that is difficult to detect due to the confusing presentations and difficult interpretations of the cardiac findings. Training such staff by using new screening devices will enable the PHC workers to send images of the cardiac lesions to experts in universities for direct interpretation and decision making to be placed on long acting penicillin.

It is envisioned that for education using computer interface by the Webcam technology, PHC staff need to receive a one-to-one field hands-on training for experiencing the tele-communication sessions through "closed clinical classroom settings" between the University based-teaching classrooms and PHC service units. This will allow for open online consultations of emergency cases as well as first presentations of chronic disorders or surgical emergencies that need referral. Telecommunications can thus be a cost effective strategy that can improve outcomes in primary health care.

## 5. Acknowledgements

The project team of the Ministry of Higher Education (HEEP) and collaborators in Center of Social & preventive pediatrics of Cairo University Hospitals, Dr. Emad Salem, Mansoura Pediatric University Hospital, Dr. Samir Abdel Azim, Benha Children Specialty Hospital, Dr. Naseif ElHefnawi, and director of Primary Health Care in the Ministry of Health, Dr. Esmá Mansour.

## 6. References

- [1] HK. Matthies, GF. Walter, A. Brandis, AC. Stan, A Ammann, U von Jan, AJ Porth. The interactive use of networking multimedia--innovative education resource for professionals and patients. *Stud Health Technol Inform.* 1999, 68:467-71.
- [2] AM. Sear, DB Douglas. Use of the Internet for real-time class instruction in a graduate health services administration program. *J Health Adm Educ.* 1998, Fall;16(4):425-37.
- [3] D. Laurillard. *Rethinking University teaching: a framework for the effective use of educational technology.* London and New York: Routeledge. Taylor and Francis group, 1999.
- [4] TA. Albritton, PJ. Wagner. Linking cultural competency and community service: a partnership between students, faculty, and the community. *Acad Med.*2002, 77(7):738-9.
- [5] SA. Zollo, MG. Kienzle, Z Henshaw, LG. Crist. DS. Wakefield. Tele-education in a telemedicine environment: implications for rural health care and academic medical centers. *J Med Syst.*1999, 23(2):107-22.
- [6] M. Allen, J Sargeant, E. MacDougall, M. Proctor-Simms. Videoconferencing for continuing medical education: from pilot project to sustained programme. *J Telemed Telecare.*..2002, 8(3):131-7.
- [7] M. Kenyon, C. Chevalier, V. Gagahe, R. Sisiolo. The community in the classroom: designing a distance education community health course for nurses in Solomon Islands. *Pac Health Dialog.* 2000, 7 (2):76-80.
- [8] G. Dever. The role of low cost communications in health in the redevelopment of the indigenous physician workforce among selected jurisdictions of the US-associated Pacific Islands. *Pac Health Dialog.* 2000, 7(2):63-7.
- [9] GL. Freed, SJ. Clark, JA Lohr, JR. Sorenson, G. Cecil: Pediatrician involvement in breast-feeding promotion: a national study of residents and practitioners. *Pediatrics.* 1995, 96(3 Pt 1):490-4.
- [10] JC. Haughwout, AR. Eglash, MB. Plane, MP. Mundt, M. Fleming. Improving residents' breastfeeding assessment skills: a problem-based workshop. 2000, *Fam Pract.* 17(6):541-6.

- [11] EM. Taveras, R. Li, L. Grummer-Strawn, M. Richardson, R. Marshall, VH. Rego, I Miroshnik, TA. Lieu. Mothers' and clinicians' perspectives on breastfeeding counseling during routine preventive visits. *Pediatrics*. 2004, 113(5):e405-11.
- [12] B. Mash. Development of the programme Mental Disorders in Primary Care as Internet-based distance education in South Africa. *Med Educ*. 2001, Oct;35(10):996-9.
- [13] DA. Person. The Pacific Island Health Care Project: easing the cancer burden in the United States associated Pacific Islands. *Pac Health Dialog*. 2004, 11(2):243-7.
- [14] J. Pryor, W. Baravilala, C. Katoanga. Telehealth in the Pacific Islands: a perspective and update from the Fiji School of Medicine. *Pac Health Dialog*. 2000, Sep. 7(2):6-10.

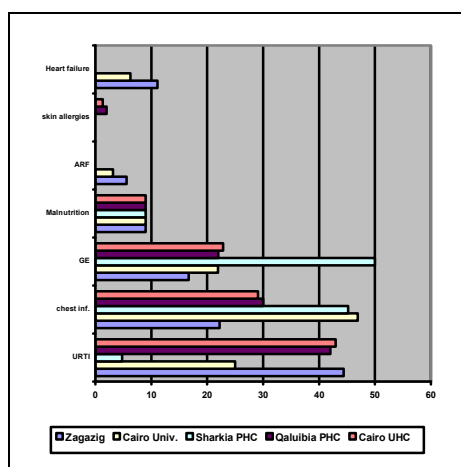


Fig. 1: Comparison of the distribution of common acute problems in University Outpatient Department (OPD) versus MOHP OPD in Cairo, Qalubia and Sharkia Governorates

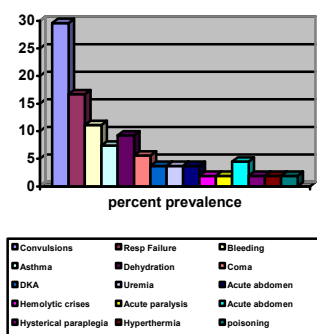


Fig. 2: Frequency of Common emergency pediatric problems mentioned by interviewed staff by Site in Cairo University and PHC centers in Greater Cairo Governorate

Table 1: Percent distribution of access to computers among the different study groups in the Cairo study group

Site	University Staff – 51		Residents 40		MOHP staff 100		Students 130		Total 321	
	No.	%	No.	%	No.	%	No.	%	No.	%
Access to computer	51	100	39	97.5	83	83	127	97.7	300	93.5
Access at work	14	27.4	10	25.6	14	16.9	3	0.78	41	13.67
Access at home	51	100	37	92.5	72	86.7	119	93.7	279	93
Access at clinic	9	17.6	0		2	2.4	7	5.5	18	6

Table 1-2: Comparing the use of internet for communication with different targets among users in the different study groups of the Cairo study

	University Staff		Staff + residents		MOHP staff		Students		Total (219)	
	No.	%	No.	%	No.	%	No.	%	No.	%
<b>Local use</b>										
- Yes	40	85.1	24	70.6	13	28.3	57	61.9	134	61.2
- No	7	14.9	10	29.4	33	71.7	35	38.1	85	38.8
- consultations	16	28.1	8	29.6	10	62.5	8	13.6	42	26.4
- conferences	14	24.6	1	3.7	6	37.5	4	6.8	25	15.7
- others	27	47.3	18	66.7			47	79.7	92	57.9
- no response (60)										
<b>International use</b>										
Yes	31	68.9	9	26.5	8	15.9	19	20.2	67	29.8
No	14	31.1	25	73.5	44	84.6	75	79.8	158	70.2
<b>International use</b>										
- consultations	18	36	5	41.7	4	33.3	4	21	30	32.6
- conferences	13	26	3	25	3	25	3	15.8	22	23.9
- others	19	38	4	33.3	5	41.7	12	63.2	40	43.5
<b>Communications with clientele</b>										
Yes	15	32.6	3	8.8	NA					
No	31	67.4	31	91.2						
<b>Clients*:</b>										
- Consultations	9	29.03	3	37.5	2	3.6				
- Conferences	10	32.2	1	12.5	51	92.7				
- Research	8	25.8	1	12.5	1	1.8				
- Degrees	2	6.45	1	12.5	1	1.8				
- Courses	1	3.2	1	12.5	0	0.0				
- International degree	1	3.2	1	12.5	0	0.0				

Clients include patients, students, companies and organizations, *PHC: Primary Health Care, MoH: Ministry of Health*