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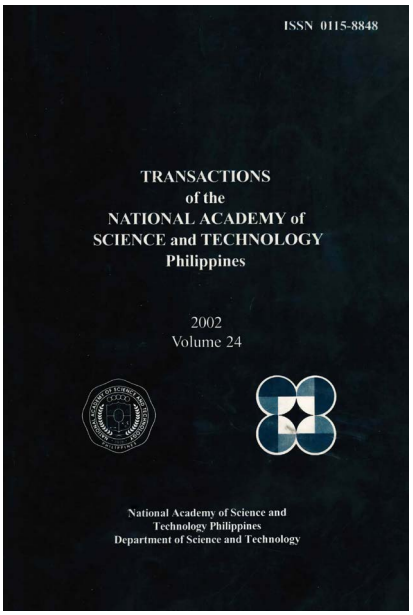

Updates on Telehealth in the Philippines

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UPDATES ON TELEHEALTH IN THE PHILIPPINES

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ABSTRACT

Major achievements in the past year include the development of the Strategic Plan for the National Telehealth Center, a teledermatology application, a teleradiology system, and design of the Community Teleservice. Teleconsultation includes the development of a videoconferencing setup, customized development of videoconferencing software, protocols and policies on standards in care over e-mail or internet, data security and privacy standards. Distance education involves the development of distance education modules using internet technologies such as Flash and streaming audio and video. The Center also aims to conduct software application development based upon open source technologies, such as Linus, PHP, PostgreSQL, and Java. Applications to be developed include geotelemedicine and teledermatology in particular in the PGH and the Philippines was accomplished with the PGH Section of Dermatology. A teledermatology applications was developed using Linus, PHP, PostgreSQL. The results show that teledermatology is an accurate tool for diagnosis of dermatologic conditions. This study also shows that health care providers are open to this new form of consultation. However, in contrast to findings in other countries, this study indicates that there seems to be hesitation on the part of the patients to use the technology. A similar application for a web-based teleradiology system was also developed with the Department of Radiology which compares store and forward technology with traditional negatoscope assessment. The design of a community teleservice center is being conducted with the cooperation of the Philippine Council on Health Research Development and the Department of Transportation and Communication.

Keywords: e-health, telemedicine, videoconferencing, teledermatology, distance education, teleconsultation, teleradiology.

Definition And Brief History of Telehealth

When it comes to delivering health care over a distance, there are three overlapping concepts which reflect the evolution of the concepts over time: telemedicine, telehealth, and e-health.

Although the term "telemedicine" was first coined in 1971, the use of communication technology to deliver health care can be traced to the 1900s, when radio was used to provide medical services in Antartica. Telemedicine is defined as the "use of advanced telecommunications technologies to exchange health information and provide healthcare services across geographic...barriers." Throughout the 70s and 90s, various governments, hospitals, the National Aeronautics and Space Administration, and the US military implemented telemedicine projects using radio, two-way interactive television, satellite, and the Internet to provide consultations and monitor patients.

During the latter part of the 90s, the new term "telehealth" was coined to be more encompassing than telemedicine. As defined by the World Health Organization in 1997, "telehealth is understood to mean the integration of telecommunication systems into the practice of protecting and promoting health, while telemedicine is the incorporation of these systems into curative medicine." This does not only cover telemedicine, but distance learning, administration, data sharing, and public health as well.

During the dotcom era, e-health became in vogue and refers to Internet-based health care delivery. This proliferation of terms reflects the field's dynamic nature and continuous evolution. This paper focuses more on telehealth, as e-health may not be appropriate for the Philippines.

Examples of Telehealth

As mentioned previously, examples of telehealth include clinical teleconsultation, distance learning and patient education, administration, and public health. There are two main types of telehealth systems : realtime teleconsultation and store and forward systems. In realtime systems, a primary care provider presents a patient in realtime to a remote specialist. Through the use of video and special peripherals, such as instruments for monitoring vital signs and scopes connected to the system, the remote specialist may examine the patient. In store and forward systems, the primary care provider takes a still image which is sent to a physician who later reviews it. There is no realtime interaction between the patient and the physician. This is most often used for teledermatology and teleradiology.

Value Proposition

Why has telemedicine and telehealth gained so much prominence? Telehealth promises to enhance access to healthcare. Patients in remote settings, such as rural areas, prison, even outer space and combat zones, may be able to avail of health care. Telehealth also allows enhanced access to health care information for both the health care provider and the patient.

Obstacles

Despite these potential benefits, telehealth has met with a number of hurdles throughout its history. Foremost among these is the financial sustainability of telehealth programs. A significant portion of this cost is devoted to the bandwidth required to deliver video for realtime videoconferencing systems. Most programs in the world would stop if federal funding for these programs would cease to exist. Also, reimbursement for telemedicine consultations are still ill-defined. Despite these, these are a few notable cases of stable telehealth programs, such as those found in East Carolina University and Eastern Montana in the US, and in Tromso in Norway. In fact, in 1996, Norway was the first country in the world to have telemedicine consultations reimbursed by the national health insurer. Today, telemedicine is very much commonplace in Norway.

Another stumbling block is the issue of cross-border licensure and regulation. Physicians can only practice in the country which they have licenses to practice in. In the US, 26 states have legislation regarding licensure, 21 of which require full licensure for an out-of-state physician.

Related to licensure are legal issues such as malpractice. For example, a patient in Country A sues a physician in Country B who provided consultation over the Internet. Which country has jurisdiction in this case? Also, some physicians are concerned that if telehealth provides high-quality care, they might be liable for failure to use it where such facilities exist. Since no one has yet been sued for malpractice related to telemedicine, it is not possible to resolve these issues yet.

Without widely adopted standards and guidelines, interoperability and interconnection are not possible and the great potential of telemedicine will be difficult to achieve. Older equipment often will not interconnect with newer versions of the same machine. Different brands of the same equipment will not operate with one another, making networking across projects and sometimes within a project expensive and frustrating. In addition to technical standards, there is a need for clinical protocols and guidelines. Examples of clinical protocols for telemedicine practice include preliminary scheduling procedures, actual consult procedures and telemedicine equipment operation procedures (such as telecommunications transmission specifications. Only a few professional associations have adopted standards and protocols pertaining to telehealth, such as

DICOM for teleradiology. There are also clinical guidelines for telepsychology and teledermatology.

Finally, there is the issue of privacy, security, and confidentiality. While it is true that no computer network can truly be secure, breaches of security may be as likely with electronic medical records as with paper ones. In general, electronic records are probably more secure than paper-based ones — what is in contention are standards pertaining to the level of security that providers of electronic records must uphold.

Updates in Telemedicine in the Philippines

The first documented telehealth activity in the Philippines was in 1985, when the country became part of the SatelLife/Healthnet project which linked medical centers in the US and the Philippines. The system provided e-mail communications and other services via the LEO Healthsat satellites. In 1991, Makati Med started a series of videoconferences with Stanford University Hospital. Makati Med was the first hospital in the Philippines to regularly use videoconferencing for realtime consultations with doctors from other institutions. This was started by Dr. Edmundo Villacorta, then Chairman of the Department of Nuclear Medicine. It is currently being managed by the Director for Telemedicine, Dr. Jose Eduardo Rondain.

The videoconferencing system is a VITEL 232LC500 d-M,32 MB RAM, 8X CDROM, 1.2 G hard drive, 3.5" floppy drive, Pentium 166MHZ, PTZ Camera with six presets, ITU-TSS standards compliant, direct dial module network interface, expansion box for I/O connectivity, remote diagnostics, user interface tablet, Apps View user interface (mouse control), T1 Line rate (1536 kbps), SmartView document camera control software, Windows 95 operating system, PenPal, Supports up to 4 PTZ cameras, AppsShare application sharing, QuickFrame 30 frames per second video display, Local and remote camera control, and two Sony XBR'32" Color TV's.

The system is connected via two ISDN lines (2x56/64 Kbps with four channel capability up to 256 Kbps). Currently, it holds monthly videoconferences with Stanford University Hospital, Singapore General Hospital, and Chinese University in Hong Kong.

In 1993, Dr. Arturo Pesigan at the College of Public Health in Manila held a series of audioconferences with health professionals in the Southern Philippines in coordination with the Memorial University of Newfoundland in Canada. The purpose of the project was to develop the College's distance education and outreach programmes in the field of public health and to increase access to continuing medical education opportunities for health professionals in the Philippines.

The Philippines has a number of characteristics which make telehealth appropriate. One is its scattered archipelagic geography which makes travel difficult and isolated. Another is its localization of tertiary care centers and specialists in

urban areas. According to the National Statistical Board, the doctor to patient ratio is 1:2500, with 95% of doctors serving just 5% of the population. Add to this the predisposition of the country to natural calamities, and telehealth may have a significant impact in the country. Unfortunately, unlike developed countries, the Philippines has a poor Internet penetration of 4% or around 3.5 million users connected to the Internet. However, for a developing country, it does have a relatively high penetration rate of 15% for mobile cellphone users. Nokia has two examples of Mobile Telehealth using mobile phone technology in Finland but this has met with limited success as expected. In terms of healthcare reimbursement, telemedicine is not recognized as reimbursable by Philhealth. There are as yet no laws which govern the practice of telemedicine or cross-border licensure. Chapter 31 of the Philippine Administrative Code (Medical Law) provides for the registration of medical practitioners. The law requires that a person practicing medicine must be registered after having graduated from a "reputable institution" and having satisfactorily passed the examination. Registration is not required for "physicians and surgeons from other countries called in consultation." Telemedicine may fall within this exception.

National Telehealth Center

The vision of the National Telehealth Center is to be the center of excellence and nucleus for telehealth and telemedicine in the Philippines, under the National Institutes of Health and UP Manila. Established in July 1998 during the term of Chancellor Perla D. Santos Ocampo, its major achievements in the past year include the development of the Strategic Plan for the National Telehealth Center, a Teledermatology Application, a Teleradiology System, and design of the Community Teleservice Center.

Strategic Plan of the National Telehealth Center (NTHC)

Major applications areas are to be focused by the NTHC are teleconsultation, distance education, and software application development.

As a strategic initiative, we have chosen to develop store-and-forward applications first since store and forward applications have been proven to be more successful in most clinical situations requiring telehealth. We have also chosen open source platforms running on Linux, based on its cost and scalability. As such, we see that the National Telehealth Center's role in the value chain in telehealth programs would be in the development of software and applications running on readily available network infrastructure, such as that of Preginet.

Teleconsultation includes the development of a videoconferencing setup, customized development of videoconferencing software, protocols and policies on standards in care over e-mail or Internet, data security and privacy standards. distance education involves the development of distance education modules using

Internet technologies such as Flash and streaming audio and video. The Center also aims to conduct software application development based upon open source technologies, such as Linux, PHP, PostgreSQL, and Java.

Teledermatology

A landmark research in telemedicine and teledermatology in particular in the PGH and the Philippines was accomplished with the PGH Section of Dermatology. A teledermatology application was developed using Linux, PHP, and PostgreSQL. The study compares the diagnostic results from traditional face-to-face dermatology consult and teledermatology consultation using store-and-forward technology. The study also aims to assess the acceptability of this new technology to patients and healthcare providers.

Ninety-nine (99) patients were included in the study. A resident physician gathered the medical history of each patient. The primary investigator took images of the lesions and the patients were then referred to a clinical dermatologist for the face-to-face (FTF) diagnosis. The medical history of the patient, the images of the lesions, and the FTF diagnosis were then entered into a computer database using a standardized format. Each FTF entry was randomized to three teledermatologists who viewed the data under identical conditions. Each teledermatologist then made a store-and-forward (SAF) diagnosis, which was also entered into the computer.

A single diagnosis was preferred but differential diagnoses, which were limited to two, were allowed.

For consistency, the primary investigator, who did not have any special training in photography, took all images. No special lighting protocols were used since the study emphasized on usability in the field. The skin lesions were imaged from several angles and up close using a Kodak DC215 camera.

This camera is a consumer grade camera with a resolution of 1152 x 864 pixels.

The teledermatology application was run on a server computer with a Pentium II 400 MHz processor, 32MB of RAM and Debian GNU/Linux 2.2 as its operating system. The application was developed using PHP as the language, mySQL as the database, and Apache as the web server. The client computer where the teledermatology referrals took place was a Pentium III 800 MHz machine with 64MB of RAM running Windows 98. The monitor used was a standard 14-inch monitor with S3 Inc. Trio 3D/2X. The monitor settings were at 800x600-pixel resolution with True Color (24 bit). The teledermatology application was accessed over the network using Internet Explorer version 5 (web-based). Both computers were connected using UTP cable.

Observed agreement was then computed by comparing the number of SAF diagnoses that matched the corresponding FTF diagnoses. The SAF diagnosis was considered an exact match if it was the same as the FTF diagnosis. The SAF diagnosis was considered a clinical match if the FTF diagnosis was one of the SAF differentials or if the difference in diagnoses would not have made significant

difference in terms of management (e.g., atopic dermatitis and nummular eczema). The SAF diagnosis was considered a mismatch if it did not agree with the FTF diagnosis. Observed agreement was defined as diagnoses that matched exactly and those that matched clinically.

Observed agreement between FTF and SAF diagnoses was high for all dermatologists, ranging from 77.35% to 95.24%.This includes exact match and clinical match diagnoses. When only exact matches were analyzed, the observed agreement ranged from 64.1% to 80.9%. Sixty-eight per cent of respondents signified willingness to consult via teledermatology. However, 59% of all respondents still preferred the traditional face-to-face method of consultation.

More common reasons given for this preference included being able to talk to the doctor personally, being able to ask questions and being able to consult other specialty clinics in the hospital. Respondents who preferred face-to-face consultation also felt that a hospital had necessary equipment for procedures and could provide necessary laboratory tests if their disease warranted it.

Forty-one per cent of respondents preferred to consult via teledermatology if it were made available to them. Many of these patients felt that teledermatology would be a cheaper alternative and would save not only money but also time.

Univariate analysis of factors in the questionnaire such as age, gender, educational attainment, distance traveled and costs incurred showed that none of these significantly affected the choice of one method over another. It was initially postulated that patients who are more familiar with computers and information technology (i.e. college graduates, younger respondents) would be more receptive to teledermatology. This view was also thought to be true for patients who had traveled longer distances and spent more money in order to avail of specialist opinion. Statistical analysis, however, shows that none of the aforementioned postulates regarding patient acceptability are true. Thus, there may be other factors involved in the decision making process that were not addressed in the questionnaire.

The results shows that teledermatology is an accurate tool for diagnosis of dermatologic conditions. Agreement is high between SAF and FTF diagnoses. This study also shows that health care providers are open to this new form of consultation. However, in contrast to findings in other countries, this study indicates that there seems to be hesitation on the part of the patients to use the technology.

Teleradiology

A similar application for a web-based teleradiology system was also developed with the Department of Radiology which compares store and forward technology with traditional negatoscope assessment.

Community Teleservice Center

The design of a Multipurpose Community Telecenters (MCT) is being conducted with the cooperation of the Philippine Council on Health Research Development and the Department of Transportation and Communication. Pilot MCTs will be launched allowing access to information at the barangay level to health, agriculture, education and rural enterprise development through satellite TV and satellite Internet technology for 100 underserved areas. The role of the National Telehealth Center will be to provide content and applications for health.

The Future

Future development efforts will be mostly based on developing applications and services for the next generation Internet, such as IPv6; and mobile and wireless applications, such as MMS, Bluetooth, WAP, GPRS, and 2.5/3G services. Next generation Internet applications will be developed with the Preginet network, while Bluetooth applications are being explored with the Advanced Science and Technology Institute. Networking with other institutions such as the Advanced Asia Pacific Network (APAN, through Preginet), the International Telecommunications Union, the Department of Transportation and Communication, and telco companies such as Globe, Smart, and PLDT, will also be targeted.