Health Ripples

The UP Manila Health and Life Magazine

July-Dec 2015 · Vol.1 · No.2

Advancing Telehealth

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EDITOR'S NOTES

The first issue of the Health Ripples focused on programs and services for patients with congenital and metabolic disorders. It was dedicated to the investiture of UP Manila's 9th chancellor, Dr. Carmencita Padilla, a human geneticist and founder of the newborn screening program in the Philippines.

For the second issue, in the spotlight are programs and platforms that use information and communication technologies (ICTs) for health. ICTs are tools that have different applications, and in health, it has been proven through studies that they have a wide variety of uses with positive outcomes, be it in health education, research, training, management, or patient care.

The first article, "Leveraging Technology for Continuing Medical Education," is based on a lecture of Dr. Alvin Marcelo, Asia eHealth Information Network Executive Director, director of the UP Manila's Technology Translation and Business Development Office and former director of UPM's National Telehealth Center. It tackles different platforms that are appropriate for continuing medical education, particular the webinar.

This is followed by a brief profile of the National Telehealth Center (NTHC) that includes a short history and its growth from a unit that provides continuing medical education to doctors in remote communities to a Center that leads in providing varied telehealth undertakings to improve the Filipinos' access to quality health.

The different telehealth programs of the NTHC are tackled in the succeeding articles. In varying stages of implementation are the RxBox, Community Health Information Tracking System (CHITS), National Telehealth Service Program (NTSP), and other programs and activities that are geared towards effective and efficient use of ICT for better health outcomes.

Sandwiched in these articles is a feature on Dr. Iris Thiele Isip Tan, first recipient of the UP Gawad Pangulo Award for progressive teaching and learning. She is an endocrinologist, director of the Medical Informatics Unit of the UP Manila College of Medicine, and faculty member of the MS Health Informatics which is also described briefly in this issue.

Through this issue, we hope to deepen the reader's understanding and appreciation of the role of ICTs in health and how they can be optimally used and applied in different health endeavors.

This issue's Guest Editor: Portia Grace H. Fernandez-Marcelo, MD, MPH

Dr. Portia Fernandez-Marcelo's vast experiences and achievements in health have contributed greatly to making quality health care accessible to the Filipinos, especially those in remote and underserved communities. For more than 25 years now, she has been engaged in health human resource education and training management. She devoted 14 of those years to health program/project management, research and documentation.

She served as project leader, technical writer, and consultant in various projects of the Department of Health, UNICEF, GTZ InWent, USAID and World Health Organization.

At the helm of the UP Manila's National Telehealth Center in the last five years, she built on and extended its public health informatics projects to more underserved communities and tested new features to address identified gaps in health information systems.

Such projects increased the people's access to health services and created a positive difference on their health. The Community Health Information Tracking System or CHITS, the first electronic patient record that leads to easier tracking and faster and more accurate diagnosis, was awarded the Best Health Market Innovation by the Philippine Institute for Development Studies and Center for Health Market Innovation.

Under her leadership, the NTHC assisted the DOH in conducting nationwide regional conferences to broaden awareness and engagement of regional government agencies, local government and private sector on the importance of a strong Philippine health information system and the promises of eHealth use. Likewise, with both the DOH and the Philippine Statistics Authority, regional conferences were held on the importance of universal civil registration and its link with the health sector and the Philippine HIS.

She is currently the Project Leader of the Secretariat Support to the Asia eHealth Information Work of the WHO Regional Office in the Western Pacific Region. She serves as consultant of the Gawad-Kalinga – Kalusugan, a Community Health Development Program of GK and SAFEKIDS Worldwide-Philippines. She is an Associate Professor of Community Medicine and Social Medicine at the UPM College of Medicine. She obtained her medical degree from UP in 1993 and Masters in Public Health from Johns Hopkins University, Maryland.

For advocating and championing social upliftment projects, she is one of the recipients of the Gawad Lagablab Award given by the Philippine Science High School in November 2015. The award recognizes PSHS alumni who have been developing and applying their professional competence and skills for the widest benefit of the majority of the Filipinos. She is an alumna of the PSHS Main Campus Batch 1983.

Leveraging Technology for Continuing Medical Education*

Dr. Alvin B. Marcelo**

Technologies, such as webinars, offer tremendous opportunities for reaching out to health professionals practicing in remote areas of the country and letting them get updated with new advances in medicine.

This article is divided into three parts. Part I is about the ABCDEs of webinars, Part II is on other technologies for continuing education, and Part III is on best practices and lessons learned with technology-enhanced Continuing Medical Education (CME).

Part 1 - Webinars

The term webinar, a blending of the words "web" which is a synonym for the Internet and "seminar," according to the Oxford dictionary, is a seminar conducted over the Internet. Think of it as an alternative to the face-to-face seminar in classrooms where we have a lecturer and a group of students attending, but this time, the lecturer is in one room supported by a technical team and the rest of the participants are either in their workplace or at home or in their own schools. There is no physical interaction between the lecturer and the participants.

The author, Dr. Alvin Marcelo (center), with Dr. Jose Macario Faylona and Dr. Iris Isip-Tan (standing, 2nd from left) and the rest of the webinar team. The UP Med webinars are held every 1st and last Wednesday of each month.

A webinar, in this case, allows more participants to join over an Internet connection and achieve the same objectives as a face to face seminar which makes for a strong argument to have your message reach a wider audience.

I divided this presentation into the ABCs of webinar for easier recall and understanding. The first is A which means **About** and **Advertise**. In a webinar, one of the first things to prepare is the selection of an interesting topic for the target audience. For this particular series of UP Med webinars, we are addressing the need of general practitioners in the Philippines. Once you have selected the topic, you would want to disseminate this as widely as possible using social media to ensure that the target audience is reached and informed of the webinar ahead of time.

The next **A** is about **Assistants**. Not visible to the remote audience are the elaborate preparations by an army of assistants to help lecturers focus on simply delivering their presentation. The Assistants help with the promotion of the event, orienting the speaker, if needed, installing software, or sometimes, addressing their anxiety because of the new modality. The Assistants also prepare the physical room to ensure the smooth flow of the program and mitigate the risks. The most disastrous thing that can happen during a webinar is a disconnection. If this happens, we have mitigation techniques like having engineers on standby who can help.

B is for **Bridge** or the technology that connects the resource persons with the participants. Right now, we are using the gotowebinar.com platform. We have been using this since last year and hope to use it as much as we can because of our proficiency. But there are other bridges or webinar platforms that we can use. At the Asia eHealth Information Network, we use webex which is the WHO platform for webinars. There are other platforms, such as Fuze.com, Join.me, Vidyo.com, BigBlueButton.org, Anymeeting.com, and others. The things to look out for in webinar platforms are ease of control and use, reliable performance, quality of correction, error correction, recording capability, ability to be accessed through mobile phone, and price.

I wish to emphasize error correction because during webinars, there might be participants with slow Internet connection and the error correction capability compensates for those slow connections. Some of you might be connecting from an island and might be using mobile phones with very slow connections but the webinar platform will compensate for that. It will ensure that you are getting my lecture clearly and that there are no gaps in the presentation.

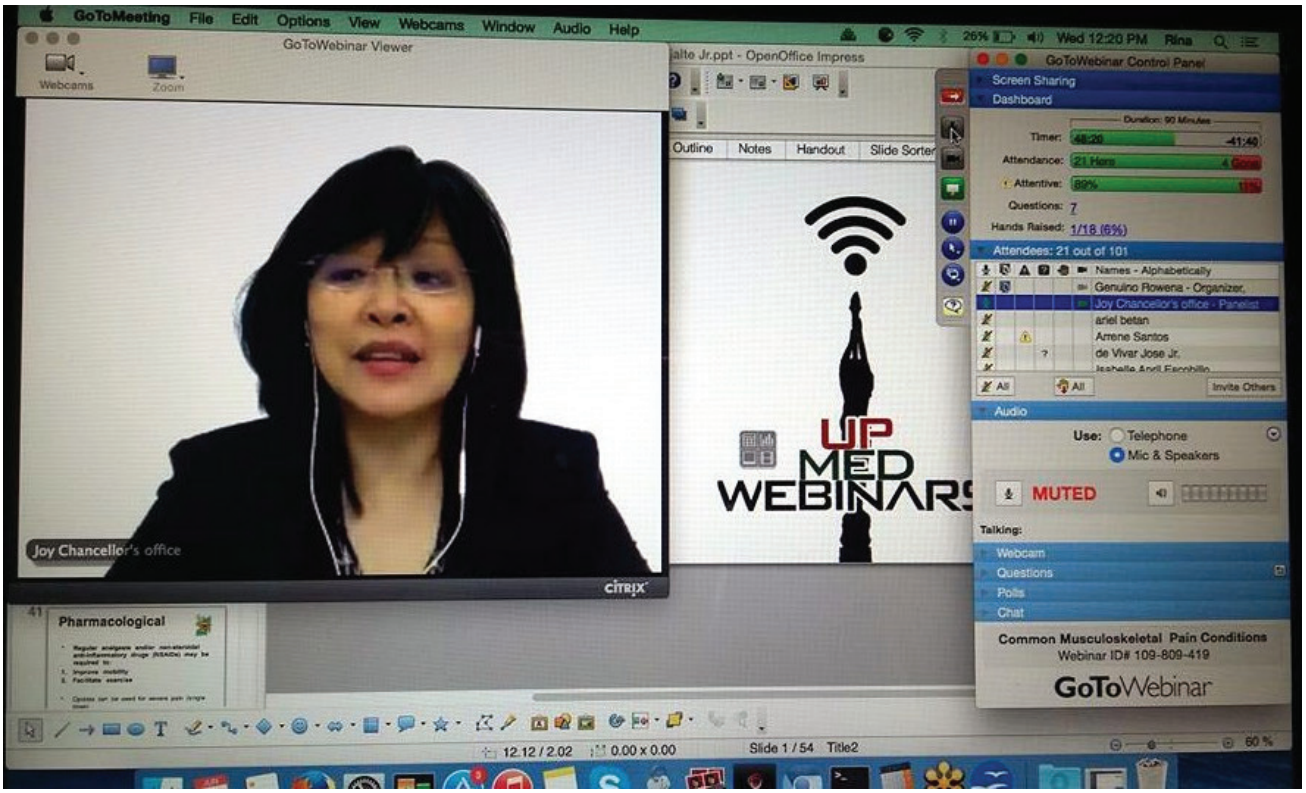
B and **C** represent **Bandwidth** and **Connectivity**. Ideally, the resource persons should be in an area with reliable Internet connection and preferably with engineers and technical support staff on stand by. Participants may join from any location at their convenience. It becomes more challenging for the participants because of their limited options for connectivity.

C is also for **Content** and is primarily the responsibility of the speaker. It would do well if they keep their slides simple with no or minimal animation or special effects. If possible, speakers should avoid embedding videos as those consume bandwidth and may not display correctly in participants' computers. It is advisable to use large fonts as some participants may be using mobile phones.

D is for **Delivery** which is, again, speaker-dependent. It can be as simple as asking the lecturer to deliver a straight lecture using simple Powerpoint slides. This is very comforting to some lecturers as they are used to lecturing using Powerpoint. Some other methods, like Flipping the classroom, are also possible. For some speakers who are not well-versed with Powerpoint slides, it is possible to take a real time video of them using the white board while lecturing.

The challenge for webinars is the inability of seeing your audience and their reactions because the visual feedbacks are very helpful in calibrating your delivery. But these are the limitations of technology and we have to live with these.

Dr. Iris Thiele Isip-Tan serves as reactor during the recent webinar lecture of Dr. Alvin Marcelo.



UP Manila Chancellor Carmencita Padilla greeting the webinar participants during the first webinar lecture that tackled the common musco-skeletal disorders.

E is for **Evaluation** and **Evidence**. After the webinar, the participants will be asked to fill up an online form to assess their concerns and interests on the webinar to help the organizers revise the protocol as needed.

One of the challenges that we will address for the next webinars is to measure if learning had happened. Right after every webinar, the organizers will try to measure through pre-test and post-test the concepts that were transmitted to the audience.

Part II – Other Technologies

If you search the Internet for technologies that are used for medical education, you'll get a long list. I will be presenting those I have personal experiences with. They are **Twitter chats, Periscope live social media broadcasts, Massive Open Online Courses and Flipping the Classroom.**

The first two are areas with tremendous research opportunities if we start using them as modalities for continuing medical education. For those on Twitter, there is a method for using Twitter not just for your messages but also to organize an event of participants and resource persons answering particular topics in a scheduled session.

A very popular local Tweet chat is **#healthxph**. It is an interesting modality because it consumes small bandwidth and you can use it in your cellphone and the interaction between the participant and resource person can be very rich. This is one way of showing that even participants can be resource persons which is the trend now in medical education.

Periscope.tv is a new modality that can actually deliver live broadcast lectures or rounds through cellphones . We can use Periscope.tv with one or more people talking as a panel over mobile phones. It is also another area for research. Perhaps, in the future, we can use Periscope.tv as a modality for our UP Med webinar.

Massive Open Online Courses – I don't know if some of you have enrolled in m-o-o-c-s, which are specialized websites that offer learning packages to participants all over the world using a laptop or mobile phone with Internet connection. Most of the courses are free but if you require certification, they you are charged certain fees. Most are offered by creditable institutions like the Massachussets Institute of Technology. Examples are edX, Udacity, coursera. For those who are there for the learning, there is a tremendous amount of material in these sites.

Flipping the Classroom is basically defined as a reversal of traditional teaching where students gain first exposure to new material outside the class usually via reading or lecture videos and class time is used

to do the harder work of assimilating knowledge through strategies, such as problem-solving, discussion or debates (Vanderbilt University Center for Teaching). It would entail me recording this lecture beforehand and delivering it to a group later and meeting that group after watching the video. That makes for a richer interaction and experience between the resource person and the participants. It saves time for the faculty because they do not have to repeat the same lecture all the time and constrains the students to prepare questions for the session knowing that that is what is expected of them during class time. This has worked very well for some faculty members.

There are more technologies. Apparently, the problem right now is that the technology is changing at a faster pace than how teachers can adopt them. I, myself, am overwhelmed because the technologies come faster than I can learn them. Usually, the students are more often well-versed than the faculty and that can be a challenge to the faculty because students know more about technologies than they do. It takes some maturity for the faculty members to learn and grow with the students in the use of the technology.

In any case, whether it is a new technology or not, we should proceed with the same principles: conscientious exploration guided by basic principles of ethics, transparency, and participatory methods, making sure that we are nurturing our students, listening to their needs and being responsive to their learning. I challenge ourselves as faculty members and resource persons to make sure we gather the right evidence and publish our findings so we can share these with other faculty members and create a base of evidence for appropriate use of emerging technologies.

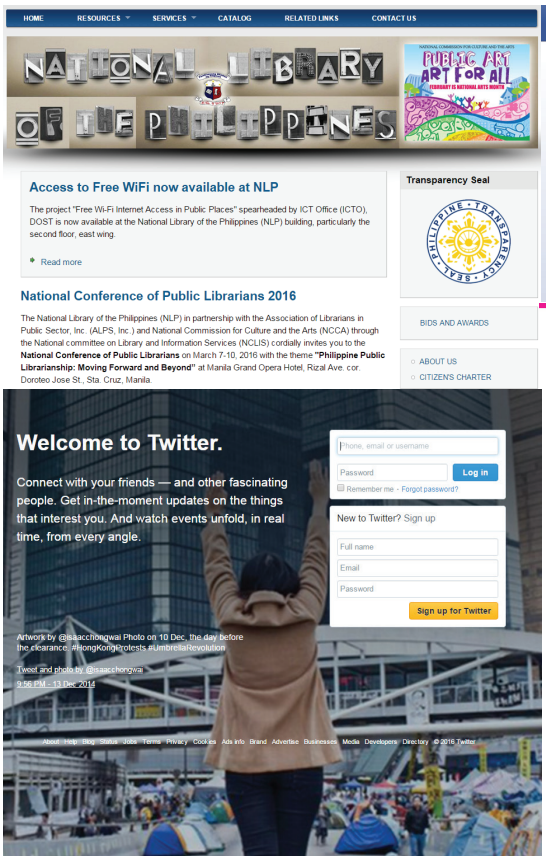
Part III – Best Practices and Lessons Learned

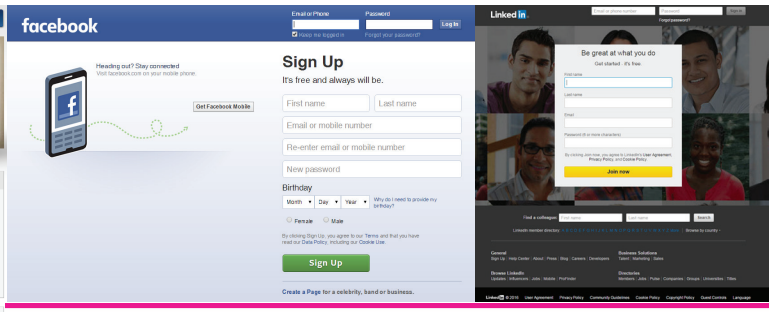
One of the topics that came up when I was preparing for this webinar is Intellectual Property or IP. I will divide the IP discussion into two: one from the speaker's perspective and another from the participant's perspective. From the speaker's perspective, based on Philippine laws, the content is owned by its creator. The right is inherent upon the creation. So this webinar, technically, is copyrighted by me and because I now placed it online available to many, it is now at risk of copyright infringement which is a natural fear of many resource persons.

If you are a resource person and wary of the copyright infringement of your material, you may wish to assert your copyright by submitting an application with the National Library or with the Supreme Court Library. There is a link, http://web.nlp.gov.ph/nlp/?=node/6460 which you can access to help you with the application. The cost is P200 and that will grant you a copyright certificate for your material. For the resource person, it establishes you as the owner of the content.

From the participant's perspective, I briefly reviewed **Republic Act 8293** and Section 185 on "Fair Use of a Copyrighted Work." Section 185.1 states that "fair use of a copyrighted

The assistants or support staff of the UP Med webinar who ensure the physical and technical arrangements and the smooth flow of the online lecture.





work for criticism, comment, news reporting, teaching including multiple copies for classroom use, scholarship, research and similar purposes is not an infringement on copyright." As a matter of fact, even if I copyrighted my material, that allows you, my participants, to use my material fairly as indicated in this section. That is limited by your right to gain economic benefit from the material. Because you are able to get my material freely, you cannot gain economic benefits from my material.

Another best practice is to maximize social media for disseminating information about the webinar or even using social media at the same time we are having the webinar. We can use Twitter, Facebook, Orkut, LinkedIn, Mailing Lists to promote the webinar. We can use Twitter as a platform not just for people with access to webinar but even for people in remote areas with access only to Twitter. We should open ourselves to multi-modality technologies and not just fix ourselves to a certain platform. We should be open to expanding the base of the participants regardless of the platform that they are able to use. There is a research question here, "Is social media an effective platform for CME dissemination?"

Another best practice is providing post webinar support. After this webinar, we should allow participants to continue exploring the topic, provide feedback and suggestions to the resource person and organizers, encourage participants to share their own links and resources because you might know of other technologies that are useful for CMEs. If there is enough interest on a particular topic and with the help of other relevant stakeholders, such as professional societies, we can actually nurture these people into a community of practice and further along the development of the topic.

This lecture will be uploaded in YouTube and it is one way for the organizers and resource persons to monitor interest in a particular topic by measuring access to the recordings. You can measure the number of hits and qualify comments and if popular, consider another lecture on a related topic or an advanced topic.

Summary

In our context of an archipelago, we have a lot of health professionals in remote areas who cannot easily travel to attend seminars. Technologies, such as webinars, offer tremendous opportunities for reaching out to them and letting them get updated with new advances in medicine.

Technology-enhanced CME, however, can be challenging and a committed team is key to success. This team should be on continuous learning mode in order to improve the webinars. We hope that with the support of my classmates from the UP College of Medicine Class 1991, the UP Medical Alumni Society, and the Postgraduate Institute of Medicine, the UP Med webinars can be the premier online CME platform for physicians and allied health professionals in the country.

*Based on a lecture delivered as part of the UP Med Webinar series being conducted by the UP Medical Alumni Society and the UP College of Medicine Postgraduate Institute of Medicine , and Information Management Services
**Executive Director, Asia eHealth Information Network; Senior Vice President and Chief Information Officer, PhilHealth; Director, UP Manila Technology Transfer and Business Development Office, former director, UPM National Telehealth Center

National Telehealth Center: Bridging distance to improve health through ICTs

Dr. Portia Fernandez-Marcelo and Cynthia M. Villamor

After the pioneering research service and advocacy work of the National Telehealth Center, the national government began to include eHealth in its development language.

In the Philippines, distance is one of the several factors that make health care inaccessible to many Filipinos. Think of the 7,107 islands, 18 regions, and the huge number of provinces, cities/municipalities and barangays separating the country's more than 100 million population that make health care delivery inequitable, the trek to reach all arduous.

In recent years, health care has been getting much-needed boost by reaching patients in remote, isolated communities through telehealth. Telehealth is the provision of health care with the use of health data transmitted from a distance through information and communication technologies (ICTs). Telehealth falls under the broader concept of eHealth. The World Health Organization defines eHealth as the cost-effective and secure use of ICTs in health and health-related fields, including health care services, health surveillance, health literature and health education, knowledge, and research. Telehealth, thus, is eHealth to bridge a distance.

eHealth as a discipline and practice is fast developing in the country as more and more institutions, people, especially the students and youth, are getting interested and attuned to the use of ICT beyond personal needs but also in contributing to social goals, including health.

The UP Manila's National Telehealth Center's (NTHC) growth and development coincide with the rise of eHealth and telehealth in the Philippines. Today, after 18 years, NTHC leads in advocating for eHealth policies and implementing wide-scale eHealth projects intended to increase the Filipino's access to quality health services.

Beginnings

NTHC Director Dr. Portia Fernandez-Marcelo recounts that the NTHC began in the

NTHC Director Dr. Portia Fernandez-Marcelo

same year that its mother unit, the National Institutes of Health, was founded. Also in the same year, the UP Open University was starting to build the distance education capacity of the country. NTHC's creation was approved by the UP Board of Regents in July 1998 upon the initiative of Chancellor Perla Santos Ocampo.

NTHC was born in the context of circuit courses for community doctors and health professionals conducted in the provinces provided by UPM's various colleges and units. Among others, Chancellor Santos Ocampo envisioned that UP Manila continue with this role of reaching the communities more widely and capitalize on the promised benefits of ICT. NTHC started by providing online updates on health matters through these tele-conferences.

In those early years, UP Manila was putting in place the required internal infrastructure, including human resource capacities. Anesthesiologist Dr. Herman Tolentino and surgeon Dr. Alvin Marcelo, who became NTHC's third and fifth director, respectively, took post-graduate fellowships in medical informatics at the University of Washington and the National Library of Medicine–National Institutes of Health, Maryland, United States. Dr. Inocencio Maramba, NTHC's fourth director, pursued a Master of Science in Medical Informatics from the University of Warwick, United Kingdom. On their return, they worked from both the College of Medicine-Medical Informatics Unit and the NTHC. With colleagues from the College of Arts and Sciences, they saw through the approval of the two-track Master of Science in Health Informatics jointly offered. The program was envisioned to produce leaders with competencies in applying informatics concepts, principles and skills for the strategic solutions to health problems and in the critical study of health information systems (*please see description on page 34*). UP Manila's pioneering eHealth research initiatives in medical and public health informatics would also ensue.

In 2004, NTHC proposed and secured an eGovernment grant from the National Commission on ICT to design and implement nationwide telemedicIne linking rural communities with medical and health experts in UP Manila. Dubbed the *BuddyWorks* Project, this was implemented in 10 sites initially.

The same year also saw the beginnings of the now popular, widely adopted and multi-awarded *Community Health Information Tracking System (CHITS),* an electronic medical records system (EMR) specially meant for government primary care centers. CHITS is significant because it demonstrated that UP Manila's service-learning efforts can contribute to clinical and local health (information) systems strengthening while meeting the learning needs of students (*please see separate article*). The project was funded through the Pan Asia ICT R&D Grants, with significant contribution from the International Development Research Center–Canada (IDRC). It sparked NTHC's subsequent international collaborations, grants, and advocacies for eHealth for social development.

The need for standards in HIS, inter-operability and data sharing made clearer NTHC's involvement in developing

Dr Alvin Marcelo opens the International Symposium on eHealth and Telemedicine in January 2011, with eHealth researchers from Asia and the emerging Filipino eHealth community. This was a joint offering of the NTHC with the PANACeA* supported by the IDRC-Canada and the DOST PCHRD.

UP Pres. Alfredo Pascual and Quezon City Mayor Herbert Bautista sign the MOA on the citywide implementation of CHITS in QC, September 2011; Front, from left, QC IT Development Office Engr Paul Imjada, QC Health Officer Dr Annie Innumerable , Vice Mayor Joy Belmonte, Pres. Alfredo Pascual, Mayor Bautista, UPM Chancellor Ramon Arcadio, and NTHC Director Portia Fernandez-Marcelo. Back, from left, QC councilors, including QC Councilor Dr. Dorothy Delarmente (in red), an alumna of the UPCM.

a platform that integrates data on infectious disease from varied sources in the Mekong Basin Disease Surveillance Project, supported by the World Health Organization–Western Pacific Regional Office with the Rockefeller Foundation. A major lesson from this engagement is that while technical ICT solutions may be possible, human, cultural and organizational dynamics are equally critical.

Research innovations continued under the leadership of NTHC Director Dr. Alvin Marcelo beginning 2006. The three most noteworthy ones were the interdisciplinary and cross - UP campus research **Instituting the National Telehealth Service Program (NTSP)** supported by the Department of Science and Technology Philippine Council for Health Research and Development (DOST PCHRD) *(please see separate article)*. The Department of Health (DOH) was first better engaged in telehealth under this in 2007 when its Doctors to the Barrios (DTTB) became the referring physicians.

A second area of research was mHealth, using mobile technologies, such as cellular phones. From the web-based **BuddyWorks** portal, telemedicine shifted to mHealth to convey teleconsults. This is the only mode of communication in many DTTB communities in the most remote parts of the country. Likewise, an SMS reminder system for mothers was tested extending CHITS' capacities.

Dr Alvin Marcelo opens the International Symposium on eHealth and Telemedicine in January 2011, with eHealth researchers from Asia and the emerging Filipino eHealth community. This was a joint offering of the NTHC with the PANACeA* supported by the IDRC-Canada and the DOST PCHRD

NTHC's research in the **PAN Asia Collaboration on Evidence-based eHealth Adoption and Application (PANACeA)** include collaborative research implemented in health facilities in the Philippines, Pakistan and India. This was supported by the IDRC and guided by professors from the University of Calgary, Alberta, Canada. The first was in the domain of telemedicine: **An Online Method for Diagnosis of Difficult TB Cases for Developing Countries). The second paper was the Cost Benefit Analysis of Computerization in Hospitals: A Marginal Cost Approach.** It entailed the NTHC to design and implement a working prototype of a hospital information system using the OpenMRS (Open Medical Records System) which include modules on patient registration, laboratory and radiology services (only). (Open MRS would eventually be adopted as the software behind CHITS version 2).

These researches would elucidate common concerns

and seed the eHealth policy advocacies of NTHC: the utility of Free and Open Source Software (FOSS), the need for a clear direction for eHealth development to strengthen the country's health information system, and ensuring telemedicine development and implementation, especially for underserved rural remote parts of Philippines.

The NTHC was designated as Center of Excellence for FOSS for the ASEAN +3 by the United Nations Development Program and serves as regional node of the International Open Source Network (IOSN) for the ASEAN+3 Region. The IOSN focused on initiatives on how FOSS can help in providing better health care. It became a platform for the campaign for use of FOSS in all sectors, from education to small and medium enterprises (SMEs) as well. Converging resources from InWEnt-Capacity Building International (supported by the German government) extended the campaign further by engaging more emerging FOSS advocates in the various ASEAN countries not only from government but also the academe, SMEs and non-government organizations/advocacy groups.

The Philippine National Health Information Infrastructure in 2005 was proposed by NTHC as the endpoint of what a multi-sectoral forum would discuss to set fundamentals of how eHealth can be leveraged to more systematically strengthen the health system. This, however, was superseded by the Philippine Health Information Network (PHIN), DOH-organized and WHO-supported. This is set in the background of WHO's recognition and advocacy in strengthening the country's health information system (HIS) as a fundamental building block of the health system. The NTHC actively participated in the PHIN to articulate a road map to HIS strengthening.

Lobbying for a Telehealth Bill was initiated with the Congress in 2009 but with the country's policy cycle, this had to be a continuing advocacy area by UP Manila.

The Center's staff conducted several eHealth/ health informatics seminars to increase awareness and drum up broader interest in the field. Nurses were especially targeted as the Commission on Higher Education institutionalized nursing informatics in the undergraduate curriculum. Over a thousand participated in these NTHC seminars. Multi-media modules on health topics were developed as a means to reach the country's 'last mile' –- internet connectivity remain a big challenge to telehealth. The NTHC staff also attended capability building workshops sponsored by international groups.

NTHC now

With Dr. Fernandez-Marcelo at the helm in the last five years, the NTHC built on and extended its public health informatics projects to more underserved communities and tested new features to address identified gaps in health information systems. The bias stems from the fact that the Director is an associate professor of Community Medicine at the UP College of Medicine and practices as a public health consultant. The NTHC's projects were developed collaboratively with

DOH Secretary Dr. Enrique Ona addresses members of the audience in the 2013 National Telehealth Symposium where the outputs of the NTSP's year-long efforts were presented.

other UP Manila units, the DOST and DOH, local governments and international development agencies.

Through the PHIN, the NTHC assisted the DOH in conducting nationwide regional conferences to broaden awareness and engagement of regional government agencies, local government and private sector on the importance of a strong Philippine health information system and the promises of eHealth use. Likewise, with both the DOH and the Philippine Statistics Authority, regional conferences were held on the importance of universal civil registration and its link with the health sector and the Philippine HIS.

The DOH's first investment in telemedicine was through the **Development of the NTSP in the DOH** project beginning 2011. The DOST continued national financing for telehealth through the program **RxBox: Integrating Medical Devices in the NTSP**. This innovation demonstrated the integration of NTHC's three major technologies under development – telemedicine and telemedicine device RxBox and CHITS. To date, telemedicine has linked over 550 primary care physicians serving rural remote communities from Batanes to Tawi-Tawi to medical specialists from the UP-Philippine General Hospital, Eastern Visayas Regional Medical Center and the Baguio General Hospital and Medical Center *(please see separate article)*. Telemedicine services have covered health disciplines, such as surgery, orthopedics, pediatrics, radiology, internal medicine, and maternal and child health, to name a few.

Collaborative work on telemedicine with colleagues in UP Manila is exemplified by the Medical Teleparasitology project led by current DOH Undersecretary Dr. Vicente Belizario, of the Department of Parasitology, UP College of Public Health. NTHC also supported UP dermatologist Dr. Belen Dofitas in engaging her colleagues at the Philippine Dermatology Society to appreciate and be trained on the field. Likewise, NTHC assisted efforts of the UP Section of Dermatology in educating municipal health officers on teledermatology in UP Manila's partner communities in Cavite. Medical alumni from Delaware USA provided annual funding for ICT gadgets to support the UP DTTBs in their academic, clinical and public health management roles as they serve the municipalities.

Under eRecords-eSurveillance research arm, CHITS was revamped with a more robust back-end, as it expanded to more cities (Navotas and Quezon City) serving the largest concentrations of urban poor communities as well as underserved towns throughout the country, and tested more health modules and platforms. The National Rabies Information System was developed for the DOH. PIEMEDS, the **Price Information Exchange** on essential drugs in countries in the Western Pacific region, also underwent several iterations; these latter two projects were funded by the WHO. With the NIH's Institute of Child Health and Human Development, a Hepatitis B seroprevalence and child tuberculosis treatment surveillance system were developed.

Lessons distilled from these implementations pointed to the ethical use of eHealth, ensuring patient privacy in an increasingly digitized care environment, data standards

DOH Bureau of Local Health Systems Development Director Dr Juan Perez presides over a round table discussion on the Telehealth Executive Order in 2012. Participants include representatives from the Office of the Executive Secretary, PhilHealth, clinical specialists from the PGH, and NIH Institute of Health Policy Development

and interoperability of information systems as intensified advocacy points for NTHC.

"The mandate of the University is to reach more and more, especially those in remote areas, through model-building or even direct services in ensuring that health systems are responsive, relevant health information is made available. In fulfilling this, the Center works closely with various government and non-government institutions and other stakeholders that enable our researchers and staff to develop and test practical solutions to the country's health problems," stated Dr. Fernandez-Marcelo.

eHealth, she asserts, should make health services more accessible, available, affordable, and acceptable to patients – the 4As of quality care. At the same time, she explains that the goal of eHealth should not just be to produce innovative technology. "For someone who is not techie at all, I learned that innovations should be wholly relevant and make the users' lives easier – even if it means overhauling your research concept altogether."

"CHITS was originally designed for injury care management. But health workers in Pasay needed an information system that would enable them to do their tasks more efficiently. Thus, CHITS was redesigned for maternal and child health services which is provided everyday in the health center. The RxBox, too, had to be revised – originally meant for trauma and poisoning, its newer version is redesigned for pregnant women and patients with non-communicable diseases," the NTHC director explained.

"My bias is that we strengthen the primary care system, provide eHealth tools to those at the frontlines of care – in rural communities and those serving the poor." Being in public health and an advocate of Primary Health Care, Dr. Fernandez-Marcelo admits to having that lens, although NTHC as a research unit should also grow in other fields of medicine and health promotion.

A second lesson, she added, is that eHealth innovations should be as easy to use, such as a telephone or toothbrush – that one should be able to use it almost without training. And that is not easy to do.

Challenges

eHealth presents new challenges in clinical practice and data management, such as accountability. Not all doctors will easily adopt telemedicine; many are wary about who would be legally liable in the care of patients in a telemedicine system. A frequently asked question relates to sustaining telemedicine -- who pays for this after the research grants are over? And if telemedicine is not practice of medicine as defined by the Medical Act of 1959, then the question, "how can one be compensated in such a system" is often raised.

Many of the NTHC projects were implemented large scale with both research and service objectives. These are set in the context of the national government's desire to field technology solutions to address health inequities and do this with urgency.

Dr. Fernandez-Marcelo reflects on the multiple challenges NTHC faced in those circumstances: "First, NTHC had to ensure that the eHealth technology – even at its early stages of development – is sound and ethicaly used. And because the technology fits their need, the innovation would have/should have traction (i.e. health workers would continue to use this beyond the introductory training and deployment period). At the same time, we had to tackle operational problems of a wide geographic foot print of implementation.. And in all of these, there were HUGE problems; In a nutshell, it is 'toxic!' "

Dr. Portia Fernandez-Marcelo (extreme right) and the NTHC staff holding proudly the Galing Likha Kalusugan Award for CHITS in the "Best Health Market Innovation Category" for revolutionizing record keeping in government health centers that helped improve patient care..

It does not stop there, parallel to surmounting these, sustainability through financing and policy adoption had to/should be advocated for. These are even more daunting but very important tasks.

The first RxBox prototype developed in 2007, herein being tested in RHU Quezon,.

Policy contributions

Dr. Fernandez-Marcelo considers UP Manila's involvement in national policy setting as the Center's most significant contribution to eHealth in the country.

After its pioneering research-service and advocacy work, she cites that in 2010, national government began to include eHealth in its development language. eHealth is in the DOH's National Objectives for Health and the National Unified Health Research Agenda for 2010-2016. Then Secretary Enrique Ona and DOST Secretary Mario Montejo and PCHRD Director Jaime Montoya were/are champions. Telemedicine and electronic medical records are cited in the updated PhilHealth Law of 2013.

The Aquino government espoused multi-sectoral involvement, The DOH towed the line and organized the ICT for Health Technical Working Group (ICT4HTWG) in 2010. It consisted of public and private sectors; Dr Alvin Marcelo represented UP Manila as the academic institution representative. The ICT4HTWG expanded its consultative processes to reach over a hundred eHealth pundits. It presented to the DOH recommendations on a health sector wide enterprise architecture, data standards and capacity building on eHealth.

In 2013, the National eHealth Steering Committee (NeHSC) was organized to oversee the alignment of all eHealth-related initiatives and projects in the country and implementation of the harmonized Philippine eHealth Strategic Framework and Plan. This was co-chaired by the Secretaries of the DOH and the DOST; the UP Manila Chancellor sits as part of the NeHSC. UP Manila's involvement is a recognition of its leadership and contributions in defining several concerns in the field. The NeHSC built on the output of the ICT4HTWG, and organized even more domain experts groups with broad participation from various groups of the growing eHealth community. These are tasked to set the foundations of how eHealth can boost efforts to more systematically strengthen the health system. UP Manila is represented in many of these significant outputs, such as the Joint Administrative Orders on the Philippine Health Information Exchange (PHIE) and the Privacy Guidelines on the PHIE that were recently published. These should pave the way to ensure that health data standards are met by stakeholders, ensure that relevant health information is exchanged to ascertain continuity of care but still protect the patients' autonomy and privacy.

While these are gains, more still have to be done. Ensuring telehealth for underserved communities was enshrined in two House Bills, in a Presidential Executive Order and a DOH Administrative Order – all of which were not enacted.

Two bills have been filed in the 15th and 16th Congresses: HB 6336, or the National Telehealth Act of 2012 by former Congressman Joseph Abaya in 2012 and another by Congressman Rogelio Espina in 2014. NTHC helped in the crafting of the first bill by providing major inputs and lobbying with the solon for its enactment until the session that year ended. The second bill was adopted independently and passed through the 1st reading by the House of Representatives Committee on Health. But the bill will just have to be re-filed in the next Congress after the national elections.

It is still a long way to go but Dr. Fernandez-Marcelo hopes that the broader enabling eHealth bill and a parallel bill

on telemedicine will also be passed. She admits that the latter bill will tend to be more problematic because of the clinical care aspect and the attendant ethical, social, and legal issues. "'More people are reached through telemedicine than without telemedicine' – I quote a Canadian telemedicine expert – and I believe in that. Hence, UP still has unfinished work." The NeHSC has the eHealth Bill – with provisions on telehealth – on its policy agenda.

DOH Undersec. Dr. Teodoro Herbosa speaks on the Philippines' national health agenda during the 10th anniversary of CHITS in September 2014 that also tackled the increasing opportunities and emerging directions of eHealth in the Philippines.

"We will campaign hard again for this bill in the next Congress, and this time we'll also take advantage of the newly created UP Manila Health Policy Development Hub. Legislation should ensure sustaining telemedicine for our underserved communities."

The NTHC is a founding member of the globally-recognized Asia eHealth Information Network (AeHIN aehin,org). It is a collaborative community of eHealth professionals in South and Southeast Asia with membership in 25 countries. AeHIN mainly models peer-to-peer learning among country leaders trying to make eHealth work amidst limits/ challenges developing countries face. Similar to national level campaigns globally, AeHIN advocates for eHealth governance, building capacities on national level eHealth governance, ensuring a sector wide health information architecture and standards are in place, as well as systems to ensure continuous progressive capacity building on eHealth as enablers for country-level health and development.

Likewise, UP Manila faculty members are consulted by the WHO, Rockefeller Foundation, United Nations on mHealth, electronic medical records, standards, eHealth evaluation, among others. Dr. Fernandez-Marcelo pointed out that these national and international involvement of the NTHC will not be possible if UP Manila did not have working and even problematic eHealth implementations on the ground.

Future plans

The country's eHealth Program is unfolding steadily, and there is better governance and alignment now with national development goals. Broadband infrastructure will have to catch up with the growing demands of the health and other sectors. Computerization has become a standard feature of institutions. There is increasing public awareness on the benefits of ICT.

Dr. Fernandez-Marcelo cites that one other unfinished agenda is developing a PhilHealth benefit package for telemedicine that considers telehealth a public good, not the usual fee-for-service type of benefit package. The referring doctor or nurse, or health professional, will engage in telemedicine not because someone pays for the service but because it is good for the patient.

Scaling up implementation of more mature NTHC eHealth technologies necessitates intensified policy advocacy or commercialization. The dual nature of NTHC as both a research and service unit has to be addressed.

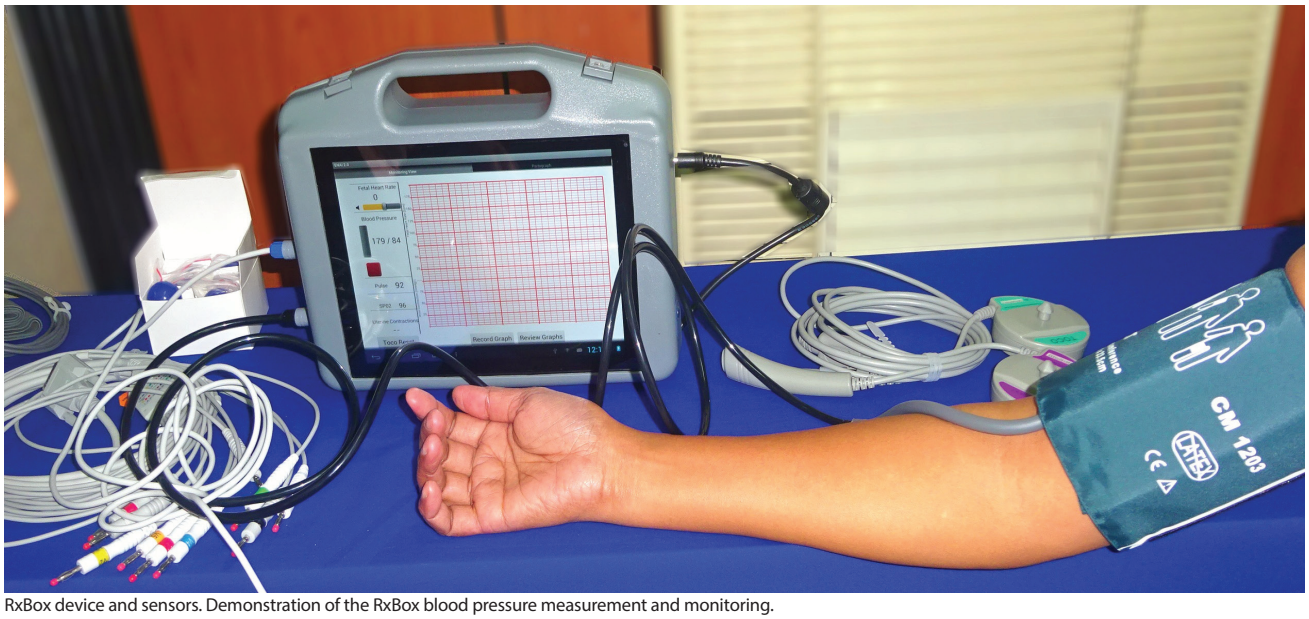
Expansion of eHealth use in other fields has to happen and NTHC research areas have to go beyond what are being done in the last five years. "eHealth is not supposed to be public health informatics alone. We need fresh blood, a full cadre of research faculty. Likewise, research assistants who grew with the Center and contributed to its growth have to be nurtured further and retained by the University in a more stable way."

The national eHealth Vision is that by 2020, there would be widespread access to health care services through eHealth. UP Manila is poised to contribute more significantly to this vision, making quality health accessible to Filipinos wherever they are.

RxBox: Empowering health workers to improve health care in remote areas

Charmaine Lingdas

This Filipino-made diagnostic device is creating ripples, transforming health care in the country's remote communities by helping health workers in performing vital diagnostic procedures and having teleconsultations with clinical specialists in urban areas for treatment and management advice.



RxBox device and sensors. Demonstration of the RxBox blood pressure measurement and monitoring.

Imagine having to travel for hours by boat or land to get to the nearest health facility, only to be told to transfer to another hospital for the necessary diagnostic or treatment procedure. This is the harsh reality faced each day by patients from remote and underserved areas across the country – geographic barriers and poverty reduce their access to health care. No wonder that President P-Noy started out his term in 2010 with six out of 10 Filipinos dying without seeing a doctor.

Telehealth efforts of the UP were intensified in recent years to respond to the government's call for *Kalusugang Pangkalahatan*. The genesis of telemedicine/telehealth in the country is rooted in the efforts of the National Telehealth Center (NTHC) of the National Institutes of Health and UP Manila. Globally, telehealth has opened up opportunities for diagnosis and treatment of diseases over a distance. In developed countries, telemedicine is already among the established modalities of health service delivery, regulated by authorities and incorporated into the health financing systems. Telehealth in the Philippines has had a slow trajectory these last 12 years when first initiated in 2004, hampered mainly by poor infrastructure in the underdeveloped countryside. Internet penetration in the Philippines is still low albeit has grown from 5.2% that year to 39. 4% of the

Dr. Kristine Mae Magtubo, RxBox Project Manager, presenting the RxBox to different investor groups at the Leaders in Innovation Fellowship (LIF) of the Newton Fund of the United Kingdom in 2015.

population in 2014. Nevertheless, the NTHC persisted, continued telemedicine support to rural remote municipalities, improved on its technologies and advocated for a national telehealth policy.

A different kind of box

A promising innovation built atop the telehealth program, a proudly Filipino-made diagnostic device called the RxBox is creating ripples, transforming health care in the country's remote communities. The RxBox telemedicine device aids health workers in performing vital diagnostic procedures, in addition to the teleconsultations with clinical specialists in urban areas for treatment and management advice.

"What the RxBox does is bring back the dignity of health workers. It is something else you can offer to your patients when you are in a place where you are their last hope," declared Dr. Kristine Mae Magtubo, among the pioneer volunteers of the RxBox in 2013. A former Doctor-to-the-Barrios (DTTB) in Samar and Leyte, she witnessed firsthand the people's lack of access to better quality health care. The introduction of the RxBox has given her and her health care team new hope for their patients.

"It was really very empowering for them – for us -- to use the device and again to reconnect with their clinical skills" asserted Dr. Magtubo, as she recounts the training she and her healthcare team underwent for the RxBox. The midwives in her team attested that it was their first time to see a cardiotocograph while one of her nurses recalled that it was 15 years ago when she last used an electrocardiogram.


Engineer Peter Banzon of the DOST's Advanced Science and Technology Institute (ASTI)

After her DTTB tour of duty, Dr. Magtubo joined the NTHC as University Researcher and RxBox project manager. As the RxBox research gained traction and was prepared for large-scale implementation, she was sent to represent the project in the "Leaders in Innovation Fellowship" (LIF) of the Newton Fund of the United Kingdom and the Department of Science and Technology (DOST) in 2015. The LIF innovation management course had two legs: the first was in London, UK with the Royal Academy of Engineers and six-month program at the Asian Institute of Management. Here, Dr. Magtubo pitched the RxBox to different investor groups, and won second best presentation leading other Filipino innovators.

Telehealth Roots

The *RxBox-2: Integration of Medical Devices in the National Telehealth Service Program (NTSP)* or Telehealth Program is a collaborative research program of the NTHC led by Dr. Portia Fernandez-Marcelo as program leader/primary investigator, with Dr. Luis Sison (UP Diliman College of Engineering, Electrical and Electronics Engineering Institute, EEEI) and Engineer Peter Banzon (of the DOST's Advanced Science and Technology Institute (ASTI). Supported by the DOST as

National Telehealth Center Director Dr. Portia Fernandez-Marcelo at the first eHealth Summit organized by DOST and DOH, with the theme: "eHealth Innovations for Universal Health Care."

among its high impact technology solutions, RxBox was launched formally in 2013 as part of the national government's call for Smarter Philippines through the strategic use of science and technology. It builds on the experience of the almost-decade-long Telehealth Program, including development and field testing of the RxBox alpha prototype.

The NTHC was established in 1998, "to improve the health of Filipinos through the optimal use of Information and Communication Technology (ICT)." In 2004, NTHC implemented the first nationwide telemedicine venture in the country called the **BuddyWorks** Project. It is a telehealth service portal enabled text-based and multimedia clinical interactions. By 2007, a five-year Memorandum of Understanding on telehealth/ telemedicine between UP Manila and the Department of Health was signed to support the DOH Doctors to the Barrios in their clinical decision making by linking them with clinical specialists based at the UP Philippine General Hospital – College of Medicine (UP CM-PGH). That same year, NTHC morphed the **BuddyWorks** project into the National Telehealth Service Program (NTSP) through the support of the Department of Science and Technology Philippine Council for Health Research and Development (DOST-PCHRD).

The NTSP was encouraged by the UP System, recognizing eHealth (the use of ICTs for health) as an emerging discipline that needs interdisciplinary collaborative work to be most effective. The NTHC led the research team which also consisted of the UP Diliman College of Science, National Institute of Physics and College of Engineering, Department of Computer Science and the EEEI. The NTSP shifted the web-based **BuddyWorks** telemedicine to the use of SMS for conveying teleconsults and response to the teleconsults by the clinical specialists. By then, cellphones were fast becoming ubiquitous even in the most remote municipalities of the Philippines where the DTTBs serve.

UP Diliman College of Engineering, Electrical and Electronics Engineering Institute, (EEEI) Dr. Luis Sison discussing the "RxBox Option for Scale Up" at Makati for the RxBox Stakeholders' Meeting

The second component of the Telehealth Program involved the development of a custom-designed biomedical telehealth device, RxBox, capable of measuring vital signs and transmitting data through both the Internet and GSM network to a remote medical specialist. The RxBox alpha prototype sensors include a sphygmomanometer, pulse oximeter, thermometer and ECG. While the initial focus of the research was to aid in the treatment of patients with injuries and trauma, testing the device and accomplishing the research presented problems on deeper evaluation of the hospital emergency room setting and workflow. The research team shifted focus and field-tested the RxBox in four rural health units (RHUs) in the country from 2010 to 2011. While it was received well by the RHU because of the promise of telemedicine

Different prototypes of the RxBox

and the immediate link with clinical specialists from UP PGH, the RxBox device had to be refined further.

The RxBox-2 research program focused more on equipping peripheral RHUs with better tools when the health staff render care, and telemedicine support in case of clinical dilemma. Typical RHUs serve pregnant mothers and children, thus, an external fetal monitoring suite as well as a maternal tocometer were added in order to aid the health workers in the critical period when the mother delivers her baby. The RxBox2 is a solution to the campaign to reach the Millennium Development Goals 4 and 5 (better maternal and child health), as well as non-communicable diseases (NCD) control. These are among the major causes of deaths in the Philippines. RxBox was also conceived to serve not only RHUs in rural remote communities but other clinics and hospitals that serve parturient mothers and adults with cardiovascular disease. This broad 'market' is meant to encourage the Philippine biomedical device industry.

The RxBox is a multi-component program that builds the capacities of primary care workers on the ethical use of ICTs for health. It integrates three eHealth technologies designed by the UP to strengthen health delivery systems, especially in the periphery where the poor seek care: telehealth/telemedicine, RxBox telemedicine device, and CHITS electronic medical records system. Within this current research, the RxBox telemedicine device underwent three iterations: two prototypes and a production model, incorporating engineering lessons in succession. Refined, as well, was the training-deployment program as it progressed from pilot to large-scale implementation.

In the last five years (2011-2015), the RxBox was a centerpiece health innovation in the DOST's annual National Science and Technology Week celebrations. The RxBox telemedicine device evolved through the years, notably, the device now features a compact, lightweight design with a tablet interface.

How it Works

Once patients consult in a health facility, the healthcare worker registers them in CHITS wherein their electronic medical records are created. Patients with or at high risk of cardiovascular disease, or pregnant women are especially targeted to use the RxBox for diagnostic tests. The patient is hooked to the RxBox through the appropriate medical sensor (e.g. for maternal contraction and fetal heart rate assessment in which the tocometer and doppler fetal are used, respectively). The patients' clinical data, including those from the device, are documented, stored, and retrieved in the CHITS electronic medical records system. When needed, specific clinical information can be exchanged between the referring physician and clinical specialists through telemedicine. CHITS facilitates the tracking of patient status under long-term care, such as pregnant mothers and those with NCDs. CHITS also automatically aggregates reports needed for public health management by both the DOH and PhilHealth. The latter is an important resource for the rural health units: PhilHealth benefit payments could be earmarked to sustain eHealth systems, such as the RxBox technologies, among others.

Each of the three technologies can stand alone and still be useful to health facilities even if employed separately, especially in remote communities where data cannot be directly transferred via Internet. Should the patient require referral to a remote clinical specialist, the patient data are then sent

over the Internet or via Short Message Service (SMS) for teleconsultations.Teleconsultations are sent to telehealth centers, Baguio General Hospital (BGH) for the Cordillera Administrative Region (CAR) and East Visayas Regional Medical Center for Region 8. The rest of the teleconsultations for the different parts of the country are sent to the Philippine General Hospital.

RxBox Stories

Currently, 143 health facilities in 17 regions and 51 provinces in the country and about 830 health workers – doctors, nurses, midwives, allied health care providers, as well as IT personnel – from different regions in the country, have undergone training on the RxBox. An estimated 2.86 million Filipinos nationwide, 56% of whom are from 4th to 6th class poor municipalities, are potentially served by these better-equipped health centers with the RxBox program.

The RxBox continues to improve delivery of health care in the concerned municipalities. The device has been integrated into the daily workflow of health care workers. According to a research conducted by the NTHC, RxBox has been used at least 15,705 times, for at least three months since its installation.

One of the key effects of the RxBox is enhancing the diagnostic capabilities of the rural health workers, making work more efficient, and healthcare more accessible and affordable, as attested to by patients and health workers.

A midwife from Kibugan, Benguet affirmed that "As a midwife, *mas na*-appreciate *ko yung* tocometer, fetal heart rate monitoring *at* partograph *kasi mas napapadali niya yung trabaho ko lalo na kapag may nanganganak*." (As a midwife, I appreciated more the use of the tocometer, fetal heart rate monitoring and partograph because RxBox facilitates my work, especially during birth)

Another health worker from Malibcong, Abra attested *"Malaki ang tulong niya sa mga pasyente lalo na pinansyal. P180 yung pasahe mula dito papuntang Bangued para lang magpa-ECG. P400 naman yung ECG fee sa ospital. Dito ay wala silang binabayaran. Malaki ang tulong."* (It is a great help to patients, especially in the financial aspect. The fare from this place to Bangued is P180 to have an ECG that costs P400 in the hospital. Here, they don't pay anything).

"Parang may na-improve yung facility, *may na*-add *na* equipment," a nurse said from Lupon, Davao Oriental said. (It seems that there is an improvement in the facility; there were additional equipment)

RxBox is felt to have improved the health situation of the community by helping in the early detection of complex clinical situations and intervention.

A municipal health officer from Concepcion, Iloilo shared, *"Yun namang* birthing clinic *namin*, *doon talaga ang malaki ang tulong ng* RxBox *sa* pregnant mother *namin kasi ginagamit yung* partograph *ng* RxBox, *yung* BP monitoring, pulse oximeter, tocometer, *saka yung* Doppler, so *na*-dedetect *talaga kapag nagkakaroon na yung* baby *ng* fetal distress *at nalalaman yung* contraction *ng tiyan ni* mother, *nalalaman kung* normal *pa ba gamit yung* tocometer. *Nakaka*-refer *kami kaagad kung meron mang problema. Kaya malaki talaga ang tulong ng* RxBox. By God's grace, last year, *wala naman kaming mortality, nire*-refer *talaga kaagad namin.*" (The RxBox helped greatly the pregnant mothers in our birthing clinic because we use the partograph in the device, the BP monitoring, pulse oximeter, tocometer and the Doppler. Fetal distress and the pregnant mother's contractions can be detected and we are able to refer those with problems. This is why the RxBox is a great

RxBox prototype device being used in labor monitoring at the rural health unit in Mayorga, Leyte

help. Last year, by God's grace, we did not have any mortality because we were able to refer immediately problematic cases).

What is most encouraging is the positive impression and effect that RxBox is creating on the health-seeking behavior of the community people. A health worker from Vintar, Ilocos Norte stated, *"Yung* belief *nila* [patients] **na** *nakakagamot at mas maganda yung serbisyo namin ay tumaas."* (The patients' trust in our abilities and quality of service increased).

Patients at the community experience RxBox during general consultation.

The Next Steps

The RxBox program will be scaled up through through stronger partnership among UP Manila, DOH and the DOST. DOST Sec. Mario Montejo announced the DOST's commitment to finance the production of the telemedicine devices and deployment of the RxBox to another 1000 target communities in 2016. The DOH has adopted the program to further strengthen its health service delivery networks. Sites to be chosen will capitalize on the DOST's **Juan Konek Program** where alternative internet connectivity modalities, such as the TV white spaces and "SuperWiFi" technology would enable telehealth better.

NTHC will also expand the capacity for training and education in the regions. The wider geographic scope of implementation presents more research opportunities for other academic institutions. Scaling up will entail further product development and the streamlining of operations; sustainability models will be tested.

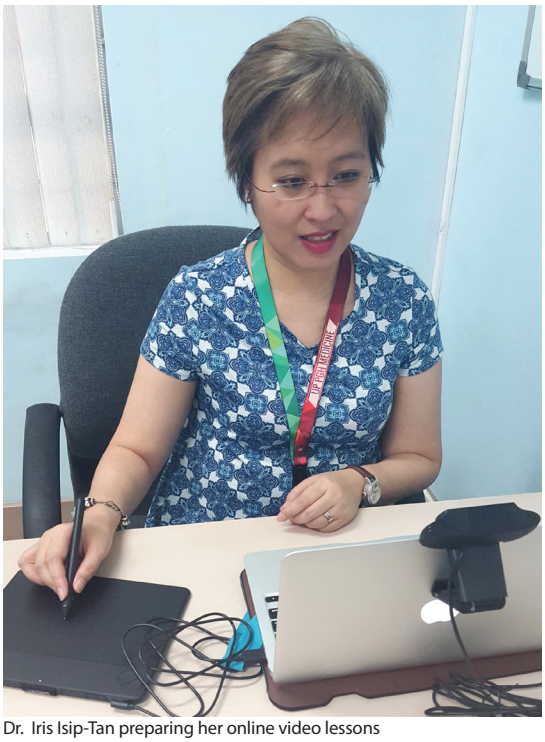
"Putting health in the hands of the people," NTHC's call was well coined if one talks about the RxBox.

Seated (L to R): Danalyn R. Echem, Frances Grace L. Amanquiton, Dr. Janine Thea D. Ellevera, Dr. Kristine Mae P. Magtubo, Dr. Portia Fernandez-Marcelo, Alyssa Marie E. Sanchez, Merry Jaine T. Ortillo, Engr. Roxanne B. Llamzon, and Esmeralda P. Ardona; Standing (L to R), Rafael Jan Teodoro, Engr. Nathaniel D. Cruz, Romeo Luis A. Macabasag, Gerard Paolo F. Villanueva, Roy O. Dahildahil, Elvin P. Inapan, Emmanuel D. Pajarillaga, Dr. Patrick G. Sylim, Harmon N. Cainglet, Randel Ligue, Cayleen C. Capco, Janielle T. Domingo.

Dr. Iris Thiele Isip-Tan: Transforming health education through ICT

Fedelynn "Chat" M. Jemena

"Doctors now have opportunities to communicate with patients and fellow physicians outside clinics, hospitals and conferences through blogs and social networking sites, such as Facebook, Twitter and YouTube." *



Dr. Iris Isip-Tan preparing her online video lessons

I first encountered Dr. Iris Thiele Isip-Tan and her work when Dr. Anthony Leachon, IPPAO's former director (2012-14), asked the staff to visit her sites on the Internet. Since UP Manila was new to social media, he wanted us to study these sites and use what we learn to benefit the University's own web presence.

A brief introduction: Dr. Iris Thiele Isip-Tan is a medic who wears many hats: an internist-endocrinologist with more than 20 years of clinical experience; a faculty of the UP College of Medicine since 2004; a health informatician; Chief of the Medical Informatics Unit of UPCM since 2011; and, a blogger since 2010. She is also a multi-awarded researcher for her work on diabetic foot infections and gestational diabetes.

Dr. Isip-Tan is also one of the very few Filipino health professionals who use social media and other tools of the Digital Age to educate and create change in the general public and among their students about health issues. Her social media handles, **Endocrine Witch** and **Dok Bru**, reflect both her higher educational background and advocacies: aside from being a faculty in a college where endocrinology teachers are called "witches" due to their strictness, the health informatician in her loves to concoct new ways to present teachings with ICT. **Dok Bru** marked also Dr. Isip-Tan's decision to communicate in Filipino with her thousands of FB followers.

As a blogger

"I blog because there are too few doctors out there and many snake oil salesmen," says Isip-Tan in an article entitled Doctor Google published in Speed Magazine. Her other online tools are **Endocrine Witch** and **Dok Bru**.

"Make Learning Visible" is Dr. Isip-Tan's philosophy in teaching.1 Although this means differently to her graduate students in MS Health Informatics, her style of presenting health messages to the public via social media does embody this.

How can one forget posts like these? Catchy images are paired with succinct, often humorous, health messages in Filipino or English. Because the posts are short, relevant,

and enjoyable, they are easy to 'share' on FB. (Just right for the Age of the Mobile Internet where, according to a 2015 study by Microsoft Corporation, the attention span of people reduced from 12 seconds in 2000 to 8.5 seconds ("No longer can we boast about 12 seconds of coherent thought"published in TIME.COM (http://time.com/3858309/attention-spans-goldfish/)

The **Endocrine Witch** Facebook and **Dok Bru** website mirror each other in uploads--perhaps to give guests a chance to choose the site they prefer. (For those who like learning by audio, the **Dok Bru** website also has podcasts in Filipino about diabetes.)

FB user: *"Doc, tanong ko lang. Puwede pa bang manganak ng normal ang my goiter?"*
Endocrine Witch: *"Puwede naman po."*
FB user: *"Paano po, di lalo ng lumaki ang goiter..."*
Endocrine Witch: *"Hindi po totoo na lumalaki ang goiter kapag umire sa pag-anak. Ang thyroid po ay likas na lumalaki kapag buntis at lumiliit kapag nakapanganak. Yun nga lamang, may mga iba na hindi na lumiliit ang thyroid kaya nagiging goiter na talaga pagkapanganak. Dito nagsimula ang maling paniniwala na ang pag-ire sa panganganak ang dahilan ng goiter."*

Dr. Isip-Tan brought health education to Facebook in 2012 because adequate health literacy is still a problem among Filipinos. For reasons ranging from poverty to not being able to afford to skip work to go to a clinic, people turn to family, friends, and the Internet to get information and advice on various health issues. Unfortunately, much of these information and advice—unless coming from legitimate health professionals—turn out to be half-baked, if not totally wrong.

Her early FB posts on topics like diabetes, proper meal portions, the dangers of eating too much processed meat drew heartening responses. People were hungry for information and they had many questions to ask. She also posted messages and videos on health issues made by the Philippine College of Physicians and other legitimate organizations devoted to health.

The FB followers grew to 2,000. But at the same time, she began having doubts: Do the 'Likes' and 'Shares' mean she was changing people's health habits for the better or were they just approval of her work? Since most of the readers used Filipino to communicate with her, did they even visit the links she provided (which were in English)?

What to do about readers whose queries verged on online consultations or complained about their doctors? Deciding distance can bring things into focus, she stopped updating her FB account in September 2014.

Fortunately, something stepped in to change her mind: Internet.org. This brainchild of Facebook founder Mark Zuckerberg allowed two-thirds of the world to access a limited version of Facebook that has General Interest pages. Dr. Isip-Tan's page is included in it. She saw it as a sign to continue with her public work.

When the doctor opened her FB again in July 2015, she made some changes: Dok Bru is now the name of her blog; her still catchy photos now bear messages in Filipino; the posts are accompanied by clear and concise health information, also in the vernacular; and, most of all, a Disclaimer: all the knowledge contained in her FB and website are for the public's general education. They are not personal recommendations of the doctor about one's illness nor are they meant to replace a consultation with a doctor. Just because you are a reader of her FB does not mean you are one of Doc Bru's patients.

"In her article, "A Doctor on Facebook," TEDx-Diliman(https://www.youtube.com/watch?v=MQAe_2rLb6M), Dr.

Isip-Tan says that she cherishes her online family, which evolved from a "conversation between her and her FB followers" into a community of readers who exchange information, experiences, advice, and encouragement. The readers are patients, friends and family of patients, doctors, nurses, OFWs, health researchers. Her FB followers now number 40,000+.

As a blogger she received the following accolades: Presidential Award for Social Media Advocacy by the Philippine College of Physicians; Endocrine-Witch.Net won "People's Choice Award" in the Health & Fitness Category of the Philippine Blogging Awards 2015 or Bloggys2015; and, her post on Why Does Self-Diagnosis Annoy Doctors? won Bloggys2015's "Best Blog Post." (http://bloggys.ph/)

As a Teacher

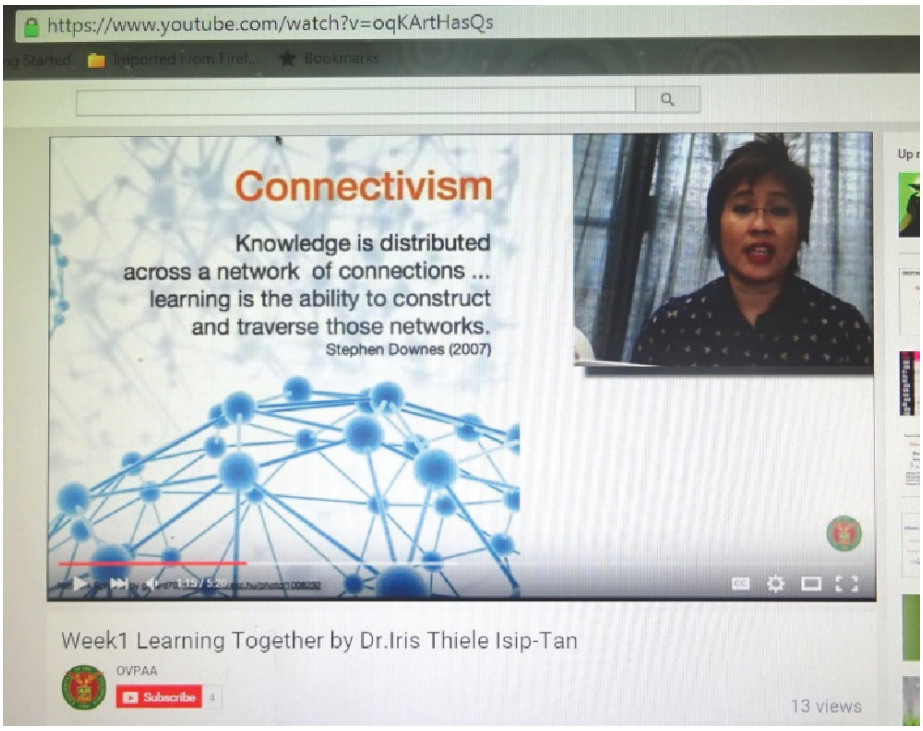
"I expect students not only to be consumers of information but active producers," Dr. Isip Tan declared during a lecture after being conferred the 1st Gawad Pangulo Award by UP Pres. Pascual on Feb. 13, 2015. This is, a competition for progressive teaching and learning being conducted by the UP System Office of the Vice President for Academic Affairs.

Dr. Isip-Tan is the first graduate of the Master of Science in Health Informatics (MSHI) program and one of its faculty members for the Medical Informatics track. The MSHI is a joint program of the UP College of Medicine and the College of Arts and Sciences. (CAS offers the Bioinformatics track under the Department of Physical Sciences and Mathematics.) Up to now, it is the only masters course of its kind in the Philippines.

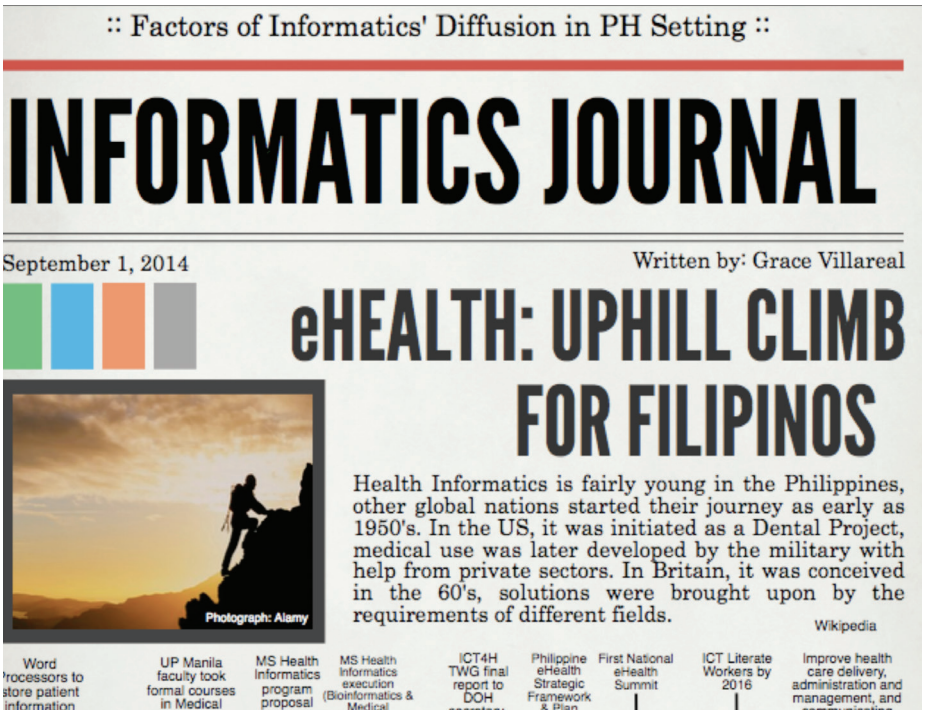
Health Informatics, according to http://www.usfhealthonline.com/resources/key-concepts/what-is-health-informatics/#.VrldHBh94gs) in article by the University Alliance, USF Health, Morsani College of Medicine, University of Florida, is a growing field which combines information and communication technologies with health to improve the quality of patient care. The Medical Informatics track, according to the Endocrine Witch's sub-page about MHSI, "involves the study of information systems in clinics, laboratories, health centers, hospitals and other health facilities involved in the management of patient data. The graduates of the medical informatics track are expected to be high-level analysts who can perceive various scenarios and analyze them in the context of building systematic information solutions to existing problems."

As mentioned earlier, making learning visible is the doctor's philosophy in teaching. This meant not assuming that the students will have learned something at the end of a term, but seeing to it (or ensuring) that they do learn during the school term. To achieve this, students of one of the subjects that Dr. Isip-Tan teaches, "Introduction to Health Informatics," undergo Problem-Based Learning (PBL), where they learn the concepts and impact of Health Informatics by solving cases of real-world problems throughout the semester. The teacher is the facilitator and mentor, not the 'source' of solutions.

How does the doctor use ICT in PBL? Dr. Isip-Tan described it in her Gawad Pangulo lecture: Her equipment for connecting with her students and creating videos are a webcam, a USB microphone, a small pen and tablet, and a screen-casting and video editing software.



She teaches using a mixture of face-to-face consultations with online activities. Each week, a topic assignment and its driving question (in PBL, a question which initiates and focus the inquiry) are given to the students together with a list of related readings and videos to watch. Most of her students go beyond this list, searching a physical library and the Internet just to get a surer handle on the problem.


:: Factors of Informatics' Diffusion in PH Setting ::

INFORMATICS JOURNAL

September 1, 2014

Written by: Grace Villareal

eHEALTH: UPHILL CLIMB FOR FILIPINOS

Photograph: Alamy

Health Informatics is fairly young in the Philippines, other global nations started their journey as early as 1950's. In the US, it was initiated as a Dental Project, medical use was later developed by the military with help from private sectors. In Britain, it was conceived in the 60's, solutions were brought upon by the requirements of different fields.

Wikipedia

Word processors to store patient information | UP Manila faculty took formal courses in Medical | MS Health Informatics program proposal | MS Health Informatics execution (Bioinformatics & Medical | ICT4H TWG final report to DOH | Philippine eHealth Strategic Framework | First National eHealth Summit | ICT Literate Workers by 2016 | Improve health care delivery, administration and management, and

Sample an infographic created by a student named Grace for Week 3: "Health Informatics in the Philippines." (From Dr. Isip-Tan's lecture for "1st UP GawadPangulo" competition)

Students then upload their answers on a blogsite they created in the first week of school. The answer, depending on the requirement, is usually presented in blog post form or a blog post paired with visual mapping (concept and mind maps which are powerful strategies for organizing and presenting knowledge), infographics, a slide presentation, an evaluation of a health system or a proposal for a game app.

They then post the link to the blogpost on their Twitter accounts with the hashtag #MSHI and on the FB page of the Philippine Medical Informatics Society (PMIS, https://www.facebook.com/groups/philmedinfo/?fref=ts). Any reactions (or lack thereof) should be documented.

The final paper is a write-up of their experiences, insights, and learnings from online interactions generated by the blog posts.

A cursory scan of the posts of students on PMIS seemed to indicate that they are enjoying the challenges offered by the course subject. Franco Louie Merjudio, a Registered Nurse who is a Project Manager for Health Information Systems of the Zuellig Family Foundation, wrote that the program gave him the "opportunity to make influences in not just nursing-related activities but in numerous other parts of the healthcare system whenever appropriate. This enabled me to develop a systems thinking approach that allowed me to appreciate systems of any kind, whether it is education, law, business, government and, of course, various areas in health." He credits his studies with securing him his current job.

Students also learn by participating (or lurking) in chats organized by #HealthXPh every Saturday evening on Tweeter (using #HEALTHXPH) and Google Hangouts. #HealthXPh (http://healthxph.net or http://healthxph.com/) was co-founded in 2014 by Dr. Isip-Tan, Dr. Gia Baquiran Sison, Dr. Remo-tito Aguilar, Dr. Narciso Tapia, and Dr. Helen Madamba. It is described by Dr. Aguilar as a platform for online collaborations among healthcare stakeholders on "emerging technologies and social media to positively impact the Philippine health landscape."

The Gawad Pangulo Award that recognizes innovations in education affirms Dr. Isip Tan's incessant dedication and efforts in using ICTs to pursue knowledge and nurture creative thinking and combine traditional and modern approaches to learning. In health education, Dr. Isip Tan has been constantly and patiently "making learning visible" through the above ICT platforms that she has deemed appropriate and useful for her students and treasured members of her "online" family.

CHITS: Revolutionizing health care services delivery in the Philippines

Anne Loren Claire A. Santos

The present age, characterized by computers, technology, and new media, has transformed the face of various industries, including health care. Innovative technologies, such as CHITS, offer health care a powerful tool to address issues of patient safety, cost-effectiveness, and quality of care.

In November 2013, super typhoon Yolanda struck Mayorga, Leyte leaving the community, including its rural health unit (RHU), severely ravaged. The strongest storm recorded devastated what were inside the RHU facility. Favorably, the Community Health Information Tracking System (CHITS) server was salvaged.

If patient data were still manually recorded, there would have been no way to retrieve them after the typhoon. CHITS, an electronic medical record that captures patient information at the point-of-care, saved the patient records from Yolanda's havoc.

Genesis, evolution, and milestones

CHITS was initially christened Child Health Injury Tracking System back in 2004 with Dr. Herman Tolentino, together with Dr. Alvin Marcelo and Dr. Cito Maramba, as its main system architect. Its funding support came from the Pan Asia Networking Program of the International Development Research Centre of Canada (IDRC), Asia Pacific Development Information Programme (APDIP) of the United Nations Development Programme (UNDP), and Asia Pacific Network Information Center (APNIC).

Tons of piled patient health data which were not sufficiently utilized in a municipal health center. (Photo from WHO WPRO, Mr. Mark Landry's presentation)

However, the real challenges in health information management at the municipal health center level were flaunted right before Dr. Tolentino and his team during their immersion at the Elvira Lagrosa Health Center in Pasay City. They were astounded to see the "data cemeteries" or a heap of valuable patient health information that was not adequately utilized.

As a result of the situational analysis, the team went to revise the original concept and developed an electronic medical record system instead, which was designed to improve health service delivery through better management of health data. The system was intended to bolster patient care by means of proper documentation and more efficient data retrieval to trace progress in care. Moreover, patient information is automatically accumulated into Field Health Service Information System (FHSIS) reports of the Department of Health (DOH).

The primary health care worker demonstrates how to navigate through the Community Health Information Tracking System (CHITS)

The team developed every module of CHITS in close consultation with the nurses, midwives, and doctors. Since then, the brainchild turned into the CHITS that it is today, and two health centers in Pasay became its birthplace.

Over the years, with the assistance of partners from all sectors, CHITS has undergone improvements and expansion to continuously respond to the dynamic needs of the local health systems. The original codebase generated by Dr. Tolentino was written in PHP, a general-purpose programming language, which focused its service on clinical encounters and automatic collection of data for basic DOH reports.

In 2007, SMS-based (short message service) enhancement to CHITS was designed and implemented. A year later, the 1st CHITS Users Conference was held in UP Manila.

In 2010, through the support of the IDRC-Canada, CHITS already had an SMS reminder for maternal care, and the family planning module was improved.

In 2011, mCHITS or mobile CHITS, the first mobile-based electronic medical record and reporting tool on the delivery of basic services for use by midwives during their barangay field activities, was launched.

That same year, CHITS expanded to a suite of eHealth applications for real-time monitoring and reporting of key maternal and child health indicators in geographically isolated and disadvantaged areas (GIDA), also known as rCHITS.

Another milestone took place in 2012 when CHITS started using OpenMRS or Open Medical Records System. According to Arturo Ongkeko, Jr., University Researcher and CHITS Program Manager at the National Telehealth Center (NTHC) in UP Manila, the two major city-wide implementations in Navotas and Quezon City were instrumental in migrating the data model to OpenMRS, a more standards-based platform. OpenMRS is "a configurable open-source electronic medical record application developed and maintained by a large network of open-source developers," (http://openmrs.org).

Also, part of its enhancements are the incorporation of CHITS with a telemedicine device referred to as RxBox and the development of a maternal and neonatal telereferral system. CHITS has also been integrated into the local civil registry through the development of a births and deaths registration tracking system. There were also improvements in the local government unit dashboard as a tool to advance the decision-making process.

Moreover, the Philippine Health Insurance Corporation's (PhilHealth) declaration of CHITS as among DOH-PhilHealth certified electronic medical records is another feather in its cap. The rCHITS-Phase 3 project has also included the upgrade of CHITS

One of CHITS developments is its integration with RxBox, a telemedicine device, which capacitates the latter to store patient data.

to be consistent with PhilHealth's Tamang Serbisyo sa Kalusugan ng Pamilya (TseKaP) Primary Care Package.

"In addition, CHITS is now compliant with the DOH and PhilHealth's Philippine Health Information Exchange Lite requirements. NTHC is just waiting for its official compliance testing and certification," Ongkeko stated.

From two health centers in Pasay City for its pilot implementation, CHITS is now installed in 236 primary care health centers nationwide, as far north in Sabang, Batanes to Sitangkai, Tawi-tawi.

Core values and important contributions

For Dr. Tolentino, CHITS is a means to an end.

During the 10th anniversary of CHITS in 2014, the primary CHITS architect was interviewed online by Ongkeko's group, and Dr. Tolentino said that his original vision is for CHITS to serve the health information needs of Philippine communities to improve community health. "Where we need health information the most is where we don't find it in its most useful form," he stated.

According to Dr. Tolentino, he was appalled to see stacks of paper records while sitting in back rooms of health centers. "The metaphors we used back in the day, like 'bayanihan' for managing health information, stemmed from the idea of creating a health information revolution. A bottom-up approach that I was hoping would be complemented with top-down approaches, example policy development, governance, standards, a national infrastructure, that would address this social injustice," he underscored during the online interview.

He also highlighted that CHITS is about empowering community health workers and community members to use health information to serve local needs. "The 'bayani' metaphor also lends itself well to what implementing CHITS requires – a transformation in the hearts and minds of the people who are implementing it, so that, they, in turn, can transform the landscape," he said. Dr. Tolentino added that without this change in their hearts and minds, CHITS will fail as an intervention.

Improved efficiencies in the health centers have been the most germane contribution of CHITS. With this innovative electronic medical records system, there is a shorter time to retrieve patient records, especially for follow-up visits and other visits for a new condition.

In addition, briefer time is needed in preparing aggregated reports of the FHSIS required by the DOH. Hence, more time is diverted to patient care, which includes field follow-up.

As stated by Ongkeko, through CHITS, it can be assured that there is better data integrity. Unlike digital records, paper-based information is prone to destruction and getting lost or misplaced. Moreover, because of CHITS, there is a timely submission of PhilHealth required reports for reimbursement of per family payment (PFP), formerly called capitation.

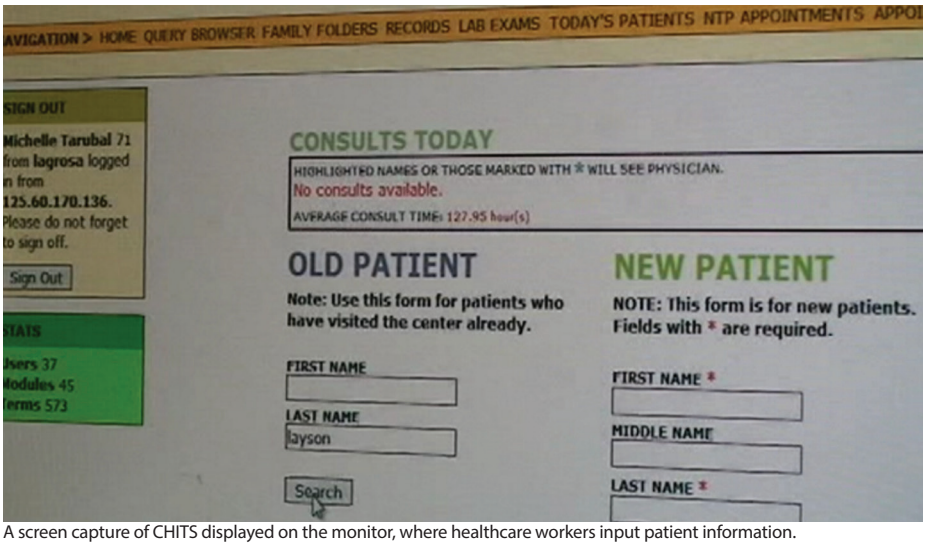
With these efficiencies come a better sense of welfare among health workers and patients. Shorter waiting time for consultations means more time for patients to do worthwhile activities. "CHITS represents investments in infrastructure by the local government. Thus, a sense of being valued by authorities is fostered among the health workers and political constituents," Ongkeko said.

The CHITS workflow

When patients seeking consultation or health care service come to the health center for the first time, the midwife or nurse acquires the patient information and encodes these into the system. The patients are then placed in the queue, and subsequently, proceed to the health center physician.

For patients with existing data, the midwife or nurse can immediately pull out the records in no time. Compared to CHITS, the paper-based record-keeping system takes longer time for authorized personnel to retrieve patient information, without

Dr. Herman Tolentino, main CHITS architect, recounts how he and his team established the country's first electronic medical record system during a forum at the UP Manila College of Medicine.



A screen capture of CHITS displayed on the monitor, where healthcare workers input patient information.

discounting the instances when patients' paper records get unaccounted for.

The physician goes over the patient record and decides from the preloaded list of standard International Classification of Diseases, Revision 10 (ICD-10) code the appropriate diagnosis. The physician may also use a plan template.

When the diagnosis has been finalized and prescription has to be given, the physician simply selects a medication from the list in the drop down menu. A database of medications, particularly drugs in the Philippine National Drug Formulary (PNDF), has already been uploaded to the system.

The primary healthcare workers can now generate reports from the system for timely decision-making. The local, regional, and national government agencies, including the PhilHealth, require these reports, such as the DOH-FHSIS, to be generated at the end of the week or month. CHITS has consolidated the various vertical programs of the DOH into a single and user-friendly interface.

National and international distinctions

The city-wide CHITS implementation in the largest and most populous metro in the country, Quezon City, won 2nd runner-up during the 2014 Jesse Robredo Awards for Excellence in ICT for good governance for effective and efficient delivery of public services to stakeholders. The award was under the "Best in eGov Customer Empowerment (G2C)" category of the 3rd eGov Awards for local government units (LGU) given by the Department of Interior and Local Government (DILG) and the National ICT Confederation of the Philippines.

In 2011, the Center for Health Market Innovations (CHMI) and Philippine Institute for Development Studies (PIDS) conferred CHITS the "Best Health Market Innovation Award" during the Galing-Likha Kalusugan Awards. CHITS


From left, Dr. Portia Grace Marcelo, Dr. Alvin Marcelo, then DOH Secretary Dr. Enrique Ona, and other awardees during the Galing-Likha Kalusugan Awards on 07 November 2011. CHITS was bestowed the Best Health Market Innovation Award by the Center for Health Market Innovations and Philippine Institute for Development Studies.

The NTHC conducts computer literacy and CHITS training to enhance the abilities of health care workers in adopting the technology.

surpassed 117 other health programs in health care service delivery, financing, facilitation, regulation, and promotion, which have undertaken innovative measures to address problems in the delivery of health care services in the marketplace.

CHITS, as part of the Tarlac Province's Wireless Access for Health (WAH) project, was bestowed with another "Best Market Innovation Awards" during the 2011 Galing-Likha Kalusugan Awards.

Moreover, during the Prince Mahidol Awards Conference held in Bangkok, Thailand on 28-31 January 2010, CHITS was featured by the IDRC. It was a global health information forum that initiated the call to action on health information systems.

In 2006, CHITS was one of the finalists selected from among 1160 entrants to the Stockholm Challenge. The award is conferred to projects that use ICT in improving the lives of people in disadvantaged communities. In the same year, CHITS was among the awardees of the "ICT Best Practices for e-Government" at the Asia Pacific Economic Cooperation Digital Opportunities Center (ADOC) Awards in Taipei, Taiwan.

In addition, CHITS was included in the "Compendium of Best Practices in Local Health Systems" by the Department of Health-National Capital Region.

Finally, CHITS was included in the "Best Programs of UP Manila" presented by then UPM Chancellor Marita Reyes to Dr. Emerlinda Roman during the latter's inauguration as the 19th UP System President.

Challenges, interventions, and purpose

The CHITS implementation in the different primary care health centers all over the country for the last 12 years has not been without hitches. According to Ongkeko, one of the major challenges in the fulfillment and sustainability of CHITS is technology adoption.

"Implementation of an electronic medical record system is usually disruptive, especially that since the primary health care workers are not used to incorporating mobile phones or computers in their daily health service routine," the CHITS Program Manager underscored. In undertaking this barrier, the NTHC conducts basic computer literacy training among health care personnel.

Another important drawback is the shortfall of sustaining technical support. "Most of the implementation sites, especially those in geographically isolated and disadvantaged areas, lack the capacity to maintain and sustain the hardware and infrastructure of the system," Ongkeko stated.

Given this capacity issue, the NTHC conducts information technology (IT) super user training. "Additionally, we are exploring how the RHUs can engage state universities and community eCenters as models for technical support," he said further.

The present age, characterized by computers, technology, and new media, has transformed the face of various industries, including health care. For Ongkeko, innovative technologies, such as CHITS, offer health care a powerful tool to address issues of patient safety, cost-effectiveness, and quality of care.

"We hope that access to [a] right amount of information at the right time, which CHITS can provide, would result in better efficiencies in the delivery of health care services, so as to allow better-informed decision-making that could ultimately redound to improvements in health outcomes," he concluded. *(with reports from the National Telehealth Center)*

From BuddyWorks to National Telehealth Service Program:

The new face of health care service

January R. Kanindot

Health care delivery is one of the country's can of worms. Hurdle after hurdle, from the brain drain of medical professionals who have chosen to seek better opportunities abroad, to lack of funding, and geographical disadvantages among others; all these and more leave an immense gap and debilitates the government's ability to serve its citizens. But with new innovations in technology, particularly in mobile communications, health care delivery in the Philippines has been vastly improved.

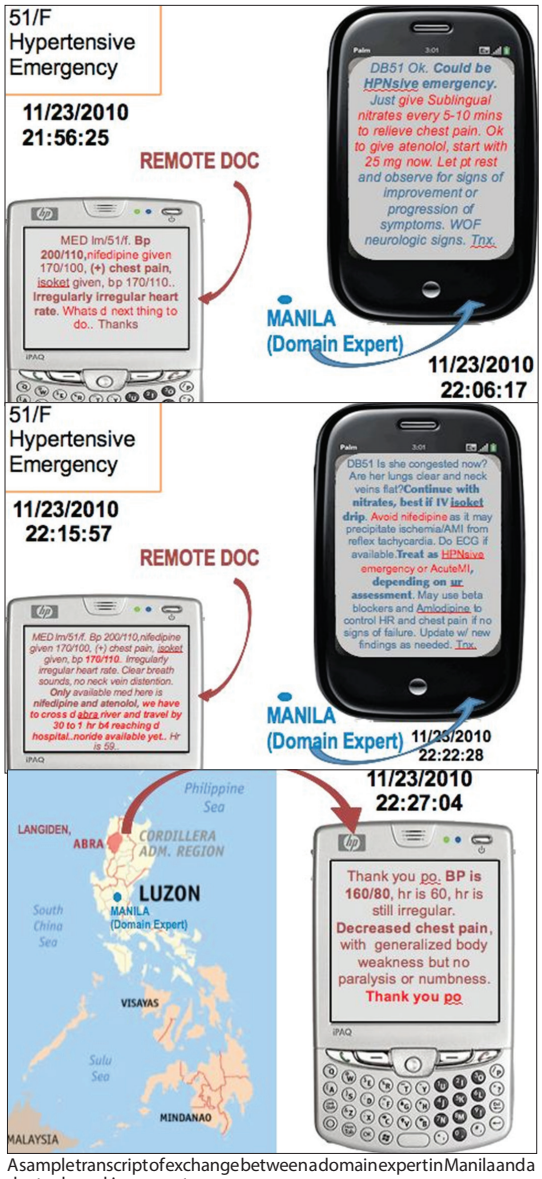
On a regular Saturday night in a remote town in Samar, Lisa (not her real name) began showing signs of labor. She was brought to the nearest rural health unit but what could have been the usual delivery case became complicated when Lisa's blood pressure went soaring high. To make matters worse, the facility did not have the right intravenous medicine Lisa required and the nearest hospital was two hours away. Lisa's attending physician, fresh out of medical school, was worried that Lisa might not be able to make the two-hour trip across the choppy sea without having a seizure that could risk her and her baby's life. Without the proper experience to handle Lisa's case, her doctor had to send an SMS to an OB expert in Manila. She asked if it was safe to use the only anti-hypertensive drug available in the facility. Within minutes, the OB replied to go ahead and give the medicine but with certain precautions. Lisa was given the drug before she was escorted to the hospital for proper care. Lisa delivered a healthy baby girl much to her and her doctor's relief.

This is only but a single example of what it is like for a lot of people in rural communities. The lack of medicine and distance from the proper health care facility are only few of the challenges they face in attaining proper health care. Such a case could have been fatal. A mother and possibly her baby could have lost their lives. But with the power of technology, the situation was saved. Technology bridged a geographical gap so prevalent in this country. It is fast, real-time, cost-effective, and most of, all life-saving. And without it, young doctors are left without the support they need to deliver proper health care, especially to the poor and underserved.

Dr. Gene Nesperos explains the provisions of the Administrative Order on the National Telehealth Service Program, during a multi-sectoral consultation in September 2012.

Buddyworks and a retrospective on the eGovernment strategy

The first telehealth/ telemedicine initiative in the country began with the University of the Philippines Manila (UPM) on 2004. A P43M grant from the 2003 eGovernment Fund by the Commission on Information and Communications Technology (CICT) gave birth to the web-based "Design and Implementation of Buddyworks: Using Telehealth Network Services in Community Partnership Program" or the "Buddyworks" Project with UPM's National Telehealth Center (NTHC) as lead implementor. The project encompassed the design, deployment and evaluation of a community-based telehealth services in partnership with a network of national health agencies, local government health units, academic institutions and clinical specialty societies. It was implemented in 10 sites across four areas: Cagayan Valley; Palo, Leyte; Iligan City; and Capiz with the NTHC as the "central" station. BuddyWorks intended to focus on target conditions, such as infectious diseases, congenital anomalies, surgical and emergency medicine conditions.



A sample transcript of exchange between a domain expert in Manila and a doctor based in a remote area

CICT Secretary Virgilio Peña, in 2005, expounded the e-Government strategy at the Buddyworks launch. "The original idea we set is essentially the delivery of traditional government services like driver's license, birth certificates, and the like – to citizens directly through technology... Para yung mga citizens natin, they don't have to line up in lines when it could be done at home or in an internet café close by. They need not go to the city or municipal hall or the SSS or GSIS. So that is our vision, as far as E-Government. ...really using technology for the benefit of our citizens, so we can provide fast, efficient, and more importantly, transparent services to our citizens. Para wala nang lagayan, because if you are getting your driver's license at home, *wala ka nang kausap na lalagyan mo*. Effective, efficient, using technology to do it.

Secondary, it should involve connectivity of various government agencies to each other. So, when the BuddyWorks project was presented to the (screening) committee, the first inclination was to disapprove it because it did not pass the criteria... But, through the efforts of the project heads, they came back and essentially convinced the committee and eventually myself, in terms of considering the project for funding by the E-Government fund... And I am very pleased that the BuddyWorks system has taken off. I know it is a long way from the vision we have of being able to deliver all types of health services to communities. The concept that we have, although this project allows you to deliver to your health centers, part of the initiative of the CICT, is to provide internet access points in every community, long term until everybody dies, short term until 2010, at least at the level of the municipality. So, every one of the 1,900 municipalities should have an internet access point. If we will be able to deliver contents like BuddyWorks to all these 1, 900 municipalities, then we would have achieved the goal of being able to deliver health services directly to the citizens. You can count on CICT to help in achieving this objective... "

The Department of Health, through Undersecretary Alexander Padilla, extols Buddyworks: "It responds to health service delivery inequities primarily to geographically difficult areas in the Philippines and also inequities in health human resource and medical expertise distribution wherein most of our medical experts are in cities and the phenomenal mass departure of health workers, initially nurses, physical therapists, and doctors, and now doctors who have become nurses. PGH, being the premier general hospital in the country,

is the best source of medical skills and expertise. It is just right and proper that these skills be shared with communities without or limited access to experts' care specially those hard-to-reach and disadvantaged areas of the country Also, we commend BuddyWorks partners for being forward-looking and technology-savvy. It takes nobility, nerves and guts to enter into something new and ground breaking. Telemedicine is certainly state-of-the-art and indeed an answer to some of our problems in providing health care. We also extol the UP community for their selfless sharing of expertise and skills to health providers in the periphery, as well as mentoring fellow health workers who may not have the access to new technologies and skills."

The project used the BuddyWorks portal that served as an asynchronous clinical encounter space and image repository for text-based and multimedia clinical communication. Physicians who were based in communities, regional as well as provincial hospitals, were able to upload clinical data to a computer, such as digitalized x-rays, pictures, and slides for parasitology cases. Consultants that were subscribed to the system could view these images and lend their expert opinion on patient and disease management. It also allowed clinical experts to mentor local government physicians. Moreover, the transposal of clinical skills and best practices even without face-to-face contact became possible.

Disciplines covered by the project included dermatology, radiology, toxicology, parasitology, community medicine, and quality assurance in health.

National Telehealth Service Program

After the BuddyWorks project ended, a more innovative approach to telemedicine was adopted. In 2007, the Department of Science and Technology - Philippine Council for Health Research and Development (DOST-PCHRD) supported the "Instituting the National Telehealth Service Program (NTSP)" research program from 2007-2010 with UPM's NTHC as its research leader. The UP System, at that time, was encouraging emerging disciplines such as health/ medical informatics and eHealth, as well as interdisciplinary collaboration. The NTSP demonstrated that and brought clinicians, physicists and engineers together.

NTSP continued to advance the objective of strengthening the health care delivery system, particularly difficult to reach communities and connecting these with medical and health systems specialists from the UP Manila. The NTSP strengthened the use of telemedicine and changed the method from a web-based application to a more convenient mobile phone transmissions. This approach is called mobile health or mHealth. The Global Observatory for eHealth (GOe) of the World Health Organization (WHO) defines mHealth as a medical and public health practice supported by mobile devices, such as mobile phones, patient monitoring devices, personal digital assistants (PDAs), and other wireless devices. mHealth utilizes a mobile phone's voice and short messaging services (SMS) as well as its general packet radio service (gprs), third and fourth generation mobile telecommunication (3G and 4G), global positioning system (GSP), and Bluetooth technology. This current trend has changed the arena of health care delivery throughout the world. For a country like the Philippines, it can exponentially improve health care access.

The NTSP looped in the Department of Health (DOH) more deliberately by making the DOH Doctor to the Barrios (DTTBs) the direct beneficiaries, and supported as the referring physicians in the telemedicine system. The NTSP produced also the first prototype of the RxBox telemedicine device, designed similarly to assist the DTTB in their diagnostic needs.

When the PCHRD-supported project ended in 2010, the UP System provided bridge support for telehealth but commissioned UP Manila to institutionalize the NTSP. By then, the DOH acknowledged NTSP, and included this as a strategy in its National Objectives for Health 2010-2016. In 2011, DOH funded for the first time the project Development of the NTSP in the DOH. It had two components: Real Time Regular Routine Reporting (R4Health) and Telemedicine. NTSP expanded telemedicine in several ways.

Telemedicine

Telemedicine is the delivery of health care services, where distance is a critical factor, by health care professionals using information and communications technologies for the exchange of valid information for diagnosis, treatment and prevention of diseases and injuries, research and evaluation, and for the continuing education of health care providers, all in the interest of advancing the health of individuals and their communities (WHO, 1997).

NTSP expanded to 389 disadvantaged municipalities served by 196 Municipal Health Officers aside from the 193 DOH DTTBs who were referring physicians in the telemedicine system. It also regionalized the implementation of

telemedicine in the Cordillera Administrative Region (CAR) and Eastern Visayas; that is, clinical specialists outside of Metro Manila are now part of the system. Telemedicine/ telecommunication in the respective RHUs are addressed by clinical specialists from the Eastern Visayas Regional Medical Center (serving about 4.1M population of the Region) and Baguio General Hospital and Medical Center (serving 11.8M population of the Cordillera Administrative Region). Whereas the clinical specialists from the Philippine General Hospital (PGH) continued to advise MHOs and DTTBs in the rest of the country. Regionalization was envisioned to eventually allow tele-referral, eHealth-enabled transfer of patients from primary care units to the facilities that can better provide resolution to more complex cases. This covered towns as far north as Sabtang Batanes, and as far south in Sibutu, Tawi-Tawi. Within the 12 month project period, there were 606 teleconsults exchanged between the referring physicians and clinical specialists.


Dr. Magtubo explaining the integration of Rxbox to the NTSP program.

NTSP teleconsults made use of Frontline-Short Messaging System (FL-SMS) and iPathology (iPath) which are both free and open source softwares (FOSS). From October 2007-2014, 2639 teleconsults have been addressed. This number translates to about 27 teleconsults per month or one to two consults a day. The bulk of these teleconsults were SMS-based. Most referring physicians needed support in managing cases that specialize in adult (internal) medicine (28%), pediatrics (20%), and obstetrics and gynecology (18%).

Dr. Magtubo, current RxBox project manager, was a DTTB assigned in Samar in 2011 and responsible for about 20,000 people. She shares that communicating with fellow physicians via SMS or email is challenging. She had to be concise but, at the same time, very descriptive so that domain experts can help her the best way they can. As a young doctor then with limited experience, NTSP had aided her in fulfilling her calling.

"To me, the greatest impact of NTSP is allowing me to DO MORE for my patients. I served areas where I was the only expert, I did not have tools I had grown accustomed to in the hospital, medicines are limited and my staff are as clueless as I am. Before telemedicine, I would be gripped with an almost paralyzing helplessness because all I can say to my patients is they need to go to a hospital. With telemedicine, I can do a little bit more with the resources I have because I am tapping the expertise of people who know more than me. Also, I learn and am able to do better each time. The fact that it does not cost my patient anything is awesome too."

R4Health

Along with national government strategy, special focus of the NTSP was put on the Conditional Cash Transfer Program (CCT) beneficiaries' utilization of life-saving maternal and child health services. NTSP expanded by incorporating a telemedicine diagnostic device, RxBox *(pls see previous article)*. NTSP thus developed and field tested, in a large-scale, the R4Health or Real Time Regular Routine Reporting for Health. With the use of a cellphone, R4Health reporters in areas with no fixed internet connection routinely submit data related to the following Kalusugang Pangkalahatan (KP) and Millennium Development Goals (MDG) - related factors:

- Conditional Cash Transfer Program (CCT) beneficiaries enrolled in PhilHealth who avail services in the health facility every month.
- Infants immunized (Fully Immunized Child rate) every quarter
- Births attended to by skilled health professionals every month
- Women with complete pre-natal check-ups every month.
- Facility-based delivery every month
- Current contraceptive/ family planning users (Contraceptive Prevalence Rate) every quarter

- Number of maternal deaths every month
- Number of neonatal deaths every month
- Availability of medications from RHU and/or (Botika ng Barangay)

The 259 towns in the CAR and Easter Visayas Region, and in the provinces of Romblon, Masbate, and Tawi-Tawi were prioritized by the DOH because of the high maternal deaths, mainly due to unequal access to health care services. A six-month blended-learning Certificate Course was offered to Public Health Nurses and Rural Health Midwives to train them to become R4Health reporters. The course offered face-to-face learning as well as field practice and mentoring. Reporters were given cellular phones with the R4Health application installed. Cellular phones varied from Cloudfone, Pocket and Zannin. Each RHU was provided with unlitext-only plans subsidized by the project for one year. After which LGUs were expected to support the reporting mechanism. Phone plans assigned to RHUs depend on the availability of the strongest network in their locale. Data from the R4Health reports are aggregated in the R4Health dashboard that gives real-time information on what happens at ground level. Such information is critical in decision and policy-making. NTHC presents its terminal report on R4H (2014):

By September 15, 2013, three to 12 months since the R4Health system was deployed among 246 RHUs in priority provinces and regions, 48,856 patient transactions and other reports on services delivered by RHU have been received by the NTHC through the R4Health. The increasing trend of data reported throughout official Project period (when R4Healths-pecific Project resources were available) is evidence of mHealth / R4Health adoption, i.e. the use of cellphones for reporting services delivered by Rural Health Units subscribed in the system. The R4Health Dashboard prototype display aggregated information from these R4Health reports from the towns. Aside from a real-time field reporting tool, the R4Health application is an emerging tracking system for individual patients' health behaviour and health worker performance.

On feedback, majority of the end-users found the provided android phone and the R4Health application easy to use. The R4Health application which was embedded in an android mobile phone was perceived by the target end-users view as easy to operate and is understandable. Mobile phones are a better alternative than paper-based reporting, and the medium is easy to use despite some degree of learning required. However, as with any other new technology, some had difficulties in operating it and found it hard to interact with. However, majority answered that despite these challenges, it was easy for them to become skillful in using the mobile phone. In terms of its usefulness, while it made their tasks of reporting quicker but not easier and they were not able to do more. In terms of its compatibility with their work, they see R4Health as a repetition of current reporting tasks and as a consequence it consumes some of their time devoted to actual patient care/ contact. This is an expected outcome since there is a current reporting system (FHSIS) and introducing a new reporting tool that is not yet integrated into policy is viewed as a duplication of tasks. Whereas R4Health was shown to be an efficacious tool for capturing and transmitting important Kalusugan Pangkalahatan (and MDG-)related data in real-time from the front lines of health care to leaders at various levels of the health sector, identified enabling and reinforcing factors to support such behaviour were not instituted within the expanded Project period.

Aside from the R4Health, at least nine other mHealth-based health information reporting tools are being used in RHUs nationwide, including two others – WOMB and MNDRS – that the DOH developed/ implemented simultaneous to the R4Health - NTSP. Each of these 10 have to be carefully evaluated, and extract evidence of maturity before national scale up is considered.

Milestones

NTSP became an impetus for House Bill No. 6336, an **Act Promulgating a Comprehensive System for National Telehealth Service in the Philippines**. This bill was filed by Congressman Joseph Emilio Aguinaldo Abaya of Congressional District 1 of Cavite on June 10, 2012. This bill will allow the institutionalization of telehealth/telemedicine in the Philippines, but unfortunately did not progress beyond this. The Telehealth Bill got further in this current Congress, filed as House Bill No. 4119 by Congressman Rogelio Espina from the lone district of Biliran. It was passed in its first reading at the House of Representatives Committee on Health. UP Manila will have to work with other stakeholders to advocate for this if only to ensure better and sustained access to health care through telehealth..

Down the Pike

There is no other recourse but to embrace this new innovative approach to health care service. Programs are still relatively new but these baby-steps have no doubt created an impact on the lives of people in remote and poor areas. Furthermore, young doctors must have a continuous mechanism that can aid them in helping patients, especially in the critical first year when they are still gripping their way into their profession. This ensures a better and improved service to many Filipinos that rightly deserve timely and quality health care service.

Master of Science in HEALTH INFORMATICS

Health Informatics covers the organization and management of information in the areas of patient care, research and administration. It focuses on the structuring of health data and knowledge to support data analysis and decision-making in medicine and health care with the use of information systems. It covers a wide spectrum of applications, from computer-based patient records in general practices and hospitals to electronic communication between health care providers, from signal analysis and image processing to decision support systems. Effective delivery of healthcare requires correct decision-making based on proper management of health information.

A joint offering of the College of Medicine-Medical Informatics Unit (for the Medical Informatics Track) and the College of Arts and Sciences (for the Bioinformatics Track), the MSHI is designed to provide prospective leaders with competencies in Health Informatics such that at the end of the program, the students will be able to:

1. apply informatics concepts, skills and principles for the efficient solution of health informatics problems;

2. provide perspective in health informatics that can be used in the critical study of all levels of health information systems;

3. plan, undertake, evaluate and monitor health informatics research projects; and

4. provide technical services to health professionals and agencies for both public and private sectors concerned with management of information which could be the bases for health policy for formulation, thereby providing leadership and excellence in health informatics.

The Medical Informatics track deals with organization and management of information in support of patient care, education, research and administration. It covers a wide area of the health informatics discipline from the fetus to the geriatric patient. It involves the study of information systems in clinics, laboratories, health centers, hospitals and other health facilities involved in the management of patient data.

The Bioinformatics track, generally speaking, tackles the creation and development of advanced information and computational technologies for problems in molecular biology. It deals with methods for storing, retrieving and analyzing biomedical data, such as nucleic acid (DNA/RNA) and protein sequences, structures, functions, pathways genetic interactions, population modeling and numerical simulations. There is significant industrial interest in bioinformatics currently because of the information being produced by the genome sequencing projects and the need to harness this for medical diagnostic and therapeutic uses.

The first graduate of this program is Dr. Iris Isip Tan, endocrinologist and head of the UPCM Medical Informatics Unit. She is the 1st Gawad Pangulo awardee of the UP System for innovative teaching methods and approaches and currently a faculty member of the program's Medical Health Informatics Track. *(With excerpts from the UP Manila Catalogue of Information 2014).*