SOCIAL INNOVATION IN HEALTH INITIATIVE

NATIONAL TELEHEALTH SYSTEM

CONTINENT	Asia
COUNTRY	Philippines
HEALTH FOCUS	Primary Health Care (PHC)
AREAS OF INTEREST	Technology, telemedicine, referral system
HEALTH SYSTEM FOCUS	Service Delivery, Community Mobilisation

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NATIONAL TELEHEALTH SYSTEM, PHILIPPINES

The National Telehealth System provides access to specialty care in remote areas through a telemedicine platform that connects primary care physicians to clinical specialists.

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CONTENTS

ABBREVIATIONS

CHITS	Community Health Information Tracking System
DOH	Department of Health
DOST	Department of Science and Technology
DTTB	Doctors to the Barrios
ECG	Electrocardiogram
GIDA	Geographically Isolated and Disadvantaged Areas
ICT	Information and Communications Technology
LGU	Local Government Unit
MHO	Municipal Health Officer
NCR	National Capital Region
NTHC	National Telehealth Center
NTS	National Telehealth System
RHU	Rural Health Unit
SMS	Short Message Service
UP	University of the Philippines
WHO	World Health Organization

CASE SUMMARY

The National Telehealth System (NTS) aims to provide timely and quality specialty health care in remote areas in the Philippines through a telemedicine platform. This platform connects primary care physicians serving in these remote areas to specialists who are based in hospitals in the urban centers. The NTS was developed and is managed by the National TeleHealth Center (NTHC), a research institute within the University of the Philippines Manila.

The key components of the NTS are: 1) telemedicine platform, 2) training program, and 3) network of primary care physicians and clinical specialists in participating government health facilities in the Philippines. The telemedicine platform connects the primary care physicians to specialists through text messaging (SMS) or web-based application. To support NTS users in the utilization of the platform, a certificate course on eHealth was developed and is regularly conducted to build the capacity of the users. NTS works through the interactions within a network of primary care and clinical specialist physicians. The primary target users are physicians in rural health units or primary care facilities in geographically isolated areas, specifically those serving under the Doctors to the Barrios (DTTB) program of the Philippine Department of Health (DOH). The clinical specialist physicians were recruited as volunteers initially from the Philippine General Hospital and later from DOH regional hospitals.

From 2007 to 2017, the NTS trained 774 referring (primary care/rural health) physicians and 96 clinical specialists located in various regions of the Philippines. A total of 2,710 consultations were completed through the platform since 2007, the majority via text messaging. The cases resolved through the NTS reduce the potential cost of physically going to speciality health facilities. In cases wherein referral is necessary, the NTS enables rural health physicians to coordinate care of referred patients more efficiently.

Funding for the NTS is primarily through research grants, consequently the services it offers are free of charge to users and beneficiaries. This raises the issue on sustainability as research grants are finite. To address this, the NTHC is considering the creation of a spinoff company through the Technology Transfer and Business Development Office of the University of the Philippines. Another consideration could be to make NTS a core service of the NTHC, with the university taking advantage of the already established cadre of health workers who are involved in it, the manual of procedures, the technology, and the wealth of experience and knowledge accumulated through the years of its implementation.

The NTS is a social innovation that responds to the felt need for medical specialist services in remote areas and care for socioeconomically disadvantaged patients. As a community of users, NTS represents a network of health workers that bridge the divide between rural areas and high resource centers and respond to the challenges of geographical isolation and chronically limited or maldistributed resources. This case also demonstrates how participation of end users in the creation of the intervention is beneficial to the implementation of NTS. It also demonstrates how a research project with practical applications can be absorbed and expanded by government, and then sustained or built upon by other projects with similar scope.

"Telemedicine is a systems intervention, not a health information or technology intervention. I think it's important to note that technology itself will not change things unless you change the human and the organizations around it and that's why it's a disruptive technology."
(Dr. Portia Fernandez-Marcelo, Project Leader, National Telehealth System)

1. INNOVATION PROFILE AT A GLANCE

Organisation details	
Organisation name	National Telehealth Center
Founding year	1998
Founder name	University of the Philippines Manila
Innovator / Project Leader	Dr. Portia Fernandez-Marcelo
Current head of organisation	Dr. Raymond Francis Sarmiento
Organisational structure	University-based research institution
Size	10-50
Main income streams	Research grants
Innovation Value	
Value proposition	The National Telehealth System provides access to specialty care in remote areas through a telemedicine platform that connects primary care physicians to specialists
Beneficiaries	Patients in remote and geographically isolated areas
Key components	● Telemedicine platform with appropriate and open-source technology ● Training program on eHealth, transferrable learnings ● Network of primary care and specialist physicians
Scale and Transferability	
Scope of operations	Regions 2, 4A, 4B, 5, 6, 7, 8, 9, 10, 11, 12, Cordillera Administrative Region, and National Capital Region
Local engagement	Local health centres, local government units, Department of Health, Department of Science and Technology
Scalability	● Sustained and regular funding is essential ● Framework of coordinating care between primary physicians and specialist should be in place ● Protocols for different types of consult and manual of operations should be established
Sustainability	● Telehealth cannot be sustained without adequate funding for training, operations and maintenance ● NTS is replicable as demonstrated in its expansion in regional centers

2. CHALLENGES

The Philippines is one of the largest island groups in the world, located in the western part of the Pacific Ocean off the coast of South-East Asia. The country is an archipelago of 7,107 islands of which 1,200 are inhabited (WHO, 2013). With a total land area of 299,764 square kilometers of which 40% is mountainous, and a vast coastline of 36,289 kilometers, the topography of the Philippines remains a challenge to the provision of health services for outlying rural areas.

Information on actual numbers of the existing health workforce in the country vary, but it is estimated that there is one physician per 33,000 population (Senate of the Philippines, 2016). There has also been a maldistribution of physicians, especially specialists who tend to practice in urban centers. Between 60% to 70% of all medical practitioners work in urban areas, and as of 2011, data reveals that out of the 24,173 recorded physicians in the entire country, about 45% are practising in highly urbanized regions with the top three located in the Philippine capital of Metro Manila (4,029) and its surrounding regions of Central Luzon (3,553) and South Luzon (3,251) also called CALABARZON (WHO, 2013). These numbers are in stark contrast to the numbers of physicians working in poor, rural areas, estimated at 4.5% of the total (WHO, 2013).

To help address this issue, the Philippine Department of Health (DOH) established the Doctors to the Barrios (DTTB) deployment Program wherein newly qualified physicians are deployed to poor, rural areas. In 2016, 503 doctors were sent to priority areas called geographically isolated and disadvantaged areas (GIDA), viewed as unserved and underserved communities (Department of Health, 2017). Half of the all the municipalities in the Philippines have GIDA (Dayrit et al., 2018).

By its definition, GIDA are located in remote areas of the country that are difficult to reach and navigate. Doctors assigned to these areas describe that they struggle with the number of villages they have to attend to, particularly when these villages are far removed from one another. A doctor can be responsible for patients within a 200 kilometer radius (Sandoval, 2017), perhaps even more if villages are separated by sea.

Whether it be small islands several miles off the coast of the main island, or villages cradled deep within a mountain range, these GIDA have challenging terrain that make access to health services difficult, particularly tertiary health care. Telehealth is regarded as one solution to the problems posed by geographical barriers and scarcity of health workforce. According to the World Health Organization (WHO), telehealth *"involves the use of telecommunications and virtual technology to deliver health care outside of traditional health-care facilities. Telehealth, which requires access only to telecommunications, is the most basic element of 'eHealth', which uses a wider range of information and communication technologies."* Telehealth solutions have been tested in different parts of the world, delivering essential services such as dermatology, radiology, infectious disease consultations, and maternal and child health advice in difficult-to-reach areas where specialty care is not readily accessible or timely.

"Telehealth was born out of the need for access to better care because of the geographical challenges as well as social challenges." (Project Leader, NTS)

3. INNOVATION IN INTERVENTION

The National Telehealth System (NTS) aims to address the problem of access to timely and quality specialty health care in remote areas in the Philippines and to facilitate timely transfer of patients to higher level health facilities. It was developed and is maintained by the National TeleHealth Center (NTHC), a research institute within the University of the Philippines (UP) Manila National Institutes of Health. The components of the NTS are: 1) telemedicine platform, 2) training program, and 3) a network of primary care and clinical specialist physicians in participating government health facilities in the Philippines. The target users of NTS were initially the rural health physicians under the DTTB deployment program, but it has expanded to include other physicians (e.g. Municipal Health Officers (MHOs)) also working in rural health units all over 12 out of the 17 regions of the Philippines.

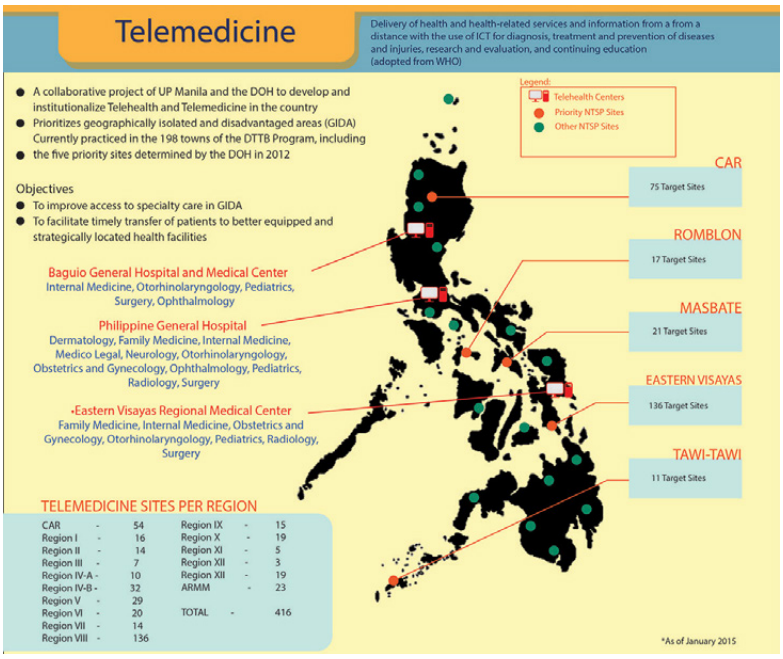

Figure 1. Infographic showing the reach of the National Telehealth Service Program/National Telehealth System as of January 2015

Telemedicine platform

The telemedicine platform of the NTS is a web-based software written in Java that connects primary care physicians to clinical specialists through text messaging or a web-based application. It was developed iteratively by the NTHC with inputs from primary care and clinical specialist physicians. The main functionalities of the platform are: image-based teleconsultation (e.g. radiographs, dermatological cases); teleconsultation via SMS or web based application; connection to an electronic medical record system called Community Health Information and Tracking System (CHITS); telereferral via web and CHITS; fast and accurate generation of reports; and an eLearning platform through a User's Forum.

The platform automatically assigns any incoming text message or web-based application consultation to the appropriate clinical specialist and has built-in functions to track and record referrals for quality assurance (e.g. automatically reassigning SMS consults when not answered within a designated appropriate time limit) and project monitoring and evaluation (e.g. frequency tables for referrals and their evolution; filtering options for reporting and data visualization). The telemedicine platform acts as a bridge between

primary care physicians and clinical specialists to interact and support each other to ultimately care for patients in remote parts of the country.

National Telehealth Center, Philippines, 2018

Training program

A certificate course on eHealth has been developed to build the capacity of physicians who will use the NTS. It is offered as a six-month blended learning course combining face-to-face (at the beginning and end of the course) and field practice and mentoring. The face-to-face two-day training covers the expected benefits and limitations of eHealth and telemedicine, ethical and legal framework and health information exchange, the role of eHealth as an enabling tool globally and in the Philippines, and use of eHealth/telemedicine tools to support clinical decision making and public health management. The procedures and tools are discussed in this training in conjunction with hands-on exercises. After the initial training, a hand-holding period ensues with close supervision and support from the NTHC. Participants graduate once the final training workshop is completed.

Network of primary care and clinical specialist physicians

A network of primary care and clinical specialist physicians is essential in the NTS. The primary target users are physicians in rural health units or primary care facilities in geographically isolated areas, specifically those serving under the DTTB program. The clinical specialist physicians were recruited as volunteers initially from the Philippine General Hospital and later from DOH regional hospitals. NTS works through the interactions of these two groups of physicians to serve patients who would otherwise not be able to access specialist care because of geographical barriers and socioeconomic factors. Figure 1 provides a map identifying the hospitals designated as telehealth referral centers and the telehealth sites where the target primary care facilities/NTS users are.

4. IMPLEMENTATION

4.1 INNOVATION IN IMPLEMENTATION

The NTS takes advantage of the existing and widespread use of mobile phones in the Philippines. As early as 2003, the Philippines ranked the first country in SMS messages, with 600 SMS texts per user per month, with the United States coming in second with a rate of 420 per user per month (Dimacali, 2010) (Mina, 2011). This widespread familiarity with text messaging was favourable to NTS in its design and praxis. During the initial stages of implementation, a number of doctors from the DTTB program were actively engaged as they were to be the end users of the NTS. Doctors participated in the training program and provided feedback on the system. Their involvement was crucial in the iterative development of the telemedicine platform.

Patient privacy and confidentiality of patient information was also a primary concern for the NTS. The NTS must ensure compliance with the Data Privacy Act of 2012. The law outlines that information collectors (e.g. doctors),

holders and processors (e.g. health facilities, IT service providers, academe, government) must follow strict rules on transparency and legitimacy in the conduct of their activities. The information can be processed or used only if it is not prohibited by law, and the patient who provided the information must provide consent. There are, however, exceptions to this. The law states should patient consent be not available nor given, there are allowances in if it is in the patient's "vital interests, such as life and health" and "to respond to the exigencies of a national emergency or public order and security" (Fernandez-Marcelo, et.al., 2016).

The NTS digitizes patient information and trains implementers on the use of telehealth tools and on the ethics of patient information management. Doctors and health providers are reminded to seek patient consent and are provided sample consent forms for teleconsultation and digital management of information (Fernandez-Marcelo, et.al., 2016).

4.2 ORGANIZATION AND PEOPLE

The University of the Philippines Manila - National Telehealth Center (NTHC) was established in 1998 as a research unit responsible for developing cost effective tools and innovations in information and communications technology (ICT) to improve health care (Marcelo, 2009). Since its establishment it has produced several ICT tools and knowledge products in eHealth, particularly in telehealth in partnership with various government and non-government institutions. The center is part of the National Institutes of Health of the University of the Philippines Manila. NTHC is organized around three functional areas: technology and software development, administrative support, and research and service projects.

Under the NTHC, the NTS was initially run by a project leader, a project manager, research associates, developers, trainers and administrative staff. During a five-year period that it was funded by the DOH (2011-2016), the NTS had additional project oversight through a committee consisting of Under Secretaries, Assistant Secretaries, and Directors from the DOH. Currently, the NTS is being managed by the Director of the NTHC with the help of a telemedicine nurse and a research associate.

The director of the NTHC is supported by university researchers and the other researchers employed under the center's different projects.

4.3 BUSINESS MODEL

The core operational costs (permanent staff, office space, and basic utilities) of the NTHC are funded through the University of the Philippines Manila budget. As a research center, the NTHC is expected to generate funding for its research projects such as the NTS. As a state-funded institution, the knowledge, tools and innovations the NTHC produces are for public consumption, but there is also the possibility of commercialization.

The NTS has been funded primarily by research grants and consequently the services it offers are free of charge to users and beneficiaries. The NTHC continually improves on the products of each round of research funding while sticking to the general framework of addressing health care access issues through ICT. However, since research grants expire, the main challenge for NTHC is to sustain the eHealth solutions it creates, especially projects that have service components such as the NTS. These will be further discussed in Section 6. Sustainability and scalability.

5. OUTPUTS AND OUTCOMES

From 2007 to 2017, the NTS has trained 774 referring physicians (DTTB and MHOs) and 96 clinical specialists located in various regions of the Philippines. The referring physicians who were trained serve in remote areas of the country while the clinical specialists are typically located in the urban centres. Referring physicians are co-ordinated with clinical specialists within their own region, to improve the coordination within the regional healthcare delivery system. There are, however, instances wherein there are no clinical specialists located within the same region and would be co-ordinated to a specialist elsewhere. Should there be any need for a patient coming from a remote area to be admitted to a higher level health facility, the referring physician, guided by the specialist, could offer a practical and relatively near option for the patient, and coordinate the referral and care with the clinical specialist(s) more efficiently. "Because they [specialists in telehealth referral hospitals] also know their network, they can give advice to where we can bring the patient or the nearest consultant in the area." (DTTB NTS User, Quezon)

5.1 IMPACT ON HEALTH CARE DELIVERY

A total of 2,710 consults were successfully done through the NTS since 2007, the majority (2,517) through SMS and the rest through email. NTS is used by clinicians from 175 health facilities and this translates, according to the Project Leader of NTS, to an estimated potential coverage of more than five million Filipinos.

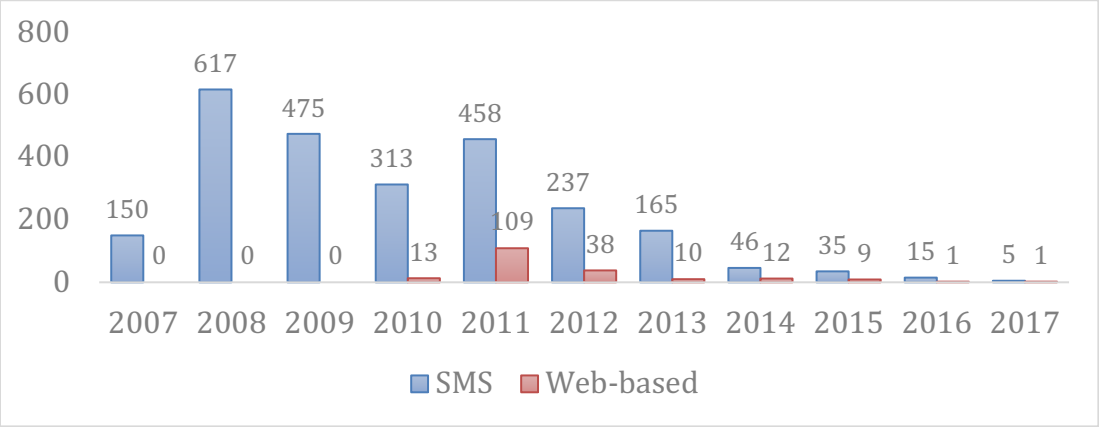

Figure 2. Number of SMS and web-based consultations per year, 2007-2017

National Telehealth Center, Philippines, 2018

From 2007 to 2008, around 90% of all the SMS referrals were responded to (Gavino, et.al., 2010). These cases resolved through the NTS could reduce the potential cost of physically going to speciality health facilities, bridge the gap in clinical experience of newly-deployed rural health physicians, and coordinate care of referred patients more efficiently. Two cases were described by the project leader that illustrate the impact of NTS on health care delivery. One was of a 50-

year old male who was having a heart attack:

"One of our more memorable cases involves a telecardiology case wherein a referring physician, who was then a newly deployed doctor-to-the-barrio, wanted to refer a case of myocardial infarction of a 50-year old male. The referring physician was unsure of how to read the electrocardiogram (ECG) but because of his well-developed clinical eye (based on the patient's symptoms and physical exam), the fact that the NTS was already in place, and because the cardiologist on hand was readily available and responded in time to confirm the referring physician's initial ECG reading, the referring physician was able to refer the patient to the nearest hospital where he was managed and was able to avoid more serious consequences. This is one instance wherein all the moving parts aligned and through the use of the NTS, a life was saved." (Project Leader, NTS)

This case illustrates how NTS helped a relatively inexperienced physician better manage a patient by involving a more experienced clinician, thereby providing better quality care for the patients and minimizing medical errors.

A case of a pregnant mother referred through NTS for possible admission to a hospital illustrates how NTS enables better coordination of care. The referring facility was not equipped to handle the case, and the woman was referred to a hospital with the necessary equipment for after-delivery life support for the child. According to the project leader of NTS, *"through the NTS, the receiving facility was informed well ahead of time of the incoming patient and they were able to better prepare the needs of both mother and child. Had the patient been referred or pointed to a less-than-capable hospital or health facility, then that could have resulted in the loss of not just the child, but potentially the mother as well."*

5.2 ORGANIZATIONAL MILESTONES

The NTHC has grown substantially since its founding. Starting as a research project on electronic medical records in a city health clinic, it has expanded its reach across the archipelago. The NTS is a major milestone of the organization in terms of its broader work on eHealth. The DOH itself saw the potential of the telemedicine programme that NTHC has developed, and consequently it invested in its expansion in Luzon, Visayas and Mindanao.

National Telehealth Center, Philippines, 2018

There were initiatives to institutionalize the NTS through the National eHealth Steering Committee in 2013-2014, through a House Bill No. 33 (An Act Promulgating a Comprehensive System for National Telehealth Service in the Philippines) and through a draft Executive Order on Telehealth. Although these initiatives did not fully succeed at the time due to lobbying challenges, they put telehealth on the national agenda for better health access in the country. Telemedicine has been included in the National Health Research Agenda and in the current Philippine Health Agenda (2016-2022), which states that "telemedicine is considered a key strategy, especially for improving Service Delivery Network".

The main elements of NTS have been reused in other projects such as the Real-time Monitoring of Maternal and Child Health Indicators through CHITS (RCHITS) and RxBox (a medical device

project); combined these projects expanded further the geographical reach of NTS.

5.3 COMMUNITY PERCEPTIONS

The community of users (primary care physicians, specialists and patients) has given positive feedback on NTS. They appreciated its relevance, prompt responses to referred cases and usefulness. A user from Mindoro, an island in Southern Luzon said:

"[NT] is very useful because I trust the source, it is relevant, it is applicable, and it provides resources that answer some of my needs. The waiting time is reasonable for patients. It is helpful because it helps me better the way I do my work."

These sentiments are echoed by other users, pointing out the savings on the cost of seeking specialist care for patients and the prompt responses they receive from specialist physicians. The latter enable them to manage their patients in a timely manner:

"I just want to say it is very helpful, informative… and great help financially for patients no longer need to travel for further evaluation or opinion." (NTS user, Albay)

"NTS is very useful for us DTTBs [Doctors to the Barrios) especially those in remote areas where internet access is not that good. Reponses [to referrals] are readily sent so management [of patients] is not compromised." (DTTB NTS user, Palawan)

"It serves as a big help for us, especially in emergency cases. We felt we're not alone." (NTS user, Abra)

The potential of NTS to bridge the gap between patients and appropriate health services has been recognized by the DOH and other stakeholders. DOH has invested a considerable amount to see how it would work and to learn from the challenges. Senior staff at the DOH related to the NTS project leader how they saw telemedicine as a *"systems intervention, not a health information or technology intervention".*

The clinical specialists who have volunteered their time, skills and experience also recognize that NTS is one way to reach out to and help more patients. This is despite initial resistance because of issues such as medical malpractice, compensation and a relatively low level of appreciation of privacy laws that govern transactions such as a telemedicine consultation. One NTS project officer expressed: *"They need to be assured that the doctor at the other end [are competent also because] they also fear litigation. That's why trust is a central factor in things. So that was our lesson in 2011, trust first. That's why we invested in the training, trust building."* As the implementation progressed and with adequate training and a period of handholding, the clinical specialists were able to trust NTS.

6. SUSTAINABILITY AND SCALABILITY

Sustaining NTS without external funding is a challenge that the NTHC is facing and must be overcome by building on its successes, learnings and experiences. According to the project leader, the elements that would make NTS sustainable are: 1) general telemedicine protocol – the staff completed certification courses on telehealth provided by the University of Texas Medical Branch in Galveston, Texas, 2) specific protocols for image-based telemedicine such as teleradiology and teledermatology based on existing international standards and current scientific evidence, 3) training manuals,

and 4) engagement of Municipal Health Officers, general medicine practitioners, and physicians under the DTTB program using NTS.

Funding is still an issue as the NTS has only been sustained by research grants which are finite. To address this, the NTHC is considering the creation of a spinoff company through the Technology Transfer and Business Development Office of the University of the Philippines. Another consideration could be to make NTS a core service of the NTHC, with the university taking advantage of the already established cadre of health workers who are already involved in it, the manual of procedures, the technology and the wealth of experience and knowledge accumulated through the years of its implementation.

6.1 SCALING CONSIDERATIONS

When the initial grants for NTS ended, the University of the Philippines Manila took the responsibility for its continuing operations. The discussion on scaling – in terms of weaning the program off from grants and offering it as a service through as social entrepreneurship model – came to fore. The university's mandate to serve the people also came into consideration. The NTHC management advocated to DOH to take it up and invest in it, but other than a PHP 30 million (623,000 USD) grant and subsequent projects, NTS has not been established as a regular government funded program. What has been explored is sustainability through the Philippine Health Insurance Corporation (PhilHealth), but this would be dependent upon a national policy on telehealth before a PhilHealth benefit package is defined (Fernandez-Marcelo, et.al., 2016).

In terms of internal scale, the number of employees has depended on the scope of work laid out in the research grant that funds it, which means that at certain points NTS project employees numbered more than 30 and at other times there were only the core telehealth nurse, a software developer and a manager. The core services are the same and instead of it being expanded, it became an element of a larger project such as RCHITS or RxBox, whose scope may be slightly different but whose core services include telemedicine.

The active NTS sites are scattered all over the Philippines and yearly at least 20 new rural health physicians are trained on how to use NTS. Scaling to other territories have not been tested but should this be done, the NTS can easily be adopted. Using the framework of organizing clinical specialists and primary physicians through regional hospitals or referral centers, then using the clinical protocols that NTS created then other countries can easily adopt it to their context. The training manuals and protocols are available, and the software is open-source. The investment will be on training, maintaining and sustaining the operations. Another consideration is the compensation for clinical specialists, while this has been done on a voluntary basis the reality is that telemedicine is a service that should be paid. Whether it should be through health insurance or through out-of-pocket means should also be considered.

7. KEY LESSONS

The NTS is a social innovation that responds to the felt needs of rural health workers for specialist support in geographically and socioeconomically disadvantaged areas. It is not simply a health information or technology intervention, but a health system intervention: it improves health service delivery and builds relationships among its users who would otherwise be disjointed by the rural-urban divide. The NTS helps bridge rural physicians to clinical specialists, and creates opportunity for patients without power or resources in remote settings to access services that were only previously accessible to patients living in high-resource urban centers.

The active participation of the rural physicians early on in the implementation of the NTS proved to beneficial in the development of the telemedicine platform, highlighting the importance of the involvement of end users in the implementation of NTS. Building and strengthening the eHealth capacities of physicians is also necessary for the innovation to be effective.

As a community of users, NTS represents a network of health workers at the primary and tertiary level working towards a common goal of helping patients in need and responding to the challenges of geographical isolation and chronically limited or maldistributed resources.

CASE INSIGHTS

1. Structural and technological considerations, and a strong network of health workers are essential in implementing NTS. A cohort of clinical specialists ready to receive and respond to telemedicine consultations, well-trained health care workers, adequate health IT infrastructure, and health facility registries are all important elements.
2. Better health care is achieved when patients are more confident in their health care providers. For health care providers in resource limited settings, confidence in their care can be boosted by bridging professional gaps. One way to do this is by connecting these physicians practicing in the provinces and more remote areas with clinical specialists in tertiary centers (e.g. regional health facilities and in the Philippine General Hospital) for support and guidance.
3. Policy support through the passage of laws or relevant administrative guidelines on telehealth is important to institutionalize telemedicine as part of the public health system.

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