TELEHEALTH AND MEDICINE TODAY

ORIGINAL RESEARCH

A Building Block Approach to Implementing a Telehealth Clinic Model to Improve Primary Care Access in the Philippines: A Large-scale Pilot Project

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Abstract

A limited number of healthcare workers and cost constraints encumber primary care access in the Philippines. To test telehealth as a low-cost and effective solution, a large-scale digital health clinic was implemented in the selected urban and rural communities. In collaboration with local authorities, our pilot telemedicine clinic was implemented for 3 days in January 2023. Patients were registered, and their vitals were assessed before they were seen by a remote US-based licensed physician who provided treatment recommendations. Medical devices with real-time streaming capabilities, such as electronic stethoscopes, were utilized to enhance remote examinations. A total of 322 patients were treated at the telehealth clinic; of which, 218 completed a population health survey. A large proportion of patients had a doctor visit more than 12 months prior (39.2%) and had not received a dental examination (86.3%) or an eye examination within the past year (84.4%). Most patients had access to a smartphone (69.7%). A lower proportion had access to an internet connection sufficient for video calls (57.9%) or a laptop (8.5%). Our clinic demonstrated that telehealth is a feasible solution to improve primary care access for disadvantaged communities in the Philippines.

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Equitable access to healthcare has been a major focus of the international development community since the adoption of the Sustainable Development Goals (SDGs) by all 193 United Nations member states in September 2015. Of the 17 goals, SDG 3 focuses explicitly on Universal Health Coverage (U, defined as equitable, quality, and affordable healthcare).[1]

Barriers to primary care access in the country involve structural mechanisms that often have multifactorial etiologies. Healthcare workers are a limited resource due to out-migration to Middle Eastern and Western countries, and internal variation in opportunities and pay creates additional scarcity in various regions of the country, all exacerbated by the COVID-19 pandemic. The Philippines

Fig. 1. Healthcare professionals and specialty hospitals are concentrated in the three hub cities of metro Manila, Cebu, and Davao, creating a logistical challenge to field healthcare workers across the rest of the Philippines.

is spread over 7,500 islands, about 2,000 of which are inhabited.[2] The majority of medical staff and specialty hospitals are concentrated in the three hub cities of metro Manila, Cebu, and Davao, thereby creating a logistical challenge to field healthcare workers across the rest of the Philippines (Figure 1). The location of healthcare facilities also limits access to care, with 50% of the Filipino population are without in-person healthcare access within 30 min.[3–5]

The cost to address these issues is significant. Digital health, particularly telemedicine, is promoted as a strategic priority given the potential of these technologies to mitigate many of the ongoing financial and logistical barriers facing patients and medical facilities.[6] However, implementing health technologies at scale involves significant coordination among government, digital experts, healthcare workers, and staff.

Our Goal

The aim of the project was to identify needs and potential gaps in establishing a free telemedicine service providing low-cost, high-quality healthcare for Filipinos that can be replicated in clinics across the country.

Clinic Design

The following aspects were incorporated into clinic design and implementation: (1) a process simple enough to be set up and operated by local healthcare staff with a minimum requirement of a high school education, (2) a business model providing free or significantly reduced-cost care to the patients and sustainable via government and local business support, (3) integration of stakeholder input at each stage of implementation, and (4) high-quality care via provider–provider access to a network of specialists in the Philippines and the United States, where the specialists are supplementary to the primary care healthcare workers. Once these factors were confirmed, we moved forward with the technological setup.

Technological Partner

The software was donated by VSee, a telemedicine company that can operate in low-resource environments using a no-code/low-code method (Table 1). This method allows clinical teams without programming experience to configure workflows tailored to their circumstances. It allows programmers to create their digital apps at about 100X the increase in productivity. Using this low-code/no-code building block approach to digital medicine, VSee has built capacity for numerous healthcare systems and governments and met their technology needs.

Phase 1. Preparation

Step 1. Key Stakeholder Engagement

The Filipino government is divided into local government units (LGUs) at the provincial and municipal levels, which are integral components of the healthcare infrastructure. After interviewing 12 LGUs to gauge interest and ability to provide resources, a local municipal officer agreed to partner in the project implementation.

Step 2. Community Needs Assessment and Site Selection

Within the greater metro Manila region, local government officials identified the Damayan Floodway in the province of Rizal as an area of need. A building that once provided safety during natural disasters was repurposed for clinic space by the LGU. The LGU also assigned zone leaders to conduct an informal basic needs assessment in the community to ensure the local population's perspective was incorporated at each stage of the process.

Prior to the clinic launch, LGU staff and clinic volunteers traveled door-to-door, identifying medical needs and

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spreading awareness of the upcoming clinic. The assessment allowed appropriate patients to be referred to the clinic. It enhanced the team's ability to proactively address potential barriers to participation, such as wage loss and food insecurity, by providing 2 kg of rice to every patient. Finally, the needs assessment allowed the team to tailor their physician recruitment and medication preparation in the months leading up to the clinic. These data were uploaded to the electronic medical record (EMR) platform for physicians to access during the clinic.

Step 3. Technical Components

In contrast to direct-to-consumer telemedicine models, in this site-based telemedicine model, patients arrived at a clinic site equipped with staff, computers, and medical devices while the clinicians were remote. An advantage of this approach was that clinicians were able to conduct a more comprehensive physical exam than if the patient was video calling from home.

The technology chosen for the clinic was intentionally structured to adapt to a low-bandwidth setting. This allowed for higher-quality live audiovisual conferencing when adequate signal was available, but with the flexibility to shift to asynchronous, text-based telemedicine as well as store-and-forward documentation, which allowed for offline documentation that could be uploaded at a later time when necessary. Streaming medical devices were also available on-site for remote physical exams, including stethoscopes, otoscopes, ultrasound probes, dermatoscopes, and vital sign monitors. Four laptops were used for remote consultations and on-site EMR access, two tablets were used for patient vitals documentation, one laptop was used for patient check-in and scheduling, and four cell phones were used for population health surveys.

Step 4. Staff and Sponsor Recruitment

Physicians were recruited for on-site participation through the LGU health office. Remote physicians who held a medical license in the United States were recruited through Healthcare Alliance for An Equitable World (https://haew.org/), a telehealth physician network, for the project. There were 25 non-clinical volunteers who facilitated clinic operations such as patient intake and assignment to physicians. On-site nonclinical volunteers included students, local healthcare workers, and zone leaders from the LGU. Additional volunteer information technology support was provided remotely by a US-based VSee team member. Two months before the clinic, bi-weekly training on clinic workflow and relevant medical technologies was provided to volunteers. Equipment, including laptops, headphones, and microphones, was supplied through a collective effort by the LGU and VSee employees.

Table 1. VSee no-code/low-code telehealth EMR building blocks

Compliance and secure IT infrastructure
Video and communications
• **Video call:** Browser, desktop, mobile, Pin video (for eye contact)
• **Audio call:** VOIP audio, phone dial-in
• **Phone dial-out**
• **Group call:** Add interpreter, family, chaperone
• **Screen share:** Lossless screen share, annotation
• **Chat:** Persistent, disappearing, group, role-based, ad-hoc, in-visit, priority
• **File transfer:** Off-the-record file transfer
• **Notifications:** SMS, Email
• **Mobile app:** White-label option, patient queue dashboard access, room code
Patient engagement
• **Intake form**
• **Consent form**
• **Patient self-scheduling with reminders**
• **Payment collection**
• **Patient routing**
• **Patient SSO and guest login:** Sign-in and membership, dependents account
Team coordination and scheduling
• **Queue management:** Separate internal and external communications, custom tagging
• **Role-based access:** Scheduler, administrator, etc.
• **Patient and visit tagging:** Custom tagging with auto-notifications
• **Provider assignment and reassignment**
• **Provider alerts:** Priority alerts with confirmation, mobile alerts, waiting room walk-ins
• **Staffing calendar:** Set single provider availability, merged calendars availability, clinical profile filters
• **Appointments:** Specific provider, 1st available provider (room), group, recurring, video, asynchronous
• **Guest invite:** Invite family interpreter, etc.
Devices and RPM
• **Remote physical exams:** Stethoscope, dermatoscopic, iriscope, otoscope
• **Remote patient monitoring:** Scale, blood pressure, fitness tracker
• **Hospital at home:** Continuous monitoring, EKG, SpO_2, temperature
• **RPM data visualization with alerts**
• **Telemedicine carts:** Far-end PTZ camera control, ergonomic design
Clinical
• **SOAP notes:** Custom templates, assessments
• **Medical history:** Existing conditions, family and social history, surgery, allergies, medications
• **Asynchronous visit**
• **E-prescribe**
• **Pharmacy picker**
• **Document upload**

Table 1. (Continued)

Compliance and secure IT infrastructure
User adoption
• **Patient education:** Videos and images
• **Clinic directory**
• **Languages:** Spanish, Chinese, Vietnamese, Arabic + 4
• **Self-test device**
• **FAQ & tutorials:** Audio and PDFs, videos
• **Announcements:** Social networks, blog
Payments & billing
• **Payment processing:** Credit card
• **Superbill**
• **Eligibility and prior authorization**
• **Data dashboard:** Financial health, claims efficiency
• **Claims Center:** Charge review, claims inspector
• **Accounts receivable and collections**
• **Payment and denial posting**
Analytics
• **Reports dashboard:** Customized, filterable views
• **Program utilization:** Total/active providers and patient, total visits, patient drop-offs
• **Financials:** Payment collected, total claims data
• **Operational efficiency:** Call duration, patient wait time; visits completed, aborted, canceled
• **Survey responses:** Post-visit survey, intake control

EKG: electrocardiogram; EMR: electronic medical record; IT: Information Technology; PDF: portable document format; PTZ: pan-tilt-zoom; SOAP: subjective, objective, assessment, plan; SpO2: oxygen saturation; RPM: remote patient monitoring; SMS: Short Message/Messaging Service; SSO: single sign-on; VOIP: Voice Over Internet Protocol: Vsee: secure telehealth consultation.

Liability

Remote international medical care is still a legal frontier without a strong global precedent established at the time of this publication.[7] An agreement signed with the LGU before the clinic absolved remote physicians of liability. Remote physicians provided medical advice that was then verified by an on-site physician, releasing remote providers from responsibility for adverse outcomes at the clinics.

Phase 2. Launch

The clinic ran from January 4 to 6, 2023. The clinic workflow was divided into two floors. The patient waiting area and vital examination stations were located on the first floor, while the clinic room designated for patient interactions with remote providers was on the second floor. Upon arrival, the patient's vital signs were examined, the patient was identified using an iris scanner, and a unique patient identification number was assigned to them. In addition, portable digital devices were used to assess the patient's blood pressure, temperature, pulse oxygenation, and weight. The patients were then guided to the second floor for their telehealth appointment. A kid's play area was adjacent to the waiting area so parents could bring their children to the clinic if they could not arrange childcare.

During the appointment, the remote physicians would recommend the patient's treatment. VSee also provided one telemedicine kit containing medical devices with streaming capabilities to enhance remote examinations, including a stethoscope, ophthalmoscope, dermatoscope, ECG, and ultrasound probe. The results from these devices were available to the remote physicians in real time. On-site medics served as interpreters when necessary and assisted with technical support during visits. While integrating supplemental devices such as stethoscopes and otoscopes into patient visits enhanced the capacity of the remote clinician, they were not vital to the overall functioning of the clinic. They should not be viewed as a cost-prohibitive barrier.

Patients who required further in-person assessments were directed to an on-site local physician. The local physician would then evaluate the patient and coordinate follow-up care, including recommended labs and imaging. After the telehealth consultation, patients were provided the medications they required free of cost. Patients were also provided a bag of 2kg of rice and other household necessities to compensate for the loss of daily wages from the time spent at the clinic.

Patient Characteristics

A total of 322 patients attended the telehealth clinic; of these, 218 completed the registration survey. Most patients who completed the survey were female (72.7%). The highest level of education attained by patients was high school (37.1%), followed closely by elementary school (32.4%). Most patients were unemployed (50%). A significant proportion of patients had not received a dental examination (86.3%) or an eye examination within the past year (84.4%), and a large proportion of patients had not visited a doctor in over 12 months (39.2%). The median cost for travel to their previous doctor visit was 20 pesos (IQR [interquartile range, and median travel time]: 15–40), and the median travel time was 15 min (IQR: 5–30). A small proportion of patients reported receiving care from a traditional healer (35.2%) (Table 2).

Respiratory problems were the most common diagnosis among patients attending the VSee telehealth clinic (50.3%), followed by neurological issues such as headache, prior stroke, or dizziness. The median travel time to the clinic was 5 min (IQR: 3 to 15 min), and most patients walked to the clinic (86.4%). A small proportion of patients lost their daily wages due to their visit to the clinic (25.5%) (Table 3). Access to technology was also assessed, and most

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Table 2. Demographics of patients (N = 218) treated at the VSee telehealth clinic

Gender, *n* (%)	
• Female	157 (72.7)
• Male	59 (27.3)
Level of education, *n* (%)	
• No education	10 (4.7)
• Elementary school	69 (32.4)
• Middle school	10 (4.7)
• Some high school	20 (9.4)
• High school graduate	79 (37.1)
• Some college	5 (2.3)
• College graduate	16 (7.5)
• Advanced **degree**	2 (0.9)
• Vocational training	2 (0.9)
Employment status, *n* (%)	
• Unemployed	103 (50.0)
• Employed	66 (32.0)
• Retired/not applicable	37 (18.0)
Prior healthcare utilization	
Time to last healthcare visit, *n* (%)	
• Less than 1 month	24 (11.1)
• 1 to 6 months	50 (23.0)
• 6 to 12 months	58 (26.7)
More than 12 months	85 (39.2)
Travel cost for last healthcare visit: (pesos*), median (IQR)**	20 (15–40)
Travel time for last healthcare visit: (minutes), median (IQR)**	15 (5–30)
Cost for last healthcare visit: (pesos*), median (IQR)**	600 (150–1,500)
Prior treatment by traditional healer, *n* (%)	
• No	138 (64.8)
• Yes	75 (35.2)
Dental visit in the past year, *n* (%)	
• No	182 (86.3)
• Yes	29 (13.7)
Eye examination in the past year, *n* (%)	
• No	179 (84.4)
• Yes	33 (15.6)
Chronic disease requiring medications, *n* (%)	
• No	117 (60.6)
• Yes	76 (39.4)
Primary diagnosis at VSee clinic, *n* (%)	
• Dental issues	3 (1.6)
• Dermatologic issues	4 (2.1)
• Diabetes	5 (2.7)
• Gastrointestinal issues	11 (5.9)
• Gynecologic/obstetric issues	9 (4.8)
• Hypertension	18 (9.6)
• Infection	8 (4.3)
• Vision issues	14 (7.5)
• Neurological issues	21 (11.2)
• Respiratory issues	94 (50.3)
Travel time for VSee clinic: (minutes), median (IQR)**	5 (3–15)
Means of transport to VSee clinic, *n* (%)	
• Walk	184 (86.4)
• Bicycle	9 (4.2)
• Motorcycle	10 (4.7)
• Public transport	10 (4.7)
Loss of wages from VSee clinic visit, *n* (%)	
• No	146 (74.5)
• Yes	50 (25.5)

*1 Philippine peso = 0.018 USD; **IQR: interquartile range, and median travel time; Vsee: secure telehealth consultation.

Table 3. Access to technology for patients treated at the VSee Clinic

Technology access	Total (N = 218)
Access to smartphone, *n* (%)	
• No	64 (30.3)
• Yes	147 (69.7)
Access to laptop, *n* (%)	
• No	195 (91.5)
• Yes	18 (8.5)
Access to adequate internet connection, *n* (%)	
• No	90 (42.1)
• Yes	124 (57.9)

Vsee: secure telehealth consultation.

patients had access to a smartphone (69.7%). A lower proportion had access to an internet connection sufficient for video calls (57.9%) or a laptop (8.5%) (Table 3).

Those surveyed in the 2017 National Demographic and Health Survey who visited a healthcare facility or provider in the previous 30 days reported the average round trip travel time was 47 min.[8] This did not vary significantly between urban and rural areas. The average round-trip travel time to a health facility in the Calabarzon region where the clinic took place was 35.4 min. In comparison, the median travel time of our survey respondents' last medical visit was 15 min (IQR, 5 to 30 min), and to the VSee clinic was 5 min (IQR, 3 to 15 min).

The diagnoses made in the VSee clinic aligned with the most common causes of morbidity in the Calabarzon region. At the clinic, 50.3% of patients were seen for respiratory-related issues, and 9.3% were seen for hypertension. Together, hypertension and respiratory complications make up four out of five of the most common causes of morbidity in Calabarzon, the fifth being cardiac complications.[9] To overcome internet-connectivity challenges, our team created offline forms to register patients and minimize disruptions to clinic workflow.

Medications

Medications for this project were purchased with donated funds or directly through Genericka, a well-known local generic pharmacy chain. These were then packaged by clinic volunteers, a labor-intensive effort. While useful to attract patients for this pilot project, this model would be unfit for a sustainable, large-scale intervention. However, integrating telemedicine clinics into the broader community could mitigate the wage losses many patients feel due to decreased time and transportation required to access a physician, thereby allowing them to reallocate these funds to medications if necessary.

Discussion

This large-scale clinic was the first phase of a multi-level implementation strategy. Having successfully demonstrated proof-of-concept within a single LGU, the team plans to expand to three clinic sites in phase 2 – in Caloocan, Pasay, and the City of Manila later this year, and 10 to 20 clinics in phase 3 and later, in areas of conflict.

To scale this program and implement it on a national level, it is important to make the following adjustments:

1. As local physician involvement increases in the management of the clinic, individuals can be selected to pursue further training in pilot clinics at various locations. The role of the remote physicians can be minimized to create a three-tier system:
    - Patients can initially be triaged by a trained nurse and treated by a local physician.
    - Due to the lack of geographical barriers in telehealth, patients can then be referred to a remote, local specialist.
    - A remote physician in the United States can be consulted for additional expertise as needed.
2. The VSee EMR system currently requires access to the internet. We plan to create an offline-online version of VSee EMR that can still be used when the network is not available. The system would cache locally and, when the network is available, seamlessly sync the local data with the servers in the cloud.
3. It is important to utilize government funds to purchase and supply medications for patients and provide financial compensation for the staff involved in conducting the clinics. While the Filipino government provides universal government-run insurance, it does not adequately cover many medication costs, creating a burden for the patients seen in our clinics.

Digital medicine, for all of its potential, can often contribute to widening inequity in health access. Termed "the digital divide," this phenomenon can be seen in countries regardless of national wealth.[10–13] While the Filipino healthcare system is at risk of perpetuating or even exacerbating barriers to digital health access for disadvantaged citizens, the country has a robust internet and electricity infrastructure that, if utilized strategically, could instead harness health technologies to narrow the divide and move the country closer to achieving Universal Health Care. Our model demonstrates a clinic-centered solution to overcome barriers, including lack of material resource limitations and digital literacy skills in homes or communities of traditionally disadvantaged communities.

Conclusions

This initiative involved launching a telemedicine clinic in the Damayan Floodway area in the province of Rizal, in the region of Calabarzon, located outside of Manila. The telemedicine model chosen for the clinic was structured to function in a low-bandwidth setting and provide secure live audiovisual conferencing. Electronic tools such as stethoscopes and ultrasound machines enhanced physical examinations, allowing the remote provider to execute a more comprehensive visit. The liability of remote physicians was absolved through agreements with LGUs. The clinic ran from January 4 to 6, 2023, during which 322 patients were treated. The results of our survey, when compared with national survey results, align in that our clinic cared for some of the most common diagnoses in the region while reducing patients' travel time to reach medical care.

In addition to increased patient access through our clinic structure, the foundational technologies used to set up the clinic demonstrate a model that empowers physicians and other healthcare team members to integrate telemedicine without requiring a background in coding or programming. By providing a menu of low-code/no-code building blocks, telehealth platforms can appeal to a much wider audience and allow the ability to design a digital health program tailored to their specific circumstances. At scale, this model could equip local healthcare systems and governments to replicate this model independently, thereby reducing inequality in digital health access.

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Milton Chen is the CEO of the organization who conducted the telehealth intervention described in this study.

Contributors

Milton Chen, Annalicia Pickering, and Jarone Lee conceived and designed the study. Aidan Chen, Alexander Davis, and Erika Chuang collected data for the study. Wardah Rafaqat, Adi Balk, and Annalicia Pickering prepared the manuscript. Jarone Lee, Mary Showstark, Limuel Abrogena, and Shuhan He critically reviewed the manuscript. All authors read and approved the manuscript.

Data Sharing Statement

Data used in this manuscript will be made available upon reasonable request to the corresponding author.

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