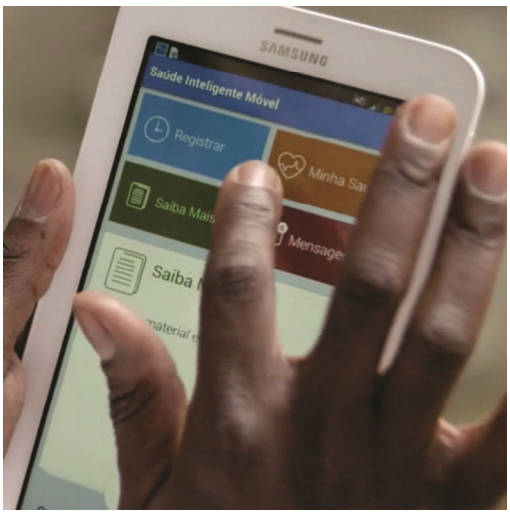

Project SIM: Smart Mobile Health

Improving Outcomes for Patients with Diabetes through the Use of 3G and 4G Technologies

Project SIM: Smart Mobile Health is a twelve-month clinical study in Rio de Janeiro, Brazil, that aims to demonstrate how an innovative mobile health platform can be an effective approach to improving outcomes for patients with type 2 diabetes. The specialized platform supports patient adherence and engagement in treatment through remote monitoring and better access to educational resources. The clinical study protocol was approved by the Rio de Janeiro State University and the City of Rio de Janeiro's Health Secretariat.

BRAZIL

2018 Statistics*

Population (est.)	207.3 million
Life Expectancy	74 years
GDP Per Capita (2017 est.)	US$15,500
Mobile Penetration	112.54%

Challenge

- The existing public health care infrastructure in Brazil was primarily created to deal with acute diseases. Today, a different health care system is needed to cope with the lengthy duration and demand of chronic diseases.
- Over the last 30 years, life expectancy in Brazil has increased by up to 12.4 years, resulting in a larger elderly population requiring treatment for chronic diseases, and therefore increasing the demand for public health care services.[2]
- Despite significant efforts from the City of Rio de Janeiro's Health Secretariat to deal with chronic diseases, the number of patients continues to increase. There is a strong need for tools that enable the existing health care workers to reach more patients faster and more efficiently.

Solution

- A platform developed by MTM Tecnologia includes a website and mobile app that provides a constant connection between the health care workers and the patient.
- Four hundred patients with type 2 diabetes from an underserved clinic are participating in the clinical study, half of whom are in a control group. The other half are in the technology intervention group and receive a 3G- or 4G-enabled smartphone or tablet pre-loaded with a specialized mobile app; a scale to measure body weight; a pedometer to measure physical activity; a heart rate monitor to measure blood pressure; and a data plan provided by TIM.
- The technology intervention group uses the mobile app on their device to submit their health information to their health care providers, track their progress and access educational material.
- Providers and clinical researchers log in to the mobile health platform via clinic computers to access patient information, monitor and track patients' progress, send reminders, and push educational material to them.

*Sources: CIA World Factbook (https://www.cia.gov/library/publications/the-world-factbook); Mobile penetration data provided by Ovum World Cellular Information Service and based on market intelligence.

Projected Impact

Reduce Costs

The study aims to demonstrate that remote monitoring with mobile health solutions will cut costs, increase capacity and improve patient outcomes.

Improve Health Decision-Making

The use of 3G and 4G mobile technologies to support patient treatment, adherence and self-monitoring is expected to increase the quality, accuracy, speed and availability of data for health decision-making primarily by health care providers.

Increase Capacity of Patients

It is expected that patients will increase their capacity to self-treat and manage their chronic diseases and conditions as a result of the education, prevention and behavior management strategies acquired via the platform.

Improve Quality of Life

Project SIM: Smart Mobile Health aims to demonstrate how remote monitoring with mobile technology can increase the overall quality of life for patients with chronic diseases.

Technology

- 3G- and 4G-enabled Samsung Tab 3 tablets
- Motorola “Moto G” Android 4.4 smartphones powered by Qualcomm® Snapdragon™ 400 platform with a 1.2 GHz quad-core CPU
- 3G and 4G network connectivity and data plans provided by TIM

Program Stakeholders

RIO PREFEITURA SAÚDE

SUS

MTM Tecnologia Software Solutions

Instituto TIM

Qualcomm wireless reach

[1] World Health Organization. World Health Organization – Chronic diseases and health promotion in Brazil http://www.who.int/nmh/countries/bra_en.pdf

[2] http://www.ibge.gov.br/english/estatistica/populacao/tabuadevida/2014/default.shtm

July 20, 2018

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Qualcomm believes access to advanced wireless technologies can improve people’s lives. Qualcomm Wireless Reach is a strategic initiative that brings wireless technology to underserved communities globally. For the last ten years, Wireless Reach has invested in programs that foster entrepreneurship, aid in public safety, enhance the delivery of health care, enrich teaching and learning and improve environmental sustainability, impacting over 11 million beneficiaries.

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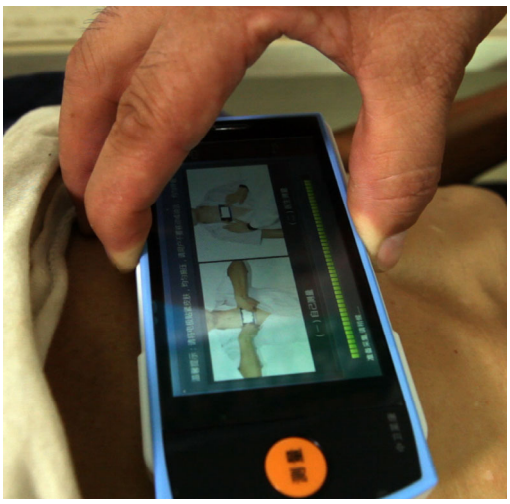

Wireless Heart Health

Mobile-enabled Rapid Cardiovascular Screening Improves Health Care for Rural Patients in China

The global health burden of cardiovascular disease (CVD) is on the rise and disproportionately affects rural residents. Researchers from the Shanghai Institute of Cardiovascular Disease recently concluded that "the morbidity and mortality of CVD in China are increasing persistently, although the government has taken an active part in the prevention and control of CVD."[1] In addition, early detection and consistent monitoring, accompanied by necessary treatment, have the potential to decrease health risks associated with CVD. To support the prevention and management of CVDs in China's rural communities, the Wireless Heart Health (WHH) program was launched in collaboration with Life Care Networks in 2011.

CHINA

2017 Statistics*

Population (est.)	1.37 billion
Life Expectancy	75.5 years
GDP Per Capita (2016 est.)	US$15,400
Mobile Penetration	89%

Challenge

- According to the World Health Organization, non-communicable diseases (NCDs) — including CVD — have placed a grave economic burden on countries.[2]
- China will lose $27.8 trillion USD in national income between 2012 and 2030 –amounting to over $1.5 trillion a year—due to the five main NCDs (CVD, cancer, chronic respiratory disease, diabetes, and mental health). CVD was one of two NCDs in the lead for most costly.[3]
- CVDs such as coronary heart disease, heart failure, and arrhythmia are the leading cause of death in China, responsible for approximately 2.6 million deaths annually. By 2020, deaths caused by CVD are projected to increase to 4 million per year.[4]

Solution

- WHH features a mobile broadband-enabled system developed by Life Care Networks.
- This system includes a smartphone with three built-in electrocardiogram (ECG) sensors comprising one-lead (or one angle of measuring the electrical activity of the heart), and an Electronic Health Record (EHR) platform that offers instant access to patient records, including ECG data.
- Providers hold the device to patients' chests for approximately 30 seconds while the ECG sensor collects their ECG data. The data is automatically stored in the patient's EHR and sent immediately over the 3G or 4G LTE wireless network for analysis by a cardiac specialist at the Life Care Networks Call Center, staffed around the clock in Beijing.
- The on-call cardiac specialists provide prompt feedback within minutes to clinic staff and patients via SMS or a phone call. Currently, the call center has 72 physicians and ten nurses triaging requests and providing rapid diagnosis around the clock.

*Sources: CIA World Factbook (https://www.cia.gov/library/publications/the-world-factbook); Mobile penetration data provided by Ovum World Cellular Information Service and based on market intelligence.

Impact

Over 2,300 Devices

To date, the program has deployed over 2,300 ECG-sensing smartphones.

Over 1,100 Clinics

There are over 1,100 community health centers and clinics actively using the ECG-sensing smartphones to screen patients and conduct remote consultation with the Life Care Networks Call Center.

Over 300,000 Patients

Over 300,000 patients across 21 provinces and direct-controlled municipalities have benefitted from the program.

Identifying Abnormal Data

About 360,000 pieces of ECG data have been sent through the devices. About 1/3 are abnormal ECG data, which alerts doctors that patients may need further screening, treatment, or more help managing their chronic condition.

6x Less Expensive

ECG-sensing smartphones are 6 times less expensive for patients than conventional 12-lead ECG machines.

Program Stakeholders

Life Care 中卫莱康 Networks 知护关爱平台

中国电信 CHINA TELECOM 世界触手可及

山海牛

摩美得制药 MOMENTUM PHARMACEUTICAL

QUALCOMM 10 YEARS Wireless Reach™

[1]Li, Hua et al. “Cardiovascular Diseases in China: Current Status and Future Perspectives.” IJC Heart & Vasculature, Volume 6, 25 – 31, March 1, 2015. http://www.ijcha-journal.com/article/S2352-9067(14)00069-4/fulltext#s0010

[2]Abegunde, Dele. “Essential Medicines for Non-communicable Diseases (NCDS).” World Health Organization. 20 Sep 2013. http://www.who.int/medicines/areas/policy/access_noncommunicable/EssentialMedicinesforNCDs.pdf?ua=1

[3]Bloom, David E., et al. “The Economic Impact of Non-Communicable Disease in China and India: Estimates, Projections, and Comparisons.” NBER Working Paper No. 19335. Aug 2013. http://www.nber.org/papers/w19335. Estimates are undiscounted in 2010 USD, and derived using the WHO's EPIC model of economic growth.

[4]National Heart, Lung, and Blood Institute. “China - The George Institute for International Health.” 27 Aug 2012. http://www.nhlbi.nih.gov/about/globalhealth/centers/china-center-of-excellence.htm

April 16, 2017

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KidzAlive Mobilized

Leveraging Mobile Technology & Creative Storytelling to Enhance HIV Prevention, Care and Treatment for Children and Adolescents

Great strides have been made in the fight against HIV and AIDS globally. This is especially true in South Africa, which has the world's largest HIV treatment program. However, largely due to social and structural barriers, children and adolescents are still being left behind. The KidzAlive Mobilized program aims to help fill the gap. Using wireless technologies, the program trains healthcare workers and empowers HIV-exposed and -infected children and adolescents, and their primary caregivers, to overcome barriers that prevent children from receiving HIV testing and treatment and to set them on the path to a healthy future.

South Africa

2018 Statistics*

Population	55.3 million
Life Expectancy	64.1 years
GDP Per Capita (2017 est.)	US$13,600
Mobile Penetration	157%

Challenge

- HIV/AIDS remains one of the largest international public health crises. HIV exacts a significant socioeconomic toll, particularly in countries with a high burden of the disease.
- An estimated three million children and adolescents (0-19 years) were living with HIV in 2017, nearly nine in 10 (87 percent) of whom live in sub-Saharan Africa. According to the World Health Organization, 73 percent of these vulnerable populations in sub-Saharan Africa are not receiving life-saving treatment.
- Fear and stigma keep many HIV-exposed children and adolescents from being offered an HIV diagnostic test. Primary caregivers and healthcare workers (HCWs) are often afraid to have children tested because disclosing a positive result without the appropriate training and tools can can be very traumatic for the adults and children alike.
- Evidence suggests that HCWs fail to provide young patients with HIV services, such as HIV Counseling and Testing (HTC), due to a lack of adequate knowledge, skills and confidence in dealing with children, adolescents and their primary caregivers on this topic.

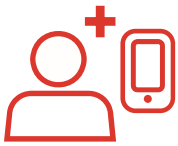
Solution

- The KidzAlive Mobilized program aligns with South Africa's 4th National Strategic Plan for HIV, TB and STIs 2017-2022. The plan prioritizes customized and targeted interventions to accelerate progress in reducing illness and death associated with HIV, TB and STIs among all key and vulnerable populations, including children and adolescents.
- The KidzAlive Talk tool, originally a paper-based HTC tool developed by Zoë-Life and widely used by the National Department of Health and community-based organizations, has been adapted into the KidzAlive Talk Tool App.
- The Talk Tool App is a job-aid, empowering HCWs to provide age-appropriate HIV education to children, adolescents and their primary caregivers. It helps ensure that children who are HIV-negative stay negative and that those who are HIV-positive are supported to lead healthy lives.

*Sources: CIA World Factbook (https://www.cia.gov/library/publications/the-world-factbook); US Census Bureau (https://www.census.gov/popclock/); Mobile penetration data provided by Ovum World Cellular Information Service and based on market intelligence.

- Through the App, children learn the heartwarming story of an animated frog, Sibusiso, as he discovers in a fun and non-threatening way his HIV status and the importance of adhering to his treatment. The App also features interactive games which keep the children focused and engaged throughout the counseling session.
- In a pilot study, 33 HCWs at private- and government-healthcare facilities in 11 sites in Gauteng and KwaZulu-Natal were provided Qualcomm Snapdragon™-enabled Lenovo Tab 4 10 tablets loaded with the Talk Tool App, as well as ongoing training and mentoring on their use. The HCWs used the App to provide age-appropriate HTC, status disclosure and health education to children and adolescents and their primary caregivers at clinics, during home visits and in early childhood development centers.

Impact



Improvement in Provider Confidence

After receiving training on the App, HCWs in the pilot study experienced a 62 percent increase in confidence and competence in providing age-appropriate, children-centered counseling, disclosure and care for HIV-exposed and -infected children.

Increased Uptake of HIV Testing

Primary caregivers participating in the pilot study were more willing to give consent for their children and adolescents to receive HIV testing and counseling.

Retention of Information

The interactive games offered on the App increase children's retention of information and leads to a safer, more positive understanding of their HIV status.

Effective Identification of HIV-Positive Patients

In the pilot study, 280 children and adolescents were provided HIV testing and counseling via the App. Seven percent of these patients were identified as HIV-positive, far exceeding the national average of two percent.

Strengthened Access to Treatment & Care

100 percent of children and adolescents who tested positive in the pilot were referred to a clinic for HIV care and treatment services.

Program Stakeholders

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February 14, 2019