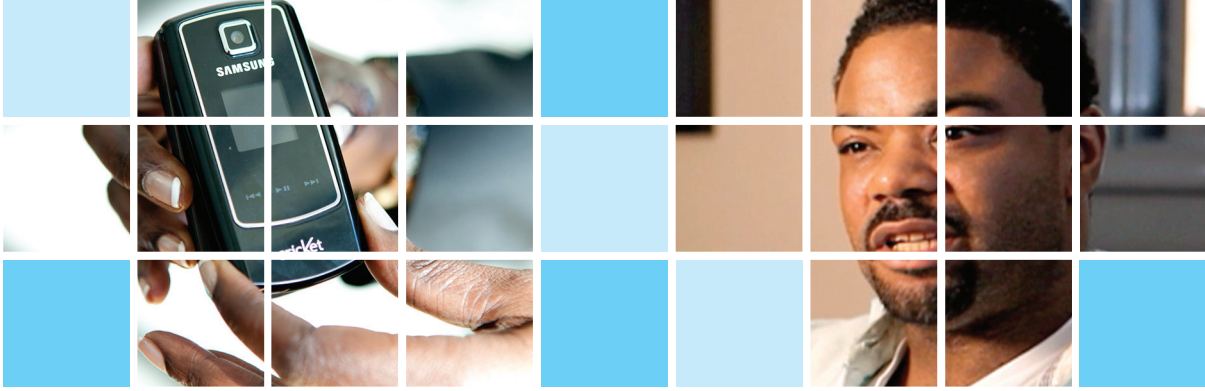
Wireless Reach™
from Qualcomm



Health Care | Education | Entrepreneurship | Public Safety | Environment

Partners

- Cricket Communications
- George Washington University Medical Center
- One Economy Corporation
- VOCEL

2011 Statistics

- Life expectancy: 78.5 years
- Population: 313,847,465
- GDP per capita: US$48,100
- Internet penetration: 78.3%
- Mobile penetration:

Sources: CIA World Factbook (https://www.cia.gov/library/publications/the-world-factbook); Mobile penetration data provided by Informa UK Limited and based on market intelligence. Internet penetration data provided by www.internetworldstats.com and based on data published by Nielsen Online, the International Telecommunication Union, GfK, and local regulators.

Case Study

Medication Adherence and mHealth: The George Washington University and Wireless Reach Pill Phone Study

For urban, underserved hypertensive patients, poor medication adherence rates and low patient engagement can result in uncontrolled blood pressure and potentially serious complications. With a grant from Qualcomm's Wireless Reach,™ the George Washington University Medical Center conducted a research study to determine if the Pill Phone™ mobile application can improve medication adherence in underserved hypertensive populations. Collaborators included Cricket Communications, One Economy and VOCEL.

Challenge

- Hypertension has been estimated to affect over 65 million adults in the United States. Slightly more than 50 percent of hypertensive individuals are on treatment and approximately one third of treated patients still do not achieve blood pressure control below 140/90 mmHg.[1]
- Blood pressure control in patients with hypertension is often inadequate, particularly in underserved populations. In the United States, Medicaid insured patients in urban medical clinics have a high prevalence of uncontrolled hypertension, and increased rates of morbidity and mortality (e.g. heart attack, stroke, renal failure, death).[2]
- Poor adherence to blood pressure medications is a major cause for failure to control hypertension. Studies have shown that patients with high blood pressure often take only 40-60 percent of prescribed pills. Medication adherence is of particular concern in underserved populations.

Solution

- The George Washington University and Wireless Reach Pill Phone Study (Study) aims to improve health outcomes for hypertensive patients in underserved urban communities by examining how 3G wireless technology may improve medication adherence rates and consequently, improve health outcomes.
- Methods to increase adherence and improve blood pressure control through self-monitoring by telephone or other electronic media have shown promise for improving clinical outcomes.[3]
- The Pill Phone mobile application has potential to improve medication adherence, by increasing patient engagement and empowering patients to participate in their own disease management. Improved adherence is associated with improved blood pressure control, which results in fewer complications such as heart attack or stroke. Patients, doctors, nurses, and the project research team had the ability to use the Pill Phone wirelessly with Qualcomm's 3G technology offered through Cricket's 3G EV-DO network.
- This Study was conducted over a seven-month period with 50 Medicaid patients who were recruited from the internal medicine, renal/hypertension, and cardiology clinics of the George Washington University Medical Center in Washington, DC. The candidates were randomly selected from a pool of 350 patients and were invited to participate in the program. The first 50 eligible patients who agreed to participate were enrolled after giving written consent.

The Technology

- Wireless connectivity via Cricket's 3G EV-DO network.
- 3G mobile phones enabled by Qualcomm chipsets.

A patient uses the Pill Phone application.

- Mobile Pill Phone application based on Brew®, J2ME, and iOS® operating systems - The Pill Phone application offers many benefits to patients, such as the ability to receive visual and audible medication dosage reminders, tracking and storage of dosage records, image displays of prescription pills, and access to realtime information about potential drug side effects and interactions.
- Pill Phone Web application – This application allows a nurse to use a computer or phone keyboard to enter the name and dosage of patient medications, along with the time they need to be reminded to take each pill. Additionally, the nurse has access to an online dosage diary for the purpose of tracking patient medication adherence in order to intervene if necessary.

Impact

- Patients were taking an average of three blood pressure medications and eight total medications. They had low health literacy with 43 percent of patients at an 8th grade reading level or below.
- Participants were also non-adherent to medications by self-report. Follow up was obtained on 48 of 50 patients. The patients in the Study showed a high level of acceptance and sustained use of the Pill Phone application.
- Only 6 percent of patients turned off the Pill Phone alarms during the course of the study. A survey following the pilot indicated that participants were generally satisfied with the medication reminder software.
- On average, patients agreed or strongly agreed that having the Pill Phone made it easier to keep track of their medications and indicated they would use the Pill Phone or similar program in the future.
- There was a trend toward increased prescription refill rates with the use of the Pill Phone application and a decrease after the application was discontinued.
- When patients were asked to rank their medication adherence on a scale from 0-44, with higher scores indicating better medication adherence; the mean pre-study score was 2.4. When asked to rank adherence after the study the score rose to 3.2, which is a statistically significant increase.
- Larger studies with longer follow up periods have the potential to discover if similar mHealth systems improve health outcomes and are cost-effective.

Project Partners

- **Cricket Communications** provided mobile handsets and 3G data plans for the 50 participating patients
- **The George Washington University Medical Center** designed, conducted and analyzed the Study
- **One Economy Corporation** is a global nonprofit organization that aided in patient recruitment, study design and execution, and project management
- **VOCEL** developed the FDA cleared Pill Phone application
- **Wireless Reach Initiative from Qualcomm** acted as the primary funder and provided project management support

[1] Hajjar I, Kotchen TA (2003) Trends in prevalence, awareness, treatment, and control of hypertension in the United States, 1988-2000. JAMA 290:199-206.

[2] Krousel-Wood M, Thomas S, Muntner P, Morisky D. (2004) Medication adherence: a key factor in achieving blood pressure control and good clinical outcomes in hypertensive patients. Curr Opin Cardiol;19:357-362.

[3] Wetzels GE, Nelemans PJ, Schouten JS, et al. (2007) Electronic monitoring of adherence as a tool to improve blood pressure control. A randomized controlled trial. Am J Hypertens 20(2):119-125.

[4] SMS survey results pre and post intervention; 46 patients had both pre and post intervention data.

Wireless Reach Initiative™ from Qualcomm

Qualcomm believes access to 3G and next-generation mobile technologies can improve people's lives. Qualcomm's Wireless Reach initiative is a strategic program that brings wireless technology to underserved communities globally. By working with partners, Wireless Reach invests in projects that foster entrepreneurship, aid in public safety, enhance the delivery of health care, enrich teaching and learning and improve environmental sustainability. For more information, please visit www.qualcomm.com/wirelessreach.