



PROJECT OVERVIEW: DULCE WIRELESS TIJUANA

EMPOWERING COMMUNITIES TO PROMOTE DIABETES CARE AND PREVENTION THROUGH 3G TECHNOLOGIES

Dulce Wireless Tijuana empowers underserved communities to utilize 3G wireless technology to effectively monitor and treat diabetes. The project involves partners from both the United States and Mexico who represent the public, private and non-profit sectors. The solution combines mobile applications, web applications, mobile phones, netbooks, laptops, diabetes educational content, and health care worker and patient training to create the Dulce Wireless Tijuana system. All these components offer many benefits to the health care workers such as the real-time ability to locate and receive confidential access to patient information, manage patient appointments, and review training curriculum. Patients are also able to review diabetes information online including instructional videos, participate in interactive surveys that help their providers learn how they are managing their diabetes, and receive notifications from an alert system. Patients, doctors, nurses, promotoras (community health workers) and the project's research team will have the ability to access this information wirelessly with Qualcomm's 3G technology offered through Iusacell's 3G EV-DO network.

In addition to technology, this project introduces several innovative and cost-effective strategies. One example is providing peer education through working with promotoras that belong to the patients' communities and understand their culture. Promotoras are able to educate the patients close to their homes and work, making this a more effective patient-centered approach. Another example involves creating a multidisciplinary team of doctors, nurses, social workers, dieticians and promotoras. All these professionals share specific responsibilities to ensure well coordinated and high quality of care for the patient. Lastly, an alliance of various organizations from the public, private, academic and non-profit sectors are all leveraging resources towards the common goal of better diabetes care and prevention.

This project is a research study with 360 patients in total. 180 were randomly selected to be part of the control and the other 180 patients will participate in Dulce Wireless Tijuana for an initial period of 10 months.

The Need

- Currently, chronic diseases, like diabetes, are the first cause of mortality in the world.¹ The prevalence of diabetes has increased both in developed and developing countries.^{2,3}

¹ Nicholls ES. Temas de actualidad. Diferenciales de mortalidad en las enfermedades no transmisibles según el nivel socioeconómico: El caso de América Latina. Bol Oficina Sanit Panam 1993;115:255–269



- In less than four decades diabetes has become the most prominent public health problem for Mexico⁴ and is the first cause of premature disability, including blindness and renal failure.⁵
- Studies show that diabetes in Mexico has increased 25% over the last seven years and that 14% of the population with diabetes is younger than 40 years old.^{6 7}
- According to the first U.S.-Mexico Border Diabetes Prevention and Control Project, “among the 7.5 million persons 18 years and older living at the U.S.-Mexico border, 15.7%, or approximately 1.2 million, have diabetes. Of these adults, 500,000 live on the Mexican side of the border and about 700,000 live on the U.S. side.”⁸
- In particular, IMSS clinic #27 in Eastern Tijuana, the main site of this project, has a total of 26,054 patients with diabetes and over 41,653 have been diagnosed with hypertension.⁹
- Many patients in Baja California have limited access to primary care services and disease management programs because they live too far away from clinics and transportation is difficult. This lack of access exacerbates chronic diseases, like diabetes, since they require continuous monitored care.
- Furthermore, providers have limited tools to communicate with patients to constantly monitor their disease. The current health system relies on patients visiting the clinic and does not provide convenient options for accessing services or education in their communities.

The current epidemic of chronic illness, including diabetes, in northern Mexico and around the world highlights the urgent need for innovative, efficient, technology-supported interventions to fight and prevent these diseases. Dulce Wireless Tijuana is an example of how to use wireless technology in

² Pan American Health Organization/World Health Organization (1997) Celebrating 95 years: 1902–1997 – Protecting the Americas’ Health. Diabetes cases in the Americas expected to jump from 30 million to 45 million. PAHO/WHO, Washington, DC

³ King H, Aubert RE, Herman WH (1998) Global burden of diabetes, 1995–2025. Prevalence, numerical estimates and projections. *Diabetes Care* 21:1414–1431

⁴ [Vázquez-Martínez JL](#), [Gómez-Dantés H](#), [Fernández-Cantón S](#). Diabetes mellitus in an adult population of the IMSS (Mexican Institute of Social Security). Results of the National Health Survey 2000. *Rev Med Inst Mex Seguro Soc*. 2006;44:13-26.

⁵ [Velázquez-Monroy O](#), [Rosas Peralta M](#), [Lara Esqueda A](#), [Pastelín Hernández G](#), [Sánchez-Castillo C](#), [Attie F](#), [Tapia Conyer R](#). Prevalence and interrelations of noncommunicable chronic diseases and cardiovascular risk factors in Mexico. Final outcomes from the National Health Survey 2000. *Arch Cardiol Mex* 2003;73:62-77:

⁶ Dirección de Finanzas y Sistemas. División de Sistemas de Informática Médica y Proyectos Especiales. Instituto Mexicano del Seguro Social, 1998. [Albertorio-Díaz JR](#), [Notzon FC](#), [Rodríguez-Lainz A](#). Diabetes hospitalization at the U.S.-Mexico border. *Prev Chronic Dis*. 2007;4:A28.

⁷ [Zonana-Nacach A](#), [Castillón-Chapa MA](#). Frequency of the metabolic syndrome among overweight and obese patients in a primary health care facility in northern Mexico. *Gac Med Mex* 2006;142:299-301

⁸ The U.S.-Mexico Border Diabetes Prevention and Control Project, First Report of Results. (2004) <http://www.infofrontera.org/lildbi/docsonline/fep002607>, Accessed on Sept 9, 2010

⁹ IMSS Clinic 27 Registry from SIAIS System.



diabetes management to improve patient care for marginalized communities—not just in Baja California, but throughout Mexico, Latin America and the world.

How it Works

Dulce Wireless Tijuana combines the expertise of all the partners and addresses the need for innovative diabetes treatment by utilizing Qualcomm 3G technology over Lusacell's EV-DO network to augment staff training, extend the reach of clinicians, improve follow-up care and facilitate inter-institutional collaboration. The system works by consolidating and centralizing patient information over the 3G wireless network and extending education to communities via wireless 3G access and community classes. Patients, promotoras, nurses, and doctors access the system via mobile devices such as cell phones, smart phones, netbooks and laptops. The system provides the following benefits via 3G:

- **Electronic Diabetes Management Health Record:** Designated health care workers can locate and receive confidential access to a patient's medical chart via a computer or laptop anytime anywhere using 3G Internet access.
- **Manage Patient Appointments:** Health care workers can manage health data and patient appointments using a customized web application. The system sends automatic reminders to patients of upcoming appointments with doctors, clinical tests or classes via cell phone.
- **Access to Diabetes Care Content:** Patients use cell phones to access videos and health education on key diabetes self-management topics.
- **Interactive Surveys:** The system sends automatic questionnaires to patients to monitor how they are managing their diabetes. Patients respond and their responses are instantly available in the wireless database for the health care providers to review.
- **Notification and Alert System:** Promotoras, nurses and doctors can send email and text messages to patients. Alerts are turned on when patients report significantly out of range indicator levels or when the system identifies lack of adherence to appointments, tests or classes. These alerts appear in the health care workers' database for their immediate review and follow-up.

The Technology

- Wireless connectivity via Lusacell's 3G BAM™ network
- 3G enabled mobile devices using Qualcomm chipsets
- Specialized web application
- Specialized mobile application using Lusacell's Geocontrol™ based on Brew®
- Glucose meters, from Entrahealth, able to download glucose levels to the project system



Project Partners

- The Autonomous University of Baja California's School of Medicine (UABC) oversees academic and evaluation aspects of the project and provides administrative support.
- Fronteras Unidas PRO SALUD manages the promotoras and directs community-outreach coordination in underserved areas.
- Instituto Mexicano del Seguro Social (IMSS) Clinic #27, a Primary Health Care Delivery Institution, serves as the main implementation/operation site where clinical care is provided to patients.
- The International Community Foundation (ICF) serves as the fiscal agent providing evaluation oversight, develops and oversees a financial sustainability plan and fosters private and international funding. Its sister organization, la Fundación Internacional de la Comunidad (FIC) is facilitating Mexican charitable giving to support the project by providing the fiscal due diligence and programmatic support making the in-kind contributions possible.
- Iusacell has donated the mobile devices and applications and is providing the 3G connectivity.
- Qualcomm's Wireless Reach™ initiative is the main project funder.
- The Scripps Whittier Diabetes Institute (SWDI) provides trainings on diabetes on the successful Project Dulce™ Chronic Disease Management Model, develops technical manuals and prepares the project evaluation framework.