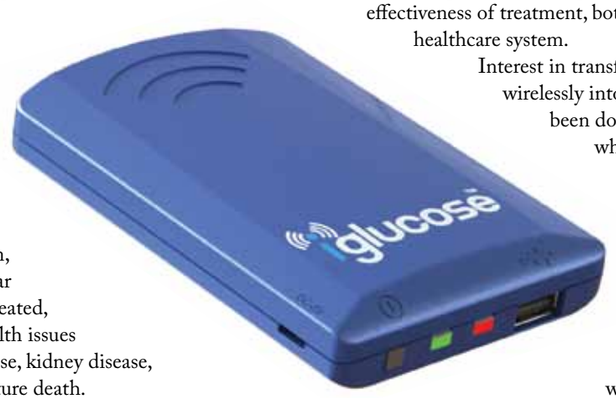
GLUCOSE MONITORING GOES MOBILE

DIABETES: A GLOBAL PROBLEM WITH PERSONAL IMPACT.

The number of adults diagnosed with diabetes has exploded throughout the last 30 years. According to a new international study published in the British journal, *The Lancet*, on June 25, the number of adults with diabetes is 247 million worldwide, with 138 million in China and India. The U.S. alone had 24.7 million diabetics in 2008. Jointly funded by the Bill and Melinda Gates Foundation and the World Health Organization, the study found diabetes has increased or remained the same in every part of the world, raising global concerns.

"Diabetes is a long-lasting and disabling condition, and it's going to be the largest cost for many health systems," says Majid Ezzati, professor of global environmental health at Imperial College London, a lead author of the study.

Diabetes is a chronic condition stemming from the body's inability to produce, or properly use, insulin, which is needed to convert sugar (glucose) into energy. Left untreated, diabetes can lead to serious health issues including blindness, heart disease, kidney disease, nerve damage, and even premature death.



MONITORING IS KEY TO BETTER HEALTH

Fortunately, with modern medical care, most people with diabetes can manage their condition and live normal, healthy lives. To stay on top of diabetes, however, patients need to closely track their blood glucose levels.

"For people who have diabetes to get the best care, it is helpful for their healthcare professional to understand the blood glucose level trends that occur on a daily basis," says Mary Ellen Harrison, vice president, PositiveID Corp. "For most people today, the only way to do this is to keep manual logs of glucose levels and take those records to their doctor. Unfortunately, because the process is so time consuming, few people actually do it."

So just how onerous is the daily monitoring? For people with diabetes, blood glucose monitoring using a drop of blood and a portable glucometer is required several times a day. Initially, testing may be required as frequently as four times daily until glucose levels are under control and fall within the normal range of 4-8mmol/l. Depending on the treatment plan, testing may be recommended first thing in the morning, before or after meals, and at bedtime.

This data is analyzed by healthcare providers to identify spikes or dips in glucose levels, which can be addressed through changes in meal plans, medicine, or exercise programs.

GETTING DATA TO THOSE WHO CAN HELP

But what happens when a patient fails to record or loses his/her data? Or for that matter, what if the patient is receiving care remotely, for instance in rural areas of China or India? Many patients rely on what they can recall from memory, which is often incomplete at best. Automating delivery of this data to the healthcare provider could greatly increase efficiency and effectiveness of treatment, both in the home and in the healthcare system.

Interest in transferring glucometer data wirelessly into health record systems has been documented as early as 2005, when the Norwegian Center for Telemedicine built a prototype system. This system used an in-house-developed Bluetooth module connected to a glucometer to send data to a cellphone, which in turn transmitted the data over the wireless network via SMS to a preset telephone number. One conclusion from this study was that use of GPRS/3G should be considered instead of SMS, to lower the cost of operation.

That problem has now been solved with the introduction of iglucose from PositiveID. iglucose addresses the "mismanagement" of diabetes by providing access to live data and realtime notifications. It facilitates both management of the condition and monitoring of compliance to a treatment plan.

iglucose comprises a smartphone-size device that connects to most data-capable glucometers, and a secure cloud-based database. Blood sugar readings are sent wirelessly from the device to the database over the GSM cellular network. Once entered into the database, automated assessment of levels can occur and data can be sent via SMS or email to health providers or family members.

This could enable, for instance, parents to monitor a child's compliance throughout the day. Trend reports can also be automatically faxed to a healthcare provider. A Web-based application gives users secure access to their data, the ability to generate logbooks and trend reports, as well as control over where their data is sent.

The product is simple to use. The first step is to enroll online to get an iglucose account. Then, after taking a glucose reading, the glucometer is connected to the iglucose device. A green light on the device flashes to confirm the data has been uploaded via a secure VPN connection. Once in the database, trend reports, logbooks, and alerts can be generated and forwarded as configured by the user.

The product achieves this seamlessly, without the need for a PC, cellphone, or even a cellular data plan.

IT TAKES TWO TO TANGO

In order to free the data trapped in glucometers, PositiveID needed to find a way to provide secure, reliable cellular connectivity. To achieve this, the company looked for a cellular technology partner with international reach and proven technology. Equally important was the need for comprehensive support throughout the development process.

"This is an accessory to a medical device, so high quality is critical," explains Harrison, "We also need a wireless module that provides good battery life in a small footprint to keep the form factor small. To make iglucose accessible to the most possible users, we also want to keep the price low, without sacrificing quality."

After considering several cellular suppliers and completing an exhaustive analysis, Sierra Wireless AirPrime embedded modules emerged as the ideal solution.

The iglucose device uses Sierra Wireless AirPrime embedded GSM modules to communicate with the cloud-based iglucose database. The AirPrime embedded modules integrated seamlessly, and with support from Sierra Wireless, PositiveID had a working product to demo in less than three months. Also, as AirPrime embedded modules are already certified and deployed in more than 30 countries, choosing Sierra Wireless helps accelerate time to market.

"Anytime someone contacts us about deploying iglucose in a new country, we find that the Sierra Wireless module is already approved with the local carrier," says Harrison. "We recently had an opportunity in Brazil. Within two weeks of the initial inquiry, we received confirmation that the AirPrime GSM module was approved and ready for sale there.

"When you are submitting a medical device for approval to the U.S. Food and Drug Admin., it's very important that you choose high-quality suppliers," says Harrison. "It's very helpful to partner with a company like Sierra Wireless that has so much credibility in this technology."

iglucose is one of several innovative products being developed by PositiveID to improve healthcare and quality of life through wireless communication for people with diabetes. It will be the first to be submitted for FDA approval in mid-2011.

Though refrigerators still can't order milk, PositiveID and Sierra Wireless are making life easier for people with diabetes around the world.

More information on PositiveID and iglucose can be found at www.positiveidcorp.com *and* www.iglucose.com

iglucose from PositiveID uses embedded GSM modules from Sierra Wireless to communicate patient data to a iglucose database in the cloud.

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To find out more about Sierra Wireless solutions for healthcare, please visit www.sierrawireless.com/healthcare