

Tracking Down Diabetes

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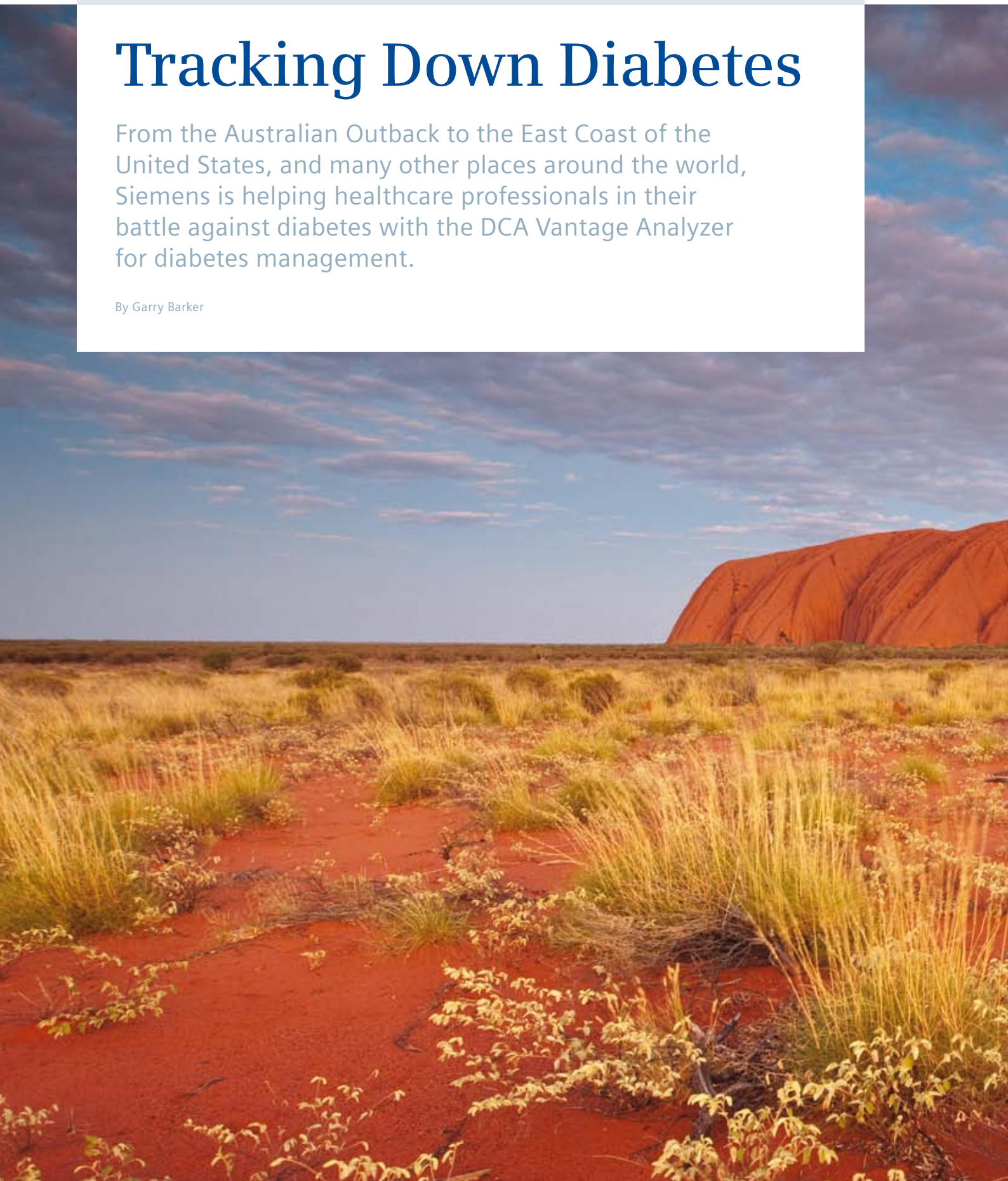
SIEMENS

The Australian Outback is home to one of the oldest civilizations on earth, the Australian Aboriginal people – a population with a high incidence of diabetes.

Tracking Down Diabetes

From the Australian Outback to the East Coast of the United States, and many other places around the world, Siemens is helping healthcare professionals in their battle against diabetes with the DCA Vantage Analyzer for diabetes management.

By Garry Barker





Australia's outback is vast, dry, red, remote, wild, and hypnotically entrancing. By day, it glows with intense colors. At night, a myriad of stars shine from a sky as clear as crystal. Its heat in the day can scorch your skin, and at night, you may have to huddle under blankets from the cold. Its vast expanses are dusty dry, but sudden storms can send wild torrents of water down its ancient creek beds. And, from the outback's huge store of buried minerals, from iron ore to uranium, it is, for all its emptiness, one of the richest places on earth.

It is also home to one of the oldest civilizations on earth, the Australian Aboriginal people, whose close links with this harsh land began thousands of years before time was measured. Their communities are often remote, hundreds of kilometers from civilization.

HbA1c Testing

Glycosylated hemoglobin, or HbA1c, is formed when glucose in the blood binds with hemoglobin (the protein in red blood cells that carries oxygen). The level of HbA1c in the blood is directly related to the level of blood glucose. HbA1c levels do not change quickly, due to the life-span of red blood cells, and so this test provides an indication of the average blood glucose over a period of three months. HbA1c measurements are used in the management of diabetes to monitor glucose control and to aid treatment decisions. If diabetes is not well controlled, the average blood glucose levels will be high and the HbA1c measurement will be over the acceptable limit; generally seven percent. Conversely, if diabetes is well controlled, the HbA1c measurement will fall on or below an acceptable limit.

“We know our results are sound and we have seen significant falls in HbA1c levels in diabetes patients within and between communities.”

Mark Shephard, PhD,
Flinders University, Adelaide, Australia

Jamaica Plain, just outside Boston, Massachusetts, is crowded and urban, yet it shares problems with the Australian outback. And one of them is diabetes. The Australian outback and Jamaica Plain are just two of many places worldwide where incidence of diabetes is disproportionately high.

Enter Siemens DCA Vantage™ Analyzer, an instrument that allows tests for the management of patients with diabetes to be done during the patient visit, with results available within as little as six minutes. Treatment can be prescribed at time of testing rather than days later, as is usually the case with laboratory tests. In the outback, as in Jamaica Plain, this is a critical point, for in both cases, healthcare professionals say their biggest problem is getting people to return.

The globally increasing incidence of diabetes, which can lead to kidney failure, damage to eyesight, loss of limbs, and death, can be fostered by a poor diet, low socioeconomic status, obesity, malnutrition, and alcoholism.

Point-of-care Testing

The Australian point-of-care diabetes program, now regarded as leading the world in remote-area medicine, began with a chance meeting on a bus near Ayers Rock in the red center of Australia nearly 12 years ago. It is now one of the world's largest diabetes and kidney disease programs, with 115 assessment sites now working across the country and plans to expand to 170 sites by 2013.

Associate Professor Mark Shephard, PhD, of Flinders University in Adelaide, South Australia, the medical scientist who set up and still leads the project, had worked with the DCA 2000R+ Analyzer (the predecessor of the DCA Vantage Analyzer) in an earlier program in Coober Pedy, a famous opal mining site in the far north of the South Australian outback.

Back in 1998, because of that interest and his fascination with the outback, Shephard decided to attend a conference on kidney disease among Aboriginal people held at a resort hotel near Ayers Rock, a huge, iconic rock near Alice Springs known to Aboriginal people as Uluru. “We were going by bus to a conference dinner,” says Shephard. “I knew no one in the group, so I just found a seat and began chatting with the person next to me. She turned out to be with the Australian government health department, which, unknown to me, was interested in point-of-care testing among indigenous people.”

As they talked, the two found a lot of common ground. “She told me that the National Diabetes Strategy had recommended a trial of the Siemens DCA 2000R+ Analyzer in outback healthcare centers, but [they] did not know who had experience using it in those conditions,” says Shephard. “I told her that we had used it for renal testing, and could help.”

That chance meeting on a bus in the outback led a year later to the setting up of QAAMS (Quality Assurance for Aboriginal and Torres Strait Islander Medical Services), Shephard's thriving,



Mark Shephard set up the Australian point-of-care diabetes program.

nationwide point-of-care program that now operates in the major Australian cities as well as the outback. "We have developed a sustainable model, whereby we can educate and train Aboriginal health workers to perform testing on-site, carry out quality management of the devices, and provide support services around Australia to help them manage their diabetes patients," he says.

And, just as in Jamaica Plain, where Regina Policastro runs an incredibly busy unit with two DCA Vantage Analyzer units performing 50 or more tests a week, the work in Australia is helping fight diabetes. In Jamaica Plain, for example, the hemoglobin A1c (HbA1c) levels have dropped from an average of more than 8.8 percent to 7.3 percent. Southern Jamaica Plain Health Center, a community health center licensed by Boston's Brigham and Women's Hospital, has been in operation for more than 30 years. Its patient population tends to be of low socioeconomic status, predominately Latino, with a significant mix of African-American and Caribbean

people. "Diabetes is a big problem with this cohort," explains Policastro. "We see a lot of patients here. It is now 11:00 a.m. and I have seen 15 since 8:30 a.m."

"Coupled with an education program, and because of the ease and efficiency of conducting the test, awareness of the dangers of untreated diabetes is growing in the community," she says. Before the Siemens analyzers were deployed, Policastro had the same problem experienced in outback Australia: People did not return for the results. "Tests are done on the spot. There is reduced possibility of getting specimens mixed up or lost. If you can do it on-site, you do it, it's done, it's over. The doctor has the numbers right there, in the computer, before the patient sits down. The DCA Vantage Analyzer is an excellent system."

The point-of-care test has saved money because early detection helps avoid serious problems. "Cost is lower when the patients don't wind up in the emergency room," says Policastro. "And the pediatrics department is starting to test their kids now, which they did not do a year ago."

The work environments for Jamaica Plain and the Australian outback are certainly different. Policastro's program is intense, urban, and crowded.

Shephard's program, now the largest in the world, certainly geographically, involves distance and a challenging environment. But the human problems in both places are almost identical.

Quick and Accurate Results

So how did a medical scientist born and bred in suburban Adelaide come to build a world-leading chronic disease program that operates principally in remote Australia?

"I have always been fascinated by Australia's deserts," says Shephard. "I have traveled over many of them and have written several books. Through that, I took an interest in Aboriginal culture. I met people, particularly the elders, who were very proud of their land, but I also saw incredible poverty and ill health. So, I wondered if we could use the point-of-care systems we had at Flinders Medical Centre to help deal with the



Southern Jamaica Plain Health Center, just outside Boston, runs a busy diabetes unit, performing 50 or more tests a week.

chronic disease in those communities. I started with just an idea in my head and a piece of paper in my hand—with no funding support.”

Some persuasion of management led to his first project at the Umoona Health Service at Coober Pedy, using the Siemens DCA 2000R+ Analyzer test. “It’s an excellent system. It just needs a finger-prick of blood and it produces results as accurate as a pathology lab within six minutes,” says Shephard. “So patients can get their results and see the doctor while they are in the clinic. They don’t have to come back a week later. They don’t have to have a blood sample taken out of their arm and sent off to a laboratory that might be 600 or even 1,000 kilometers [370 to 620 miles] away, wait for the result, and return to see the doctor to get their treatment prescribed. The patient can be treated on the spot.”

The DCA Vantage Analyzer can work in very remote communities. “The greater the geographical isolation and distance from pathology services, the more the

point-of-care system shows its value,” says Shephard. Damage to blood samples caused in transit or by heat and time is avoided. Point-of-care testing helps overcome Aboriginal cultural issues. Many have social and family issues, which take priority and make it difficult for them to return to get the results of a laboratory test taken a week or more ago. The immediacy of the DCA Vantage HbA1c test also helps patients retain “ownership” of their sample and involvement with their treatment.

“When we started this work, we did not know whether the Siemens system could handle the difficult conditions,” admits Shephard. “But we have found over our 12-year journey that it fits beautifully with indigenous health. For Aboriginal people to see their blood sample go into the analyzer and see the result pop up six minutes later means a lot to them in terms of motivation. When their blood sample was taken in the traditional way, with a needle in the arm, then sent to a lab, and they waited a week for the result, they would lose interest,” he says.

“The other component of the program is training Aboriginal health workers to do these tests,” he adds. “That empowers them in their work and the community. We have a quality management program and regularly send samples to participating sites to check that the analyzer is giving the correct result.”

Shephard says the outback conditions put the DCA Vantage Analyzer to the test, “but we get tremendous support from Siemens to keep everything running well. Siemens professionals have also been closely involved with us over the past ten years, providing all the support we could possibly want.”

Shephard says the flexibility and portability of DCA 2000R+ and DCA Vantage Analyzers is a great advantage. “They weigh only about five kilograms [11 pounds] and stand on a table,” he says. “They can be put in the back of a car and taken to where the people are. We have used them at health promotion and nutrition days and at country agricultural shows. We also used them in a large trial from 2005 to 2007 in general practices—

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Regina Policastro, Lab Supervisor, Southern Jamaica Plain Health Center, Jamaica Plain, Massachusetts, USA

urban, regional, and remote. Point-of-care testing is now a major movement, nationally and globally. The work we have done has contributed significantly to the Australian government being so interested in point-of-care testing.”

Improved Diabetes Control

115 DCA systems have been deployed across Australia; 36 are DCA Vantage systems. Siemens and the QAAMS team, working with a software company, have developed a connectivity package that enables anonymous patient results from any machine anywhere in Australia to be sent via a secure Internet link to a central data station, where results can be collated and analyzed on a national basis to increase knowledge of diabetes and renal disease. Shephard says that QAAMS intends to eventually upgrade all sites to the DCA Vantage system.

“One of the clear outcomes of this program is its clinical effectiveness,” Shephard points out. “We know our results are sound and we have seen significant falls in HbA1c levels in diabetes patients within and between communities. The program fits beautifully with the way indigenous healthcare is delivered. Visiting the community clinic is now a social event for the people. They usually know the Aboriginal health workers, they chat about family and social issues, and within six minutes, their test result is on the screen. They see the doctor, have their treatment adjusted – all done in one pleasant visit. They are motivated, and diabetes control is improved in these remote communities.”

The prevalence of diabetes is between three and four times higher among Aboriginal people, in any age group, than among Australians of Western ethnic origin. The prevalence of diabetes in some Aboriginal communities is between 30 and 50 percent, and the death rate about 12 to 17 times higher. Nearly half of all cases of end-stage renal disease in Aboriginal people are directly related to diabetes.

Shephard says poor housing and living conditions exacerbate the problems. Arranging dialysis for a person with kidney failure in a remote community is very difficult, if not impossible. “Unfortunately, the survival rate for Aboriginal people on dialysis is not good. Early detection is absolutely vital.”

Aboriginal people have experienced some of the worst effects of diabetes. “Babies may start disadvantaged, and, as teenagers, they continue to be exposed to a poor diet,” notes Shephard. “We are finding that Aboriginal people are getting Type 2 diabetes in their 30s, around ten years earlier than non-Aboriginal people. Worse yet, the rates of newly diagnosed diabetes in adolescent children, including Type 2, are increasing significantly. It’s the same in the Western Pacific, and Canada has similar problems among its indigenous people,” he adds. “Diabetes is a global problem. We are now getting calls from other countries to set up point-of-care testing, and we are doing all we can to help.”

Dr. Shephard wishes to acknowledge the long-term support QAAMS has received from the Australian Government’s Department of Health and Ageing, as well as the contribution of the RCPA Quality Assurance Programs Pty Ltd to the success of the program.

Summary

Challenge:

- Reaching populations in remote or disadvantaged areas worldwide where the incidence of diabetes is disproportionately high
- Getting results to patients immediately to allow for proper treatment and follow-up

Solution:

- Point-of-care testing and diagnosis programs for diabetes patients worldwide with Siemens DCA 2000R+ and DCA Vantage Analyzer
- Counseling at the time of testing
- Educate and train staff to perform quality management of the devices and provide support services

Result:

- Patients motivated to become more compliant with their diet and testing routine, and diabetes control improved in remote communities
- Awareness of the dangers of untreated diabetes growing, thanks to an education program, and due to the ease and efficiency of the test
- At Southern Jamaica Plain Health Center, HbA1c levels decreased from more than 8.8% to 7.3%, leading to a reduction in long-term treatment costs and improved patient health
- Performance of DCA Vantage point-of-care analyzer equal to a laboratory test in accuracy

Garry Barker, based in Melbourne, Australia, specializes in business, technology, and healthcare. He has worked in Australia, New York, and Southeast Asia for the Melbourne Herald, and was group foreign editor for the Herald and Weekly Times Ltd before being posted to London as editor and chief of the bureau, covering Europe and the Middle East. He is currently technology editor of The Age, Melbourne’s premier morning newspaper.

Further Information

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