

Rural Kenya Adopts Wireless Technology and Unique Medical Map to Improve Patient Care and Student Education

Executive Summary

CUSTOMER NAME

Kijabe Hospital, Kenya

INDUSTRY

Healthcare

BUSINESS CHALLENGES

- Improving patient care by providing clinical staff with access to current medical information and best practice
- Supporting the hospital's post-graduate education programs

SOLUTIONS

- Online medical reference tool, the Map of Medicine, piloted in the hospital and two health centers using ruggedized PDAs
- Cisco wireless network deployed in the hospital

BUSINESS RESULTS

- Preliminary evidence that access to relevant information improved diagnosis and treatment at the point of care
- Improved staff morale
- Plans to set up wireless broadband links between the hospital and the health centers and to localize the Map of Medicine for Kenya

Many medical professionals in developing countries do not have access to the knowledge they need to diagnose and treat patients in the most effective way. Their personal training and options for continuing professional development also suffer, which further affects patient care. Yet relevant and up-to-date information is essential for effective healthcare delivery. At Kijabe Hospital, Kenya, a visionary project aims to solve these problems and enable future improvements by creating a connected health infrastructure.

BUSINESS CHALLENGES

In developing countries, providing adequate healthcare to poor, remotely situated, or dispersed populations is a huge social and political challenge. In many cases, it also is a prerequisite for economic growth. Healthy individuals can better look after their families, acquire skills that lead to employment, and play an active role in the community.

Sir J. A. Muir Grey, chief knowledge officer of the UK National Health Service (NHS), has been quoted as saying: "Knowledge is the enemy of disease." Yet many developing countries' efforts to distribute knowledge effectively are limited by factors such as difficult terrain, funding restrictions, and the lack of a connected health infrastructure that supports the flow of information among medical facilities and care providers.

Kijabe Hospital illustrates some of the challenges facing healthcare practitioners in developing countries. The hospital is a church-affiliated, nonprofit facility with 210 beds located 50 kilometers northwest of the capital, Nairobi. It serves as a teaching and referral center for a



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rural and remote catchment area with a radius of 100 kilometers, within which are members of the Kikuyu and Maasai tribes, and use of the center is growing among Somalis from Nairobi and even Somalia.

Staff at Kijabe Hospital urgently need access to current medical databases—and that need is growing all the time. In 2005, the hospital started running a postgraduate training program in family medicine, creating a demand for up-to-date information that would help student doctors make better decisions, within the learner-focused model of the program. A subsequent agreement with the University of Nairobi to train surgical registrars further increased this demand.

Like all hospitals in sub-Saharan Africa, Kijabe manages numerous HIV/AIDS cases, which generate a significant need for access to knowledge resources. The hospital also runs an outreach program to seven health centers throughout the region it serves. Although a doctor from Kijabe Hospital visits each health center once a month, there are no communications links between the hospital and the health centers. Some health centers have no electricity and medical textbooks are scarce, often providing outdated or incomplete information. This makes it extremely difficult for health workers in remote locations to obtain expert advice or confirm their diagnoses in a timely manner.

SOLUTIONS

In 2004, Richard Granger, director general for IT for the UK NHS, asked the outgoing head of the Department of Health's Information Policy Unit, Dr. Peter Drury, to undertake a research project. The project's objective was to assess whether certain tools and expertise being developed in the NHS could be adapted for use in developing countries. Knowledge management was the main focus of the exercise, with particular emphasis on the [Map of Medicine](#), a Web-based tool developed for the NHS that contains the latest information about diagnosis and treatment, presented as an easy-to-use series of flowcharts or "care pathways."

During the development of the National Program for IT for the NHS (a 10 year project to modernize NHS computer systems and information management), Dr. Drury and others had support from the Cisco® [Internet Business Solutions Group \(IBSG\)](#). On starting the work in Kenya, Dr. Drury asked IBSG for help in testing the utility of connected health infrastructures in a low-resource environment. Cisco became one of the project's financial sponsors, together with the UK NHS, with support in-kind from T&F Informa UK Ltd., the company that owns and manages the Map of Medicine.

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Dr. Bruce Dahlman, medical director, Kijabe Hospital, Kenya

With the agreement of the hospital's Medical Director, Dr. Bruce Dahlman, Dr. Drury chose Kijabe as the primary location for the project. As part of its commitment to improving health-care delivery through IT, the hospital already had an infrastructure of 75 networked PCs, some with Internet access, which provided a suitable foundation for the research.

In the first stage, Dr. Drury introduced sections of the paper-based version of the Map of Medicine in four of Kijabe Hospital's health centers. Clinical staff were given 26 of the 250 care pathways to use during consultations with patients, either to reinforce clinical decisions or to provide additional input that could, for example, lead to new lines of inquiry during the diagnostic process.

Dr. Drury then started planning the second stage of the project, which focused on two areas. First, a wireless network, donated and installed by Cisco allowed a preliminary evaluation of the potential of wireless technology to improve healthcare delivery in a hospital in rural Kenya.

Second, a small-scale study of the benefits of using the electronic version of the Map of Medicine on handheld devices was begun. Six doctors took part in the study over a two-month period; four doctors were based at the hospital and two at the health centers. They tested six care pathways from the Map of Medicine—HIV/AIDS, tuberculosis, malaria, abdominal pain, diarrhea, and typhoid fever—which were stored on ruggedized PDAs.

"We could have taken off-the-shelf components and tried to string them together, but essentially getting a wireless setup like this without Cisco's help would have been impossible," says Dr. Dahlman. "Having it designed and installed by a world leader in the field is important to us because it gives us a system that we can rely on. It also gives us connections to other parties who may be interested in seeing what can be done with advanced technological solutions in some of the world's more remote areas."

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Dr. Bruce Dahlman, medical director, Kijabe Hospital, Kenya

BUSINESS RESULTS

The outcome of the project's first stage was very positive. Staff using the paper-based Map of Medicine said that they found it easy to use and helpful both as a training tool and as a preparation for patient consultations. Details of the project were presented at the World Summit for the Information Society (WSIS), in January 2006, by the director for e-government in Kenya.

Although formal results from the wireless pilot are not yet available, preliminary evidence suggests that access to tools like the Map of Medicine can deliver tangible benefits to care providers and patients in developing countries. A patient suffering from fever, for example, was referred to Kijabe Hospital from one of its health centers when staff used the Map of Medicine to confirm

the diagnosis of a serious, meningitis-related condition. This early intervention contributed to saving the patient's life, demonstrating the importance of accessible and up-to-date information in improving treatment outcomes.

Dr. Dahlman emphasizes that the role of materials like the Map of Medicine is to support, not replace, the skills of physicians. However, he believes that access to such information at the point of care is essential to improving patient care in rural Kenya.

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There is also anecdotal evidence of improved morale and job satisfaction among healthcare workers participating in the pilot, because they feel more supported in their clinical roles and in their professional development.

NEXT STEPS

Dr. Drury hopes the project will be extended to test the benefits of the wireless infrastructure throughout Kijabe Hospital campus, providing wireless connectivity and online access to the Map of Medicine for all departments. Since it is possible to tailor the content of the Map of Medicine, the addition of new material would be another important next step. Medical staff in Kenya, for example, need more information on tropical diseases, such as malaria, which are not covered in enough depth in the UK-generated materials.

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Dr. Peter Drury, program director*
Developing E-Health in Kenya Program

Subject to funding, the project also aims to create links between the hospital and its rural health centers using broadband wireless access technology. These links will create the basis for telemedicine, allowing staff in the health centers to communicate in real time with experts at Kijabe Hospital—or, ultimately, elsewhere. Wireless communications also will enhance the information flow to medical staff in the health centers, supporting the timely distribution of essential clinical knowledge such as local, national, and international guidelines and procedures.

Information management is another area being targeted for improvement. Wireless links will allow staff in Kijabe's health centers to send monthly management reports to the hospital electronically, instead of making long journeys to hand-deliver paper reports. Staff in Kijabe's two HIV/AIDS clinics see a total of 90–110 patients every day. They currently manually fill out

*Dr. Peter Drury joined Cisco in September 2006 as director, healthcare practice, emerging markets. The events described in this case study took place before September 2006.

several paper forms for each patient before inputting the data into a computer at a later date—resulting in a backlog of up to several weeks. The ability to enter information into a PDA just once, in real time, will reduce their administrative burden and allow staff to spend more time treating patients.

Developments like this will help Kijabe to realize the vision of the “connected clinician,” one who has the appropriate tools, infrastructure, and information to function in even the most difficult conditions.

In the longer term, the same infrastructure might also be used to provide rural communities in Kenya with nonhealth resources and information, such as instructions on how to build a water well, access to crop prices for farmers, and educational content for local schools.

Cisco IBSG has worked closely with Dr. Drury at each stage of the project, helping to define and scope the project and advising on risk analysis and solution design. He expects this collaboration to continue. “It was clear from the start that my goals for the Kijabe project were closely aligned with Cisco’s vision of connected health,” says Dr. Drury. “What we’re trying to demonstrate is that you can deliver a huge amount of benefit to health workers and patients by appropriate use of modern technology and knowledge in a low-resource environment.”

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