

# Using Information and Communication Technology to Improve Patient Care



Most health information originates at the point of patient care. Electronic medical record systems can help improve the quality of care and the quality of data for decision makers at all levels. RTI is a leader in helping countries to realize this potential.

In July 2004, for the first time, nurses and midwives from the Chawama, Chipata, and Georgia health clinics in Lusaka, Zambia, referred patients for treatment to the University Teaching Hospital (UTH) by entering patient information into a computer.

The computer transmitted patient information to the hospital over a high-speed wireless network. The system instantly alerted medical staff in the appropriate ward and provided vital information, including appointment date and time, reason for referral, and the patient's condition.

Since the roll out of the fully integrated Zambian Electronic Perinatal System (ZEPRS) was completed in August 2007, it has been used in 24 interconnected public obstetric clinics and six hospital wards. On average, 10,000 new antenatal patients are registered in the system each month. The shared database now contains records for more than 340,000 patients and has been used during more than 3

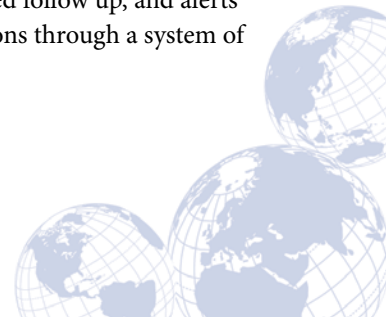
million patient encounters. This information has been used to improve the quality of care and monitor the population's health. ZEPRS is achieving results by

- Improving access to patient records
- Helping clinicians follow standard procedures, conduct follow up, and recognize critical conditions through automated task lists, problem lists, and alerts
- Providing critical information to health-care supervisors engaged in coaching medical teams and monitoring the health of the patient population
- Enabling health researchers to prioritize, design, monitor, and evaluate interventions to improve public health by providing detailed longitudinal data

ZEPRS is an intelligent, electronic-first medical records and referral system. One of the first in sub-Saharan Africa, the system was designed to be used by clinicians during the course of care. It helps to improve care, combat the spread of HIV/AIDS, and manage records for perinatal patients and antenatal infants (through 6 weeks after delivery). The integrated intelligent coaching and problem-based care system helps clinicians to follow standard procedures, reminds them of needed follow up, and alerts them to potentially critical conditions through a system of customizable rules.

## Expertise

- Point-of-care systems
- Open-source software technology
- Wireless technology
- Systems integration and management
- Local capacity building



ZEPRS was developed by RTI, the University of Alabama at Birmingham (UAB), and the Center for Infectious Disease Research in Zambia (CIDRZ), with funding from the Bill & Melinda Gates Foundation. RTI and CIDRZ worked together to develop an effective training program for clinicians and to build local capacity to support the computing infrastructure. The system is used routinely by nearly 450 clinicians.

### Open-Source Software Technology

RTI built ZEPRS using open-source software components and best-of-breed Web-based application architecture. RTI has released the software and documentation under open-source and open-documentation licenses. This eliminates licensing costs and makes it easier to adapt the system to other countries. The software architecture is flexible enough to accommodate new fields, forms, form flows, protocol rules, and reports without programming.

ZEPRS has been continually refined and enhanced based on input from clinicians and emerging needs. For example, RTI worked with CIDRZ to interface ZEPRS with a Laboratory Information Management System, enabling new lab test results such as CD4 counts to be transferred to patient records automatically.

RTI developed a multilingual version of the software called Zcore™ that can be installed and used in facilities with intermittent or no Internet connectivity. Zcore™ is designed to detect network connectivity and transmit data automatically. Zcore™ is being used to help manage antiretroviral pharmaceutical supplies in Nairobi, Kenya, and case records for rape survivors in South Africa.

### Wireless Technology

In Lusaka, 24 public obstetric clinics, UTH, CIDRZ, the Lusaka District Health Management Team, and the Ministry of Health are interconnected by a point-to-point wireless network. RTI worked with South African firm Communications Solutions to design and install the network, and to design and install a fiber optic and wireless network interconnecting UTH's wards. Three to nine computers and a laser printer are installed in each clinic and connected to the

wireless network. The networked data center at CIDRZ houses the shared patient record database and the combined ZEPRS technical support team.

Today, we are helping partner governments to use commercial mobile phone networks in much the same way to transmit health information. In Kenya, RTI helped use a mobile phone network to transmit pharmaceutical supply reports from health centers to the central warehouse. In the Philippines, we are helping to use a mobile phone network to transmit data from an electronic medical record system in rural health units to the national health information system.

### Systems Integration and Management

RTI helped project partners to analyze the functionality and sustainability trade-offs of infrastructure components, estimate operating costs, procure equipment, and prepare each facility site. Joint decisions included the use of industry standard desktop computers and low-cost wire equipment carts. RTI developed network monitoring and management systems, a data backup and recovery system, data center, network, client security systems, standard operating procedures, user policies, and a user helpdesk support system.

### Local Capacity Building

RTI worked with CIDRZ to develop a training program to give clinicians basic computing skills and to train them in the use of the electronic referral and perinatal record system. The training system depended heavily on onsite training by respected senior clinicians. Approximately 800 clinicians, many of whom had never used a computer, were trained. Standard clinical protocol reference works and e-mail were made available to clinicians electronically over the ZEPRS network. RTI mentored the Zambian network support team.

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#### More Information

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