



The Promise of Electronic Medical Records

From Silos to Systems

Chapter 6

Electronic medical records (EMRs) are increasingly deployed in countries across the globe. They enable critical, real-time information services that empower both patients and health care workers. Just a few years ago, the use of EMRs in resource-poor, developing nations was experimental at best. Few organizations believed that using EMRs was realistic in these regions and fewer still had deployed such systems. Times are rapidly changing. Information technology is more widely available in resource-poor areas, and it is allowing health advocates to tackle difficult challenges such as managing HIV/AIDS and drug-resistant tuberculosis. Successful EMR projects are now operating in such diverse locales as Zambia, Peru, Haiti, Rwanda, Kenya and Malawi. Future expansion is predicted. The global market for electronic medical records is expected to grow an astounding 23.8 percent by 2012, including EMR projects in both the developed and the developing world.

The Regenstrief Institute, Inc., and Partners In Health jointly convened *The Promise of Electronic Medical Records: An Overview*, part of the Rockefeller Foundation's *Making the eHealth Connection: Global Partnerships, Local Solutions* Bellagio Center conference series. Participants made recommendations for the broader use of EMRs in the developing world.

Electronic Medical Records: Key Issues

An electronic medical record is defined as a longitudinal collection of electronic health information that provides immediate, authorized access to person- and population-level data to support efficient health service delivery processes.¹

While EMRs hold great promise, few studies have been conducted to measure the actual impact of using them to improve the quality, access or affordability of health care, particularly in developing countries. And much work remains to determine the right mix of ingredients for a workable, culturally appropriate EMR. Other key questions also relate to electronic medical record technologies used in developing countries. These are:

- ▶ What should be built into EMR systems (e.g., reports, patient summaries and analyses needed by local teams)?
- ▶ What is the appropriate level for EMR systems to be deployed—national, district or clinic?



- ▶ What collaborative EMR approaches can be used to improve data quality, collection and tracking?
- ▶ How can EMRs be funded and what incentives can increase their usage?
- ▶ How can EMR infrastructure, technical support and capacity-building challenges be overcome?

Open-Source EMRs and the Developing World

Open-source environments enable computer programming code for a technology to be freely available for everyone to use and to customize for their purposes. The intent is to encourage the development of products that are more understandable, modifiable, replicable, reliable and accessible. Open-source software allows interested individuals to produce a new software version, share it with others, and/or market it. Implementers use open-source strategies because they can be cost effective, adaptive in addressing local needs and flexible in design, development and distribution. They enable governments and communities to play a central role in meeting the demands of health care services.

The Open Medical Record System (OpenMRS®) is one example of how open-system software principles and tools can be success-

fully deployed in challenging environments such as Africa and South America. OpenMRS is a multi-institution, nonprofit collaborative led by the Regenstrief Institute, Inc., a world-renowned leader in medical informatics research, and Partners In Health, a Boston-based philanthropic organization with a focus on improving the lives of underprivileged people worldwide through health service and advocacy. These teams nurture a growing global network of individuals and organizations all focused on creating medical records systems and implementation networks that enable system development and self-reliance within resource-constrained environments. OpenMRS has been implemented in several African countries, including South Africa, Kenya, Rwanda, Lesotho, Zimbabwe, Mozambique, Uganda and Tanzania.

OpenMRS is an application that enables the design of a customized medical records system by those with no programming knowledge. It provides a common framework to build medical informatics efforts in developing countries. OpenMRS is based on the principle that information should be stored in a way that makes it easy to summarize and analyze, with minimal use of free text and maximum use of coded information. At its core is a concept dictionary that stores all diagnoses, tests,



procedures and drugs—as well as general questions and potential answers. OpenMRS is designed to work in environments where many client computers access the same information on a server. It aims to provide comprehensive information for programmers, developers, medical records implementers and users. When combined with standards consensus, consistency, clinical mapping and knowledge modeling, OpenMRS can achieve positive health care outcomes. It is just one example of EMRs successfully and efficiently improving health in the developing world.

Migrating Towards a Robust, Integrated EMR Framework: Essential Ingredients

Progress toward broader deployment of integrated, workable eHealth solutions in the developing world requires many important actions. These include creating an implementation toolkit; developing adaptable, interoperable and scalable software; and fostering communities to support local grassroots initiatives, while linking them to other projects and organizations that can provide technical, financial and training support. A cradle-to-grave approach supported by project tools is necessary to achieve effective results.

Participants in the *Electronic Medical Records* conference made recommendations for the creation of a new toolkit that could support the effective assessment, implementation and ongoing support of electronic medical records. Toolkit elements would be featured live on a wiki-enabled Web site so that critiques and modifications would be made and would be visible online. Recommended tools include the following:

1. POLITICAL ⇒ Tools must address the political climate of the environment so that key stakeholders and motivators are clearly identified. This includes assessing the regulatory environment and governmental issues. Any legal or political constraints need to be identified up front.

2. ENVIRONMENTAL ⇒ The physical environment is a key constraint in the deployment of technology and could be a critical component defining or limiting the sophistication of the solution to be tapped. Assessments for tapping and stabilizing energy or power sources are essential, as is gauging the accessibility of the community served. Other considerations, such as temperature and humidity, may have a major effect on the technical solution that may be utilized.



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“One of the biggest challenges we face for patients with HIV/AIDS or tuberculosis is continued care over long periods of time. Previously, there were no tools to monitor across sites and multiple visits. But now, with open source medical records, we can bring all of this information together in a way we could not have dreamed of before.”



3. SOCIAL⇒ Social tools assess human relations and associated dependencies including required staff. The project owner, along with everything else that is needed to successfully run and manage the project, will be identified. Readiness of the users is a key success factor. The creation of a communications plan, regardless of how rudimentary it might be, is also essential to the success of a project roll-out. The initiation of a training program is also vital. Critical considerations include training, staffing and planning tools that take turnover into consideration.



Evidence in developed countries demonstrates that involving potential EMR users from the beginning is crucial for gaining acceptance of the necessary changes. This could be as simple as announcing the project in the health care facilities as early as possible. It could be as involved as inviting future users to be part of the system design and implementation. By the time equipment and software arrive at a health facility, future users should already have at least some knowledge of their benefits.

4. TECHNOLOGICAL⇒ An information strategy is developed, followed by a needs assessment to help map what features and work flow are

needed. Required technology solutions emerge once these activities are completed. A tool to perform a gap analysis must then be used, since customization of standard solutions is usually required. Tools needed for configuration, scaling, deployment and implementation should be considered.

5. EVALUATION⇒ Donors require confirmation and evidence that their investments are making a difference. Therefore, implementers will need tools to measure the baseline (at the onset of the project) and the project's progress against that baseline. They will also need a mechanism for reporting results. Evaluation data, even if only from an exploratory assessment, may also be crucial in winning from the support of local staff. Capacity-building education and training around evaluation methods is also critical, as consistency in reporting is of paramount importance.

6. PERCEIVED VALUE ASSESSMENTS⇒ Assessment tools measuring success objectives are important for ongoing project viability. Unless the users see value for the systems that have been installed, they will not use them.

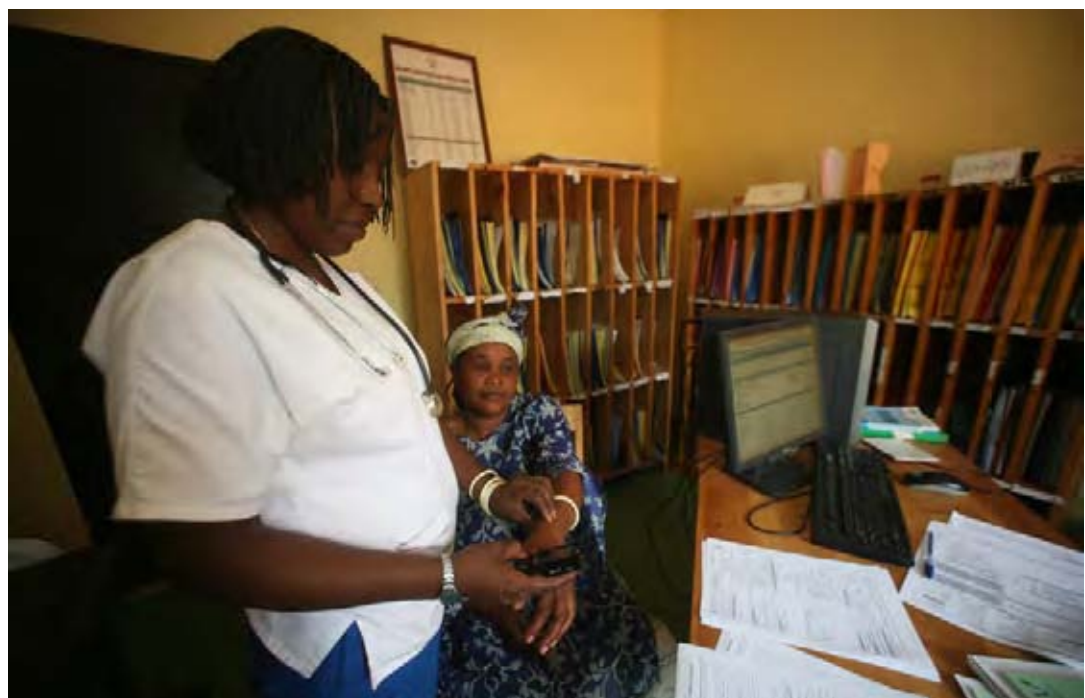
7. SUPPORT⇒ Before, during and after the systems are installed, support for the users is required in the form of education and

training as well as technical support for creating patches, fixing bugs, and releasing new initiatives.

Seeding and Sustaining EMR Solutions: Collaborative Action Networks

The most successful EMR projects prioritize a direct, supportive working relationship with developers, implementers and end users in the countries where systems are deployed. These community-based networks simultaneously meet the specific needs of end users and aim to teach proficiency in software and project approaches in order to encourage self-maintenance.

The Health Information Systems Project (HISP), based largely in Norway and South Africa, has particular experience with such efforts. HISP describes the evolution of "collaborative action networks" within its community as the focal points of implementation growth within a given country. The OpenMRS community has also had success with such networked approaches, and has built a robust community of worldwide development expertise. Instead of exerting a primarily top-down approach to large-scale implementation, these efforts enable communities to form around solving larger problems. A



Collaborative Action Network (CAN) such as this could offer support for eHealth and EMRs in the developing world. A CAN approach acknowledges challenges in developing environments. These include:

- ▶ Insufficient human capacity—both from an expertise and an ownership perspective
- ▶ Mistrust within developing environments about the motivations of individuals/organizations who come in and deploy systems from “outside;”
- ▶ A legacy of failed top-down technology deployment attempts

WE-CAN (World eHealth Collaborative Action Network)

EMR conference participants envisioned the formation of a World eHealth Collaborative Action Network (WE-CAN) to enable support for ideas to flow both from the bottom up and from the top down. CAN organizations can be formed at many different levels and are self-organizing around an idea, a work requirement or a system. CANs can interlink and/or subsume one another. They embody the concept of a community of communities.

Guidance and leadership for WE-CAN should incorporate developing world country representatives, existing or emerging collaborations (project level CANs), industry leaders, donors and others. The goal of WE-CAN would be to create a global marketplace for eHealth through collaboration, best practices and standards-based interoperable systems.

What is needed to create and sustain the WE-CAN initiative includes:

- ▶ Governance body: A board of directors or secretariat to provide basic guidance and support of the community.
- ▶ Online technologies: A series of technologies (wikis, blogs, forums, mailing lists, etc.) that allow communities to self organize.
- ▶ Face-to-face meetings: Opportunities for communities to meet with one another are central to community growth and coordination.
- ▶ Community mandate: The notion of WE-CAN needs to be supported and understood

at the highest levels in order for it to succeed. Therefore, educating decision makers will be essential.

- ▶ Core support for CANs: As these self-forming organizations are asked to serve greater functions for the world, they will need resources to properly scale their endeavors. They will need appropriate management, financial resources and mentorship opportunities.
- ▶ Reference implementations: In-country demonstration projects or reference implementation of one or more EMR systems using state-of-the-art techniques and principles will help facilitate the application of current thinking and a harvesting of lessons learned. These should be supported by in-country Centers of Excellence.

Conclusion

Canadian eHealth pioneer Richard Alvarez observed that “the last 12 months could be dubbed the international year of electronic health records, as electronic health information systems have been identified as a critical ingredient for reinvigorating health care in country after country.”²

The promise of electronic medical records in the developing world is great. With cooperation for the greater good, innovative collaboration networks can abandon top-down approaches in favor of workable, customized solutions built on lessons learned. Conference participants noted an old African saying: “I am who I am because of who we all are.” Apply this principle to the promise of EMR and the number and intensity of initiatives will continue to grow.

Notes

- 1 U.S. Institute of Medicine, *Patient Safety: Achieving A New Standard of Care*, November 2003.
- 2 Alvarez, R. Health Care Has to Move into the Hi-Tech Age. *Bull World Health Organ* [online]. 2005; 83, 5: 323-323.



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“We are facing a generation in the Global North and South that is increasingly comfortable with mobile phones and computers. We need to bring those who are ‘born digital’ into the equation now. They absolutely need to be at the table.”