

BENDING THE COST CURVE IN IMPLEMENTING ELECTRONIC MEDICAL RECORD SYSTEMS: LESSONS LEARNT FROM KENYA

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ABSTRACT

Background:

Through a CDC co-operative agreement, the Futures Group Kenya Health Management Information Systems (KE HMIS) project has been deploying electronic medical record (EMR) systems throughout Kenya. During 2013, our implementing team rolled out EMRs in 170 health facilities bringing the project closer to meeting the target of 300 deployments by 2015. With inherent challenges of setting up software systems coupled with limited resources, there is a need for innovative solutions to reduce the cost of EMR deployment¹.

Challenges:

The implementation of EMRs in resource-limited settings presents several challenges including (1) software costs, (2) unreliable electricity, (3) inadequate skills capacity, (4) hardware costs, and (5) constant systems support.²⁻³ Each of these challenges can be met, but with a cost.

Response:

Several initiatives were used to minimize EMR implementation costs. Software licensing and systems support costs were minimized by focusing on developing, deploying, and using open-source products that are free of charge like IQCare EMR. Hardware, energy and maintenance costs were reduced by using thin client computer configurations when possible.³ To reduce expenses associated with training and capacity building, we identified EMR champions at each facility, used on-the-job trainings, and standardized electronic training materials.

Lessons Learnt: These cost-saving initiatives have reduced expenses during the EMR implementation. KE HMIS will continue to use open-source products, increase the number of facilities using thin clients, and support EMR champions with additional training.

KEY WORDS

Clinical Information Systems; Electronic Medical Records; Costing Health Information Systems; Free and Open Source Medical records.

1. Introduction

Funded through the Presidential Emergency Fund for AIDS relief the CDC, the Futures KE HMIS co-operative agreement (Co-Ag) has been given a mandate to deploy a free and open source EMR, IQCare, in 24 counties in Kenya targeting HIV/AIDs and TB clinics. This is part of a larger initiative led by the Kenya National AIDS and STI Program (NASCOP) through this Co-Ag to digitize HIV data in 600 health facilities in all 47 counties in Kenya by 2015. The mandate, spearheaded by an EMR Technical Working Group co-chaired by NASCOP and Kenya Ministry of health department of Health Information Systems (HIS), has been given to implementing partners, ITech-Kenya and Futures group, each with a target of 300 health facilities. As of December 2013, Futures Group KE HMIS had deployed the IQCare EMR in 170 health facilities bringing the project closer to meeting its 300 health facility target.

In executing the project mandate in a resource constrained settings, we adopted a multifaceted approach that included stakeholder involvement in each of the deployment processes; in addition to strengthening our approach this ensured buy-in and ownership of the process which is vital for sustaining the EMR investments post KE HMIS. The process of EMR rollout, which on average takes 2.5 person weeks, is initiated by a stakeholder sensitization meeting. This initiation meeting includes government officials at national and subnational levels, development organizations and other implementing partners aimed at determining the candidate facilities for EMR rollout.

EMR readiness assessments are conducted in each of the candidate facilities identified for EMR implementation. Gaps identified during this assessment are disseminated to stakeholders in a post-assessment feedback meeting before the start of EMR deployment activities. The pre and post EMR readiness assessment meetings are vital to the deployment process as they provide an avenue to identify tasks and distribute responsibilities amongst the stakeholders that need to be met before deployment. A joint workplan is developed that identifies the gaps

including, (1) Training gaps, (2) Computer and networking needs, (3) Infrastructure needs such as securing server rooms and consistent electricity, (4) Data entry needs is developed and shared amongst the

stakeholders. Subsequent EMR deployment activities as illustrated in figure 1 below and the respective timelines are pegged on this joint workplan.

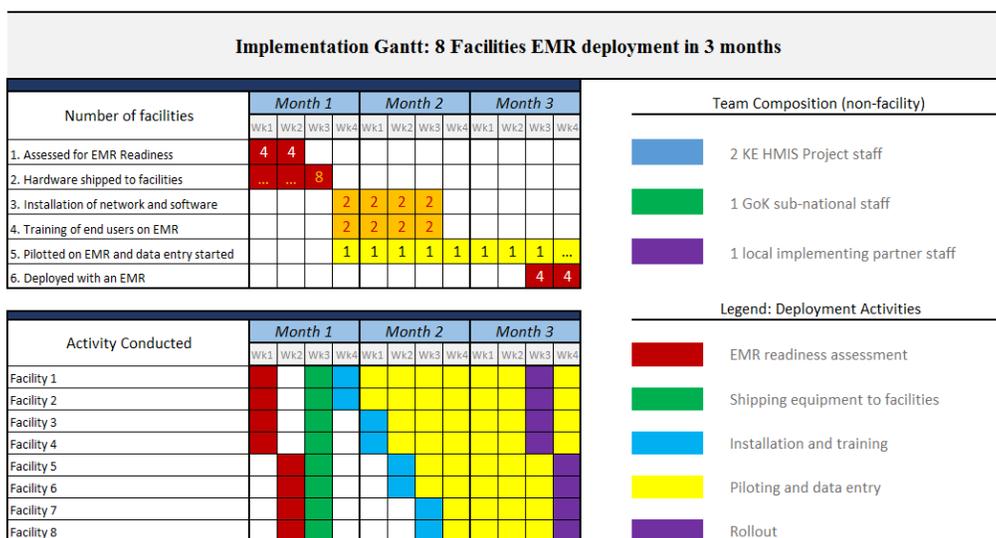


Figure 1: EMR Implementation Gantt for Deployment Team in a Project Quarter.

It is with this ability to leverage on the different strengths of the stakeholders in deploying and executing its mandate that the project is on course to achieve its target EMR implementation despite the challenges, related to project scope or budget range.

2. Challenges

In executing its project mandate, the KE HMIS project faced a number of challenges. In the section below we outline each challenge and describe how each related to the KE HMIS project. The challenges included:

a) Inadequate skills capacity

A successful implementation of an information systems requires some considerable computer and data management skills. For the KE HMIS project context, specific skills that are crucial for successful EMR implementation include:

- Basic computer skills
Health care providers need to be at ease using an EMR system as they currently on the paper based system². Common challenges including inadequate typing skills and even navigating around with a mouse can significantly hinder EMR uptake.
- Computer maintenance skills
While implementing any computer based information system, computer investments need to be taken care of and this is a specialized skill. In the Kenya Ministry of

Health (MOH) an information communication technology (ICT) staff cadre is lacking and this relates to a critical skills missing in a majority of health facilities. Without this skills at the health facility, the impact resulting from computer downtime has the potential to erode any gains made in that implementation.

- EMR use and troubleshooting skills
In addition to basic computer skills, health service providers implementing an EMR system are required to know how to use the system and have some basic troubleshooting skills. This builds the level of comfort in using the system increasing its uptake and consistent use.
- Data management skills
The adoption of an EMR system comes with a premise of better quality data for quick decision making. Data management is a skills that is highly specialized and lacking in many facilities and yet essential for this premise to be achieved.
- Data analysis and reporting skills
Data demand and information use is a key motivation to implementing EMR systems in Kenya. To utilize this utility of data however requires for some data analysis and reporting skills to extract data out of the

database. In implementations where health care providers lack even the basic computing skills, training on data analysis and reporting, while possible, becomes an expensive undertaking in terms of time and money.

- Disaster recovery and business continuity skills

A frequent question that arises during deployment and sensitization meetings is, “What happens if the computer crashes?” There is a need for assurance that there will be minimal disruption of services in case anything happens to the infrastructure which calls for skills that will enable the health facility to (1) routinely backup their data, (2) restore data from a recent backup in case of risk incidence².

- Cost of computing infrastructure and software licenses

The deployment of medical records requires substantial investment in computer infrastructure including (1) a server, (2) client computers, (3) a local area network and (4) software licenses. Combined with a need to constantly update software either during the introduction of new features, resolving a reported issue or even when updating virus definitions, the need for some form of internet connectivity adds to the cost of EMR deployment.

- Security of ICT investments

Data is a critical resource that needs to be safeguarded. Physical security of the data directly translates to the securing computers from unauthorized access including theft. The need for security guards and/or burglar proofing of computers rooms is an additional cost to be factored in EMR implementation.

- Lack of reliable electrical power supply

The dependency on electricity to run an electronic information system puts considerable risk on any EMR implementation in facilities where electricity is not adequate and there is no reliable power backup. Working in mainly rural and peri-urban health facilities, this describes over 70% of the facilities KE HMIS project operates.

3. Responses

The KE HMIS project has employed several strategies to reduce the cost of setting up electronic medical records in Kenya as well as mitigate the challenges including:

- Bridging the capacity gap**

In bridging the capacity gap to enable health care providers use the EMR with the confidence they have using paper based medical records which they are transitioning from calls for a vertical integrated training model across implementing partners, national, sub-national and facility levels. Figure 2 illustrates the training model used by the KE HMIS project.

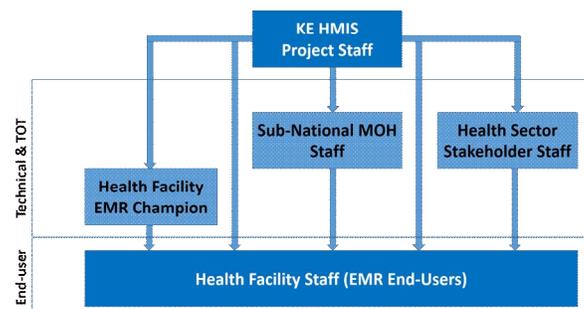


Figure 2: Training model by the KE HMIS project

With the need for the vertical approach to training targeting users at multiple level, the KE HMIS has employed a number of strategies to be able to reach more EMR stakeholder with training within budget. These include:

Facility based training

Transitioning from hotel based training to facility based training as well as on-the-job-training, the project was able to train additional health care stakeholders for less costs. Conducting the training at facilities also enabled participants to conduct live role plays while facilitators were onsite allowing for field end-user testing of various EMR components.

Identification and use of EMR champions

EMR champions are facility and subnational clinical and records staff who have shown a lot of potential to support EMR implementations. The KE HMIS targets these champions for more in-depth training equipping them with additional information to troubleshoot and support EMR implementation in the facilities and geographic regions that they support. Development partners, who are stakeholders in this process, have also contributed staff to the community IQCare EMR champions.

Remote support

Use of remote control software including TeamViewer® and JoinMe® enables project staff to provide off-site support to health facilities without having to travel. This not only saves time but it also reduces costs.

E-Learning

Leveraging on a self-paced eLearning module, the KE HMIS project converted all EMR training materials into eLearning content that forms part of the EMR deployment package. End users are able to utilize “how-to” videos for quick refreshers and as a first line level of support.

b) Computer infrastructure

The setting up of an electronic information system is almost always associated with significant computer and network investments upfront at the facility. Computer infrastructure includes (1) servers, (2) client PCs, (3) software and (4) local area network setup. These are all high-cost investments. Some of the strategies used by the KE HMIS project to reduce the implementation cost include:

Free and Open Source Software

Software license increase the cost of EMR implementation. By using free and open source products like IQCare for the EMR, Ubuntu for the operating system and Open Office for office productivity, the KE HMIS project was able to achieve considerable savings in EMR implementation. Saving of at least USD. 500 per computer were saved when opting for free and open source operating systems, office tools and antivirus³.

Desktop Virtualization

Through the use thin computing, the project was able to significant reduce the number of desktop computers required for a typical installation. In one of the larger facilities with 50 concurrent end users in Nairobi, Kenya, an installation was actualized at 45% of the hardware cost of regular desktops installation when nComputing desktop virtualization was used.

Use of in-house capacity

In staffing the KE HMIS project, it was put in cognizance that EMR deployment activities, as illustrated in figure 1, will be handled by project staff. Setting up of networks, installation of computers and the requisite software are all tasked to project staff with support from the facility and sub-national ministry staff. This has not only saved the project from expensive consultancies but also increased buy-in to the ministry as well as enable for transfer of some of these skills in the process.

Continued work with implementing partners supporting health facilities as well as subnational and national ministries of health staff has enabled the KE HMIS project to meet gaps that even though vital to the implementation process were beyond the project scope

and/or budget. Some of the work that this project has been able to accomplish through collaboration include the following:

- i) Seeking alternative power sources where the main electricity grid power is inadequate
- ii) Securing of health facilities including getting night guards and bugler proofing of windows and doors
- iii) Hiring of data clerks to assist in capturing of legacy data
- iv) Joint capacity work planning and logistics support in conducting routine EMR implementation among other activities
- v) Purchase of computers and setting up local area networks

4. Lessons Learnt

Stakeholder engagement has enabled KE HMIS as a project with relative success computerize data in 170 health facilities despite challenges that were beyond the project reach even though vital for successful project implementation.

Local government ownership and stewardship throughout the process of rolling out EMR has enabled a greater uptake of IQCare EMR system which is critical for a sustainable implementation.

The strategies employed to be able to reduce the cost of EMR implementation have shown a lot of promise in not only an economic sense but also promoting project ownership by the various stakeholders. As KE HMIS, we will continue employing these strategies ensuring that EMR champions are further trained to offer a first line of support at health facilities as well as increase the number of facilities using desktop virtualization and open source software systems.

5. Conclusion

A large scale rollout of information systems calls for significant collaboration amongst stakeholders. This is especially relevant when activities introduce a paradigm shift as is the case with the KE HMIS Project where electronic patient records would replace paper-based patient management and monitoring in over 600 HIV clinics in Kenya.

Numerous challenges are inherent in projects of a magnitude such as this and the cost and effort associated with mitigating these challenges can be astronomical even when anticipated for project planning.

The use of innovative strategies including free and open source software like IQCare EMR, desktop virtualization techniques like nComputing as well as conducting budget trainings through on-the-job-training are all considerations for planning and executing a project that involves computerization of paper records.

Project ownership by the local governments and target end users has proved crucial for EMR implementation in Kenya, working with health care providers and administration at national, county and facility levels to ensure uptake and sustain the EMR efforts post KE HMIS.

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References

- [1] Sahay, S., & Walsham, G. (2006). *Scaling of health information systems in India: Challenges and Approaches*. Information Technology for Development, 12(3), 185-200.
- [2] Boonstra, A., & Broekhuis, M. (2010). *Barriers to the acceptance of electronic medical records by physicians from systematic review to taxonomy and interventions*. BMC health services research, 10(1), 231.
- [3] Fraser, H. S., Biondich, P., Moodley, D., Choi, S., Mamlin, B. W., & Szolovits, P. (2005). *Implementing electronic medical record systems in developing countries*. Informatics in primary care, 13(2), 83-96.