Case Study: **Uganda EMR**

This case study is part of a series that showcases successful usage of open-source software with a development objective in Uganda and around the world. It was prepared by the Response Innovation Lab in partnership with URIDU, as a part of the Open Source for Equality initiative (OSEQ) in Uganda.

What is UgandaEMR?

UgandaEMR is the first electronic medical records system in Uganda. It is used in health facilities, hospitals, and clinics across the country to store patient medical files electronically. UgandaEMR is adopted by the Ministry of Health and its implementation is supported by METS.

Care for HIV patients is longitudinal, requiring detailed management of patient information over time. Information such as the patient's vitals, viral load, and antiretroviral therapy (ART) needs to be compiled, monitored, and used to make decisions about treatment. With a growing number of number of patients with HIV in Uganda, the health facilities were overwhelmed with the paper-based file management, leading to delays, wait times, and loss of patient information. There was a need for faster, more reliable data storage and retrieval to provide effective care for patients with HIV, as well as other prevalent health issues.

> **The M&E Technical Support Program (METS)** is a collaboration between Makerere University School of Public Health, the University of California San Francisco, and the Health Information Systems Program (HISP) Uganda. Since 2016, METS has the mandate to support partners in implementing UgandaEMR.

How does it work?

UgandaEMR is a web-based application that can be used to design customized medical records with little programming knowledge. The installation package and user manual can be downloaded onto a computer by users directly from the website at no cost. It is considered out-of-the-box ready so that once it is downloaded it can be used by the facility.

It has a user-friendly interface to easily add and manage information. Once the application is installed, a Health Center name is added. Users create accounts through a local system administrator. Users can easily

create a patient record and add patient information, such as demographics, ART status, allergies, regimen information and referral type. The main functions of UgandaEMR currently are:

1. **Records**: Register and maintain patient information
2. **Biometrics**: Register a patient's fingerprint to easily retrieve their file.
3. **Pharmacy and Dispensing**: Maintain pharmacy inventory.
4. **Point of Care**: Clinicians enter information directly at time of care.
5. **Critical Workflows**: Reception, triage, HIV Clinician, Laboratory, and Pharmacy.
6. **Reports**: Extract reports for the Ministry of Health or for managing facility operations.
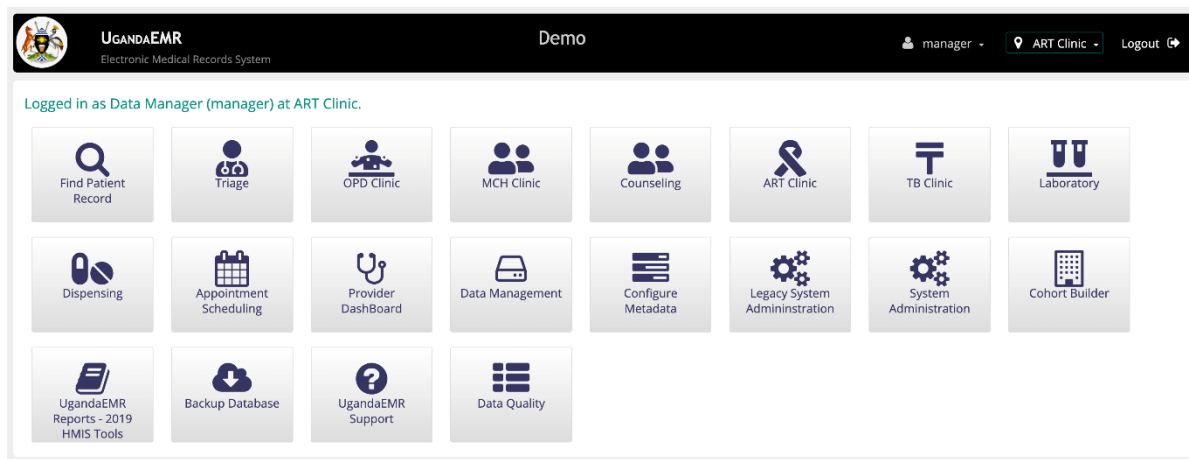
UgandaEMR runs as a standalone installation at each facility. Every facility has its own server and manages its own information. The Ministry of Health has a central server to manage aggregate data. The system in each facility generates standardized reports to send to the central level. There are implementing partners in various districts around the country who can provide support and training on how to use the system. The team at METS supports the system development and strengthening, monitoring and evaluation, training to implementing partners, and reporting. METS' support is financed by the Centers for Disease Control and Prevention (CDC).

How was UgandaEMR developed?

UgandaEMR was built off the Open Medical Record System, or OpenMRS®, an open-source software for electronic medical record (EMR) systems. It is a platform that developers can use to build their own customized EMR system.

Initial attempts to introduce electronic medical records in Uganda started in the early 2000s, when some facilities tried using Microsoft Access to record and relay patient data. However, since Access is not designed to manage medical records, within two years the program's limited number of user accounts, storage capacity and functionality were insufficient to manage the rising patient load.

OpenMRS was introduced in 2007 to facilitate research at the ISS Clinic at Mbarara Regional Hospital. The research demonstrated positive results of the EMR on efficiency, accuracy of data, and the quality of care, in terms of shortened patient wait times and more time spent with each patient. In 2011, the bare OpenMRS system was piloted in 20 health facilities across the country.

An **OpenMRS Distribution** is a particular configuration of the OpenMRS platform, modules, content, and other integrated applications, that can be installed and upgraded as a unit (wiki.openmrs.org).

In 2016, the Ministry of Health rebranded the system to **UgandaEMR**, creating its own user interface. It is a tailored, country-specific *OpenMRS Distribution* that meets the requirements of the Uganda Ministry of Health. UgandaEMR is composed of modules that are relevant to the Uganda context, including HIV, Tuberculosis (TB), Mother and Child Health (MCH), and Outpatient Diagnosis (OPD). The data fields are based on the official forms provided by the Ministry of Health to produce ministry-mandated reports for facility management.

UgandaEMR is licensed under Apache-2.0, an Open Source Initiative (OSI) Approved License. It allows free use or modification of the work, as long as the derivative works identify changes made, retain all copyright, patent, trademark and attribution notices, and shares a copy of the license. As an OpenMRS Distribution, it is available on the OpenMRS website for others to build on top of and configure to their own use case.

Why choose OpenMRS?

"**Our ultimate goal is being able to offer the best line of electronic medical record system for Uganda and anyone else can build on top of that**."

– Samuel Lubwama,
Senior Software Developer, METS

OpenMRS has a number of advantages that made it an optimal option for Uganda.

1. The source code is publicly available.
2. There are no product or licensing fees to download the software.
3. It is a well-built, cost-effective platform that can be run a small budget.
4. It is a flexible, modular, multi-layered system that can be used in many configurations. It is customizable to meet local needs by adding relevant modules.
5. It is a platform that can be built upon. It provides the backend operations, including application programming interfaces (API) and databases to support applications, avoiding the need to "fork" the system (creating a separate but related solution that is not compatible with the original).
6. It can build on an existing *OpenMRS Distribution* to leverage work that has already been done to address workflows, regional needs, or specialty service areas (e.g., TB).
7. Once installed, data can be input without an internet connection.
8. It is well-documented, with multi-language support and a large online community of practice through OpenMRS Wiki.

The main drawback of this type of open-source software is that it can be challenging to find technical support for specific problems. While there is online community support, if the problem is not of pressing need for the whole community, then one must work through it alone to find a resolution.

What lessons were learned?

The METS team identified lessons learned from their experience supporting the implementation of UgandaEMR.

1. **Keep it as decentralized as possible**. Decentralized implementation of the program gives power to the people/facilities to make decisions on its use and adaptations.

2. **Gain buy-in from stakeholders.** Transitioning from a paper-based system to an electronic system is difficult because it disrupts people's routine way of working. It requires buy-in from stakeholders at various levels – Ministry, District, partner, and facilities.

> "People don't like using new systems. Talk to them about the benefits. Show them the benefits. Work with the people day by day"
>
> – Samuel Lubwama

3. **Have a back-up plan for power failures**. During power outages, UganadaEMR does not function. In these instances, patient information was documented manually. This created a backlog of data to be entered, which resulted in incomplete reports. Some facilities are introducing generators to ensure continuity during power outages.

How is UgandaEMR contributing to SDGs?

The OpenMRS is considered a Digital Public Good. It is an open-source software that is contributing to Sustainable Development Goal (SDG) 3: Good Health and Well-being, as is its derivative work. UgandaEMR is now being used in 1,384 facilities in the country, and this number is growing. It has improved quality of care, ensuring that patients have properly documented records. It is enabling clinical teams to provide better follow up, making sure patients are adhering to treatment, and ultimately enhancing the quality of life for many.

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