EGPAF HIS

A simple description of the EMR

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EGPAF HIS

EMR System Wiki

Overview of the EMR System

The Electronic Medical Records (EMR) System is a comprehensive application designed to streamline patient data management across various healthcare modules. Built to meet the needs of healthcare facilities in both urban and rural areas, the EMR serves as a foundation for organized patient care and is designed to facilitate ease of use for individuals with little to no computer experience.

Technical Specifications

• **Back End**: Ruby on Rails

• **Data Model**: OpenMRS

• **Database**: MySQL

Front Ends of the EMR System

1. Point of Care (POC)

• **Purpose**: Designed for real-time, touch-screen interactions, primarily used by healthcare providers during patient consultations.

• **Main Module**: Anti-Retroviral Therapy (ART), which has the highest usage and funding.

• **User Interface**: Touch-screen optimized for users who may not have prior computer experience, particularly in rural and African healthcare settings.

• **Interoperability**: Operates with multiple modules (OPD, ANC, ART, CXCA, TB), sharing a common database to avoid data duplication and allowing cross-cutting reports.

2. E-Mastercard

• **Purpose**: A retrospective application that allows data clerks to enter patient data from paper records after consultations. This implementation is more flexible with validation rules to accommodate post-consultation data entry.

• **Data Collected**: The same data elements as POC, especially in the ART Module, enabling alignment with real-time POC entries.

Point of Care (POC) Modules

The POC EMR includes multiple modules tailored to different healthcare services, each integrated through a common database:

1. **Outpatient Department (OPD) Module**

• **Focus**: Manages outpatient visits, including patient interactions, diagnoses, and treatment plans.

• **Cross-Module Integration**: Shares data with other modules for comprehensive patient history.

2. **Antenatal Care (ANC) Module**

• **Focus**: Tracks maternal health, including prenatal visits, pregnancy monitoring, and risk factors.

• **Data Sharing**: Integrated with ART and CXCA modules to streamline care for pregnant patients.

3. **Anti-Retroviral Therapy (ART) Module**

• **Focus**: Manages treatment data for HIV/AIDS patients, including ART medication and progress tracking.

• **Usage and Funding**: The most used and heavily funded module due to its critical role in HIV/AIDS care.

• **Integration**: Cross-links with other modules like ANC and TB to handle cases of co-infections and pregnancy among HIV-positive patients.

4. **Cervical Cancer (CXCA) Module**

• **Focus**: Manages screening, diagnosis, and treatment data for cervical cancer.

• **Cross-Module Links**: Integrated with ANC and ART, particularly for patients in high-risk categories.

5. **Tuberculosis (TB) Module**

• **Focus**: Manages patient data on TB treatment, monitoring, and tracking.

• **Shared Data**: Cross-references with ART for HIV/TB co-infection cases, ensuring consistency across records.

Cross-Module Reporting

• **Functionality**: The shared database allows the creation of cross-cutting reports, which collect indicators from multiple modules (e.g., ART, ANC, TB) to generate comprehensive insights, such as pregnancy rates within ART patients.

External Systems for Data Exchange

The EMR system interacts with external systems to enhance data exchange, maintain patient demographics, and support lab integration.

1. **NLIMS (National Lab Information Management System)**

• **Integration**: Through API connections, NLIMS provides lab results directly to the EMR, making lab data accessible within relevant modules, such as ART and TB.

2. **Demographic Data Exchange System**

• **Purpose**: Ensures demographic data is shared across facilities, even though each facility’s EMR operates as an independent, siloed system.

• **Impact**: Enhances patient record consistency and data accuracy, particularly useful when patients seek treatment across multiple facilities.

Digital health

Digital health systems leverage data to give providers a more holistic view of patient health and patients more control over their care. These tools improve medical outcomes and enhance efficiency at every level of the healthcare system.

Since 2004, the U.S. Centers for Disease Control (CDC), funded by the U.S. President's Emergency Plan for AIDS Relief (PEPFAR), has supported the Malawi Ministry of Health (MOH) in building digital health systems and tools, including a sustainable point-of-care electronic medical records system (EMRS), retrospective data capture solutions, and other health information systems (HIS) to support quality HIV testing and antiretroviral therapy (ART) services.

PEPFAR's investments in HIS have great potential for improving HIV epidemic control and patient outcomes in Malawi. As these systems become interoperable and integrated, collection and responsible use of comprehensive patient-level data will facilitate targeted responses to micro-epidemics and provide a pathway to sustainable epidemic control.

Since 2019, CDC and EGPAF have continued to sustain and improve these HIS investments to ensure digital health is optimized to both support patient care and to reach and sustain epidemic control. These efforts are modernizing the point-of-care and e-Mastercard systems to address the full cascade of HIV and TB care by aligning facility workflows. These enhancements provide a shared and more complete history of HIV and TB patients, allowing for better-informed clinical care and robust data to inform program implementation and epidemic control efforts. The following solutions have been employed:

Electronic Medical Records System

Malawi's EMRS has been deployed in 765 clinics that provide antiretroviral therapy (ART) services: 257 point-of-care clinics and 508 e-Mastercard sites. The EMRS platform allows access to modules that providers use to capture and view patient care and treatment information in real time. EGPAF has developed specialized, interoperable modules for ART, HIV testing services, outpatient departments, antenatal care, and other points of care. The goal is to shift from back-entry stations to point-of-care solutions, with providers using platforms such as mobile phones, tablets, and web-based interfaces to access the EMRS and enter information about their patients.

To improve interoperability and integration across modules and systems, the project prioritizes the modernization and enhancement of the module-based approach, ensuring different entry points and systems are in sync and able to exchange information.

Lab Information Management

Systems

The national lab information management systems

(LIMS) is designed to support and improve efficiency and productivity of laboratories by keeping track of data associated with samples, tests, quality assurance and control results, as well as workflows, inventory, and instruments. EGPAF supports the MOH Department of Diagnostics with development, deployment, and maintenance of the national LIMS. As part of this support, EGPAF has fostered an integration of the point-of-care electronic medical records, Early Infant Diagnostics (EID), and the National Laboratory Systems.

This integration has enhanced tracking of results, improved turnaround time, allowed clinicians to access results in real time, and has increased the availability of high-quality data for management of patients and labs.

Data Lake System

EGPAF supports the MOH Department of HIV and AIDS in the management and maintenance of the Central Data Repository to serve as a centralized, interoperable data hub for HIV programs and patient data. This repository, also known as the Data Lake, is designed to collect, consolidate, and manage large volumes of data from various sources such as the EMRS and the LIMS. It provides a unified data analytics platform that facilitates data modeling, manipulation, and visualization of key program indicators that supports the MOH and stakeholders in discovering useful insights to guide decision-making to improve patient care and health

Civil Registration and Vital Statistics

Systems

EGPAF supports the National Registration Bureau (NRB) in developing and deploying an electronic system for birth and death registration. As of June 2024, an upgraded, centralized Civil Registration and Vital Statistics System (CRVS) is operational in 28 district registration offices, 28 district hospitals, and three central hospitals. The system is fully integrated with Malawi's National ID System and has reduced the turnaround time for printing certificates to within five minutes. This advancement allows certificates to be printed at the hospital, enabling mothers to collect their children's birth certificates upon discharge from the maternity ward. Currently, EGPAF has installed printers in five district hospitals that print certificates on-site.

The system also registers deaths from hospitals and communities, allowing the assignment of causes of death through the Medical Certification of Cause of Death or the WHO verbal autopsy

tool. EGPAF is also supporting the NRB in decentralizing the use of and access to the system in clinics and in developing and using dashboards to inform national planning needs.

Additionally, EGPAF plans to expand the CRVS system to 100 health facilities by the end of 2024.

Services

Developing and Deploying Software:

The EGPAF software development team works closely with users to ensure new functionality and ongoing system efficiency. A dedicated development and operations (DevOps) team focuses on national-scale deployment via automatic deployment pipelines.

National Helpdesk and Decentralized User Support:

To provide efficient support services, EGPAF has developed the National Helpdesk, reachable by a toll-free number, email, and self-service (via system portal).

The helpdesk uses a ManageEngine tool to manage all requests from users in all health facilities. The helpdesk aims for a quick response time to standard site issues, ensuring no more than 24 hours of downtime.

Enabling Contectivity:

EGPAF leverages technological and market advancements to invest in site-level local area networks

(LAN) and above site-level through a wide area network

(WAN) connectivity infrastructure, allowing for real-time connectivity within sites, across systems, and across geo-locations. EGPAF in partnership with Telecom Networks Malawi and AIRTEL provides virtual private network (VPN) connections to all clinics and labs, allowing for real-time transfer and back up of data.

Ensure Robust and Reliable Hardware, Power Infrastructure:

As health information systems become integral to service delivery and operations, proportional investments in hardware, computing capacity, and power backups will be required. EGPAF will continue to procure and deploy CDC/MOH-approved upgrades to all infrastructure, such as point-of-care terminals, mobile devices, and barcode scanners.

Electronic Medical Record (EMR) System

Overview of EMR

ART Module

Purpose

The **ART (Antiretroviral Therapy) Module** is designed to support healthcare facilities in managing and delivering antiretroviral treatment for individuals living with HIV. This module plays a crucial role in facilitating efficient and standardized care, ensuring that patients receive appropriate and timely therapy, monitoring adherence, and tracking patient outcomes over time. By consolidating patient records, medication schedules, and clinical outcomes, the ART Module aims to:

- Improve patient outcomes through better management and monitoring of ART regimens.
- Streamline clinic workflows, making it easier for healthcare providers to document and access patient information.
- Support adherence to national treatment guidelines and improve reporting accuracy for decision-making.

Data Flows

The data flow within the ART Module is structured to track a patient's journey from enrollment through ongoing treatment, making it possible to capture key metrics and outcomes. Below is an overview of the main data flows within the ART Module:

1. **Patient Registration**:
   - Patients are registered into the system with basic demographic and health information.
   - Unique identifiers are generated for each patient, ensuring data privacy and accurate longitudinal tracking.
2. **Vitals and HIV Reception**:
   - Health workers enter baseline clinical data, including vitals, CD4 count and WHO staging.
3. **HIV Consultation**:
   - This includes side effects management, hypertension management, TPT, ART regimens, and dispensing schedules, as defined by the Ministry of Health.
4. **Routine Follow-up and Monitoring**:
   - Regular follow-up appointments capture clinical measurements (e.g., viral load, CD4 counts) and any reported side effects.
   - Treatment adherence is monitored, with reminders set for missed appointments or irregular medication adherence.

5. **Data Analysis and Reporting**:
    - Clinical data is compiled and analyzed to track treatment outcomes at both individual and cohort levels.
    - Reports are generated to support national health programs and provide insights into ART program effectiveness.

Conclusion

The ART Module is central to the effective management of HIV treatment, providing essential tools for tracking patient progress, monitoring adherence, and managing treatment regimens. By enabling healthcare providers to access comprehensive patient information and supporting real-time data analysis, this module is critical in improving health outcomes for HIV patients and supporting national treatment goals.

Electronic Medical Record (EMR) System

ANC Module

Electronic Medical Record (EMR) System

CxCa Module

Civil Registration and Vital Statistics (CRVS)

Overview of CRVS

Birth Registration

Death Registration

Laboratory Information Management System (LIMS)

Overview of LIMS

Laboratory Information Management System (LIMS)

IBLIS

Laboratory Information Management System (LIMS)

National LMIS

Central Data Repository

Application Updates

HIS Evaluation