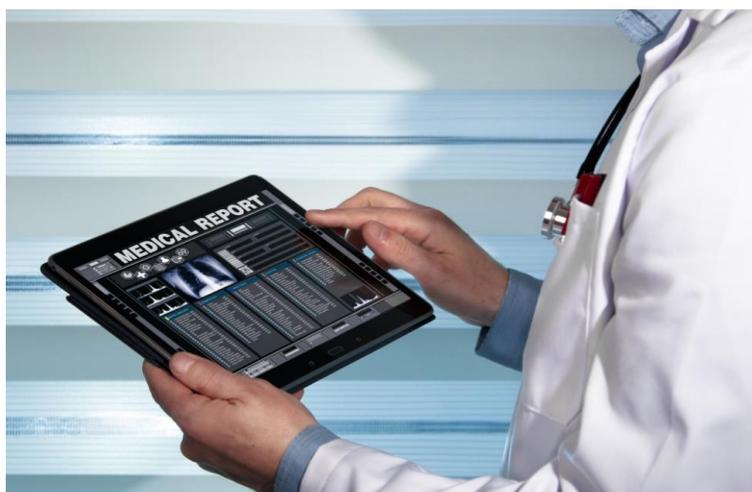


10/16/2020

Electronic Medical Records Guidelines

A Guide for Sierra Leone's Ministry of Health and Sanitation and its Partners



MINISTRY OF HEALTH
AND SANITATION
THE REPUBLIC OF SIERRA LEONE



eHealth Coordination Hub, Directorate of Policy, Planning and Information

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Acronyms

ANC:	Antenatal Care
DDPI:	Directorate of Department of Planning and Information
DHIS2:	District Health Information System 2 (Open Source application developed by the University of Oslo)
DHMT:	District Health Management Team
EHR:	Electronic Health Records
EMR:	Electronic Medical Records
MIC:	Ministry of Information and Communication
MOHS:	Ministry of Health and Sanitation
OpenMRS:	Open Source application for EMRs
NACP:	National HIV/AIDS Control Program
PNC:	Post Natal Care
SaaS:	Software as a Service
SLA:	Service Level Agreement

1.0 The National Digital Health Vision

In recent years, the eHealth Coordination Hub, co-led by the Ministry of Health and Sanitation (MoHS) and Ministry of Information and Communication (MIC), initiated the collaborative drafting of a National Digital Health strategy as a first step towards a push for an integrated ICT-enabled health system in Sierra Leone. This process yielded a shared vision for Sierra Leone's digital health strategy. This vision states "By 2023 an effective and efficient ICT enabled system should support delivery of quality, accessible, affordable, equitable, and timely healthcare services and moves Sierra Leone closer to achieving universal health coverage." Key components of the national digital health vision, such as Electronic Medical Records (EMR), are aimed at addressing the government's health-for-all agenda, which closely aligns with the Sustainable Development Goal number 3 (SDG3).

1.1 Rationale for EMR guidelines

In an effort to ensure an integrated and sustainable digital health ecosystem, the MOHS through DPPI would like to provide common framework for planning EMR system in Sierra Leone. This will ensure that EMR implementations come with an agreed minimum standard, full engagement of MOHS and other relevant partners while EMR systems contribute to improvement of quality of care. These guidelines are mainly targeting partner organizations currently using EMR or planning to roll out EMR systems. Additionally, the guidelines will be used by policy makers as well as partners who provide support to the development of EMR in Sierra Leone.

1.2 Basics of EMR

1.2.1 Definition

Introduction of HIS has transformed how data, in the form of patient medical histories, is easily made available and accessible for reference in the provision of care. An example of such systems are EMR.

The EMR and EHR terminologies are often used interchangeably given that they are both HIS with unclear consensus on their striking differences (Health Care IT Today, 2010). Therefore, in this document when we mention EMRs we are also talking about EHRs.

Whereas there is no standardized definition of an EMR, it can be summarized as a computer-based information system that integrates patient-related information from various sources within the health facility ecosystem to facilitate analysis, reporting and efficient delivery of health care.

1.2.2 Benefits

The overarching benefits of an EMR/EHR/CHIS are outlined as follows:

An EMR system captures patients' clinical encounters during their health care journey, and therefore EMR is mostly used in health facilities. EMR has many benefits, it mainly allows to:

- a) Assign unique identifiers to all patients
- b) Capture all patient clinical information. This information may include social demographic history, past history, clinical examination, laboratory test information, pharmaceutical prescriptions, follow up visits and any other information needed for patients' care.
- c) Easily have access to patients' previous clinical history
- d) Share information between the facility units
- e) Improve operational and clinical reporting
- f) Readily provide patient level or aggregated data for clinical research

1.2.3 Comparing EMR with other HIS tools

EMRs and Data collection tools have different characteristics and goals as seen below, and it's important to be able to understand the differences.

	Tool	Why	Applied for	Where	Who	How
Electronic Medical Records	Open Source EMR/EHR/HER (e.g. OpenMRS)	Tracks patient clinical encounters during their health care journey	Improving patient information flow and reporting	Hospital, Clinic, Health Center	Doctors, Nurses, Laboratory, Pharmacy personnel, clinical Supervisors	Integrated modules: registration, clinical, lab, pharmacy, radiology etc.
Traditional HIS	Open Source HIS (e.g. DHIS2, CommCare)	Data collection, dissemination, performance management and reporting	Household surveys, epidemiology, Surveillance	Health facilities, community outreach and surveys	Community health worker programs, program managers	Surveys, case management
			Health programmes monitoring	From facility to district level aggregated data	Data officers, Program managers	

1.2.4 Different approaches: Point of Care Vs Retroactive EMR

EMR can be implemented using two main approaches. The first approach is the point of care EMR. In point of care EMR, clinical staff use the system while providing clinical care to the patients. In contrast, in retroactive EMR, paper-based systems are used during care delivery and the data is manually transferred to EMR later (usually the next day).

Depending on the available resources and the role of EMR in patient care, implementers choose which approach to take. The table below summarizes the advantages and disadvantages of the two approaches of EMR.

	Advantages	Disadvantages
Retro-active EMR	<ol style="list-style-type: none"> 1. It is quicker to implement 2. Requires few users 3. Less training required 4. Because It is not live, if EMR system fails, services are not impacted 	<ol style="list-style-type: none"> 1. Time consuming as information is entered twice (paper-based forms and EMR) 2. It is prone to more data entry errors. 3. Information is not up to date (high data latency) 4. Incomplete data, paperwork can often go uncompleted. 5. Patient data not easily transferable. 6. Increased operational costs due transcription of data from paper forms, to registers and centralized data entry into
Point of Care EMR	<ol style="list-style-type: none"> 1. Information is entered once during patient care 2. Information is synchronized, up to date and available in real time. 3. An enhanced quality of care due to the amount of information at hand from every available and viable medical source. 4. Faster and more efficient diagnosis and treatments. 5. More convenient data trail; paperwork can often go uncompleted but electronically stored is faster an easier therefore it gets done effectively. 6. When medical/data audits take place all information is readily available making workflow and procedures faster and smoother 	<ol style="list-style-type: none"> 1. Implementation is complex and challenging 2. Requires extensive training as you need to train all users 3. Requires modification in patient flow hence change management challenges 4. The system is live therefore, If the EMR system fails, clinical services are directly impacted

2.0 Factors to Consider when Procuring an EMR

2.1 Business Functionality

The ideal point to start in procuring an EMR would be conducting a business functionality study.

This process will entail;

- a) **Identify the functional business units**, for example, patient registration & triage, laboratory, finance, clinician's desk and so on.
- b) **User engagement;**
 - I. Identify user groups from these business units.
 - II. Conduct user group survey to establish user and business unit requirements.
- c) **Map out the critical business processes** carried out from each the units while identifying any bottlenecks experienced; both electronic and manual.
- d) **Prioritization key matrix;** develop a prioritization key matrix that categorizes the system functionalities as either *highly* or *lowly* prioritized.
- e) **Categorize the bottlenecks** for a better understanding on how they could be addressed; software, hardware, process re-engineering, human resource, capacity building, etc.
- f) **Study existing architectural framework;** conduct a technical assessment of existing infrastructure to provide a technical requirements gap analysis.
- g) **Document** the technical requirements and user requirements for **sign off**.

The minimum EMR functionality specifications should meet the following functional areas;

- (a) Fundamental patient-related demographic and health information
- (b) Clinical decision support
- (c) Clinical instruction order entry and prescription
- (d) Health information reporting
- (e) Confidentiality & security support mechanisms
- (f) Electronic information exchange

2.2 Platform Selection Framework

A set of technical criteria should be identified forming basis of the platform selection. This will foresee that the solution is compliant to the bare technical minimum standards.

The selection framework should include the following core parameters;

- a) **Configuration model;** client-server (in-house), web hosted access (SaaS) or hybrid.
- b) **Source code** base; Open source versus proprietor-based (closed-source).

- c) **Interoperability**; ability to integrate with other systems and technologies.
- d) **Compliance to standards**; data handling, security, portability, sharing, eHealth principles.
- e) **Scalability**; ability to be used by a large scale of users without affecting its performance.
- f) **Data hosting**; specification on the location where the data is stored; on-shore, off-shore.
- g) **Feature extensibility**; ease in which additional technical features can be incorporated.
- h) **Multi-platform uses**; ability to run off various platforms such as Windows, Android, iOS.
- i) **Feature Provision Vs Business Processes**; EMR feature match to the business needs.
- j) **EMR pricing model**; the acquisition and operational costs should be articulated for purposes of budgeting and resource allocation.
- k) **Technical support**; knowledge transfer mechanisms to in-house software developers and capacity building of end users in training and helpdesk support. Product warranty and SLA should be availed for definition on technical support.

3.0 Key Stakeholder Engagement

EMR systems are beneficial and acceptable if users and key stakeholders are involved in the development process. Unilateral initiatives should be avoided as they are counter-productive in the long run. Successful EMR adoption and EMR sustainability rely in big part on the sense of ownership created by an inclusive and collaborative work approach. Therefore, EMR development and implementation should be participatory and should include all relevant stakeholders before, during and after implementation.

As multiple teams will need to be involved, EMR implementers should not underestimate the time it takes to engage all necessary stakeholders. Successful engagement will take steps described below:

3.1 Developing an EMR Deployment Concept Note

The EMR idea should be presented so that stakeholders at different levels can understand the concept and meaningfully engage in the process of EMR deployment. A concise and easy to understand concept note is advisable. Some of the key principles include:

- a) **Being realistic**: The implementers need to make sure they have thought through the process and resources needed for the EMR project. During the engagement process, the implementer can also draw on existing EMR expertise to further identify resources needed for the EMR development.

- b) **Being relevant:** The implementer should clearly describe the need for EMR including how EMR will improve the quality of care in their facilities. Additionally, EMR projects should be in-line with existing MOHS policies (including but not limited to Data Protection policy) and guidelines including Sierra Leone national digital health strategy.
- c) **Consider long term sustainability:** As much as possible, EMR systems should use locally available resources to ensure long term sustainability. Some of the priorities should include investing in capacity building, using tools adapted for Sierra Leone or other limited resource settings and ensuring the tools can be maintained by local Sierra Leoneans.
- d) **Interoperability:** All EMR applications should be capable of pushing data directly into the MoHS Central Depository for all medical reporting (dhis2)
- e) **Open Source:** MoHS seeks EMR applications that are based on transparent code base, supported by a global community of developers, for improved security and the freedom from lock in.

3.2 Mapping and Engaging Key Stakeholders

The EMR developers and implementers will need to map-out and engage all relevant stakeholders to be involved in the EMR concept development. The choice of the stakeholders will depend on the health facility where EMR will be developed. Different stakeholders will need to be included in the engagement phase. Key stakeholders that must be engaged include:

- a) **Directorates at MOHS including DPPI:** All relevant directorates, including DPPI, should be engaged earlier on to provide guidance during the initial phase. These relevant directorates may help identify other stakeholders to be involved in the planning phase, health programs that should be prioritized, and where necessary, identify where EMR will be deployed. If implementation is at Hospital level, partner must engage the Directorate of Hospitals and Ambulance Services and if at PHU level, the Primary Health Care directorate must be engaged, preferably from inception/concept development stage. If unsure of the appropriate stakeholders or relevant directorate, partner should seek advice from eHealth Coordination Hub at DPPI
- b) **District level leadership:** This includes District Health Management Teams, primary care facility in-charges and hospital management teams
- c) **Users:** This includes all relevant end users including monitoring and evaluation teams, and health care workers
- d) **Patients and other relevant community members:** Health outcomes improves when patients are involved in their own care. Therefore, whenever possible, patients should be engaged to ensure they contribute to the development of EMR systems. Where necessary, other key community stakeholder should be engaged in the EMR development.

- e) **Other stakeholders:** This include other Ministries and agencies such as the National Civil Registration Authority, NGO's and donor community with expertise in EMR or health systems where EMR will be developed.

In the engagement phase, EMR implementers will refine their concept note based on feedback from the different stakeholders. The implementer should document all the stakeholders engaged during this phase

3.3 Engaging the DDPI

3.3.1 Preparation Phase

After engaging all relevant stakeholder to refine the concept note, the EMR implementers will develop a concise high-level project scope document (see appendix for template). At the discretion of the DDPI, the high-level project scope may be presented at the relevant technical working groups for further inputs. Additionally, the project scope should reflect some important points as follows:

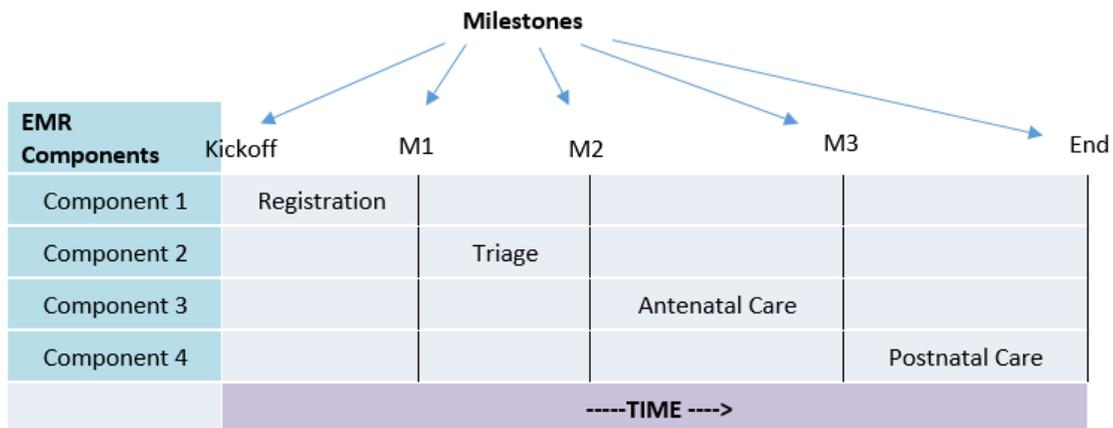
- a) **The rationale for development of EMR:** Detailed explanation of reasons why EMR will be developed and implemented. The project should be linked to improvement in care delivery and existing national policies and guidelines.
- b) **Eligibility criteria for facilities:** The implementers should describe how they identified health facilities where EMR will be developed.
- c) **Choice of EMR:** The implementer should define what tool it is planning to use, justify reasons why they chose those systems, and describe their tool's interoperability with existing MOHS reporting tools, in particular with DHIS2 (more details p.32 figure 10 of the National Digital Health Strategy in Annex). They should also describe if it's proprietary or open source, internet requirements, data storage and privacy of their tools. In general, MOHS recommend OpenMRS, but also considers other tools that communicate with DHIS2, are affordable and cheap to maintain, are not proprietary, can work without internet and have good security to ensure data protection.
- d) **Staff required in EMR development and capacity building plan:** The implementer should adequately describe the plan for training the staff that will manage and support the system when the implementation is finished.
- e) **Detailed partners involved in the EMR development:** The implementer should describe all the partners that will be involved the EMR development. If the organization is new to the country or if an already existing organization is seeking to collaborate with other partners, the MOHS can facilitate the exchange between partners and foster a stronger collaboration through the eHealth Coordination Hub platform that is organized on a regular basis by the DDPI.
- f) **High level sustainability plan:** The implementer should describe how the EMR system will be sustained when the implementation (project) is over, or when the implementer stops supporting the facility where EMR will be implemented. The plan should mention

the people that will be involved in the hand over (the project team including the EMR developers) and the timelines for the transition period. From a budgetary point of view, it is also important to include the project financial sustainability post-implementation.

- g) **Presentation of project concept** at the eHealth Coordination Hub Technical Working Group meeting. Before any EMR is implemented at facilities, the partner must present its idea at the TWG for discussions by both the MoHS and other partners. This will prevent duplication of efforts or inefficient use of resources. It is also an opportunity to know which other partner or donor is interested in supporting similar interventions and at which facilities. It can also help to better improve on the concept to suit local needs and context

3.3.2 During Implementation

At the national level, the MOHS may not monitor every step of the implementation process; however, it is recommended to update the DPPI when important milestones are achieved. These milestones usually mark the successful installation of important system components. Sharing these important achievements with the MOHS is a form of validation, ensuring the project is on the right track. Additionally, the MOHS can provide timely feedback and also obtain timely lessons learnt. Implementer should also make provision for either the eHealth Hub or M&E teams or both to monitor implementation. Below is an example of implementation milestones for a perinatal care EMR implementation.



One of the best ways of sharing lessons learnt when implementation milestone is achieved is by inviting the DDPI and other interested stakeholders to see how the EMR system is working at the facilities. These visits are very beneficial for both the MOHS and the implementing partner, as it gives a chance for everyone to learn from the successes, the challenges and discuss the plans to achieve the next milestone.

At the district level, it is expected that the DHMT (or Medical Superintendent) and relevant district level partners are kept informed of the project progress on a regular basis.

If there are important changes to the initial EMR roll out plan (e.g. Budget cuts) that greatly impact the clinical activities at the facility or at the district level, it is also recommended to inform MOHS as soon as possible to mitigate the impact and look for alternative solutions to maintain the same level medical care.

Additionally, it is highly recommended for implementing partners to attend the regular eHealth hub meetings organized by the DDPI. These are a great opportunity to share to a wider audience the progress of the implementation, inspire other participants with successes achieved and learn from others' implementations feedback to increase its own chances of success.

3.3.3 After the Implementation

When the EMR is completely implemented and functional, there are a few necessary steps to consider as discussed below.

Final project review

Implementers should plan for a final project review meeting with the main stakeholders including the DPPI. This is an occasion for key EMR users and the stakeholders at the facility to exchange lessons learned during the roll out activities. This provides an opportunity to reflect on some of the challenges that were encountered, how the challenges were resolved, some key facilitators and enablers to project success and what can be shared with other stakeholders.

Implementing the sustainability plan

If the implementer will stop supporting the EMR work at the facility after the roll-out is over, sustainability of the project requires handing over the EMR management to the facility (and/or to a 3rd party involved). For sustainability plan to be successful, EMR support system must be clearly planned and handed over to the local team. The EMR support plan should explain how the following will be handled:

- User support
- User trainings
- Configuration and development of new features
- Support on servers works (e.g. upgrades, releases etc.)

For the project financial sustainability, it is the right time to review the initial plan and assess if the situation requires any adjustments such as additional fund raising.

If the facility is supported by MOHS, it is important to include the MOHS stakeholders at each step of the handing over to ensure a smooth handover of the EMR system.

Annexes

1. Project Scope Template

Project Title	
Project Leader	
Project Owner/Sponsor	

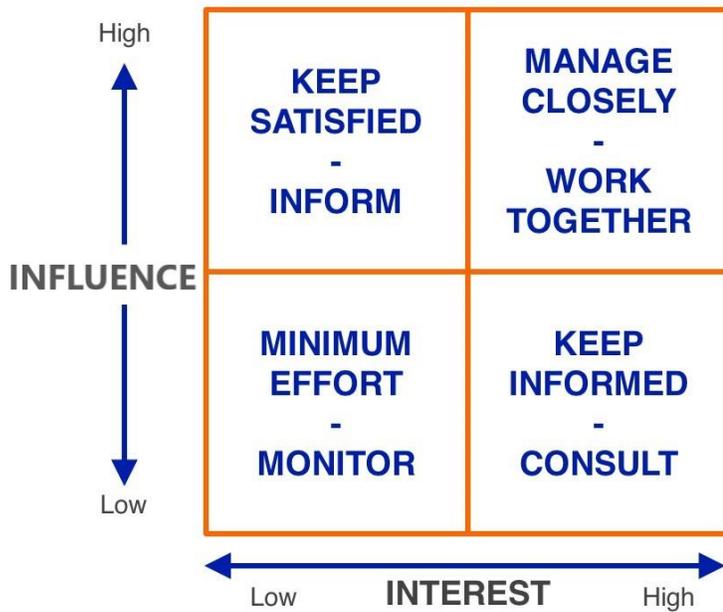
Details of Project

Project Aim and Purpose
<i>Detail the overall aim and purpose of the project. This should be a short statement that captures exactly what the project has to accomplish, (e.g. implement a new patient follow-up system to be used throughout the facility).</i>
Project Deliverables
<i>Detail what will be delivered as a result of the project, (e.g. a software system to track patient visits and patient history; a training package to upskill all managers to use the new system).</i>
Out of Scope
<i>Detail what will not be delivered as a part of the project (e.g. the laboratory information system will remain on paper).</i>
Anticipated Benefits of the Project
<i>Detail the benefits that this project will bring to the facility and the wider health information system (e.g. a performant data reporting system; time saved on producing routine reporting, time saved on looking for patient records).</i>
Project Assumptions and risks
<i>Which groups of the national health system is this project targeting? Which groups of the population will ultimately benefit from this project?</i>

2. Stakeholder Mapping

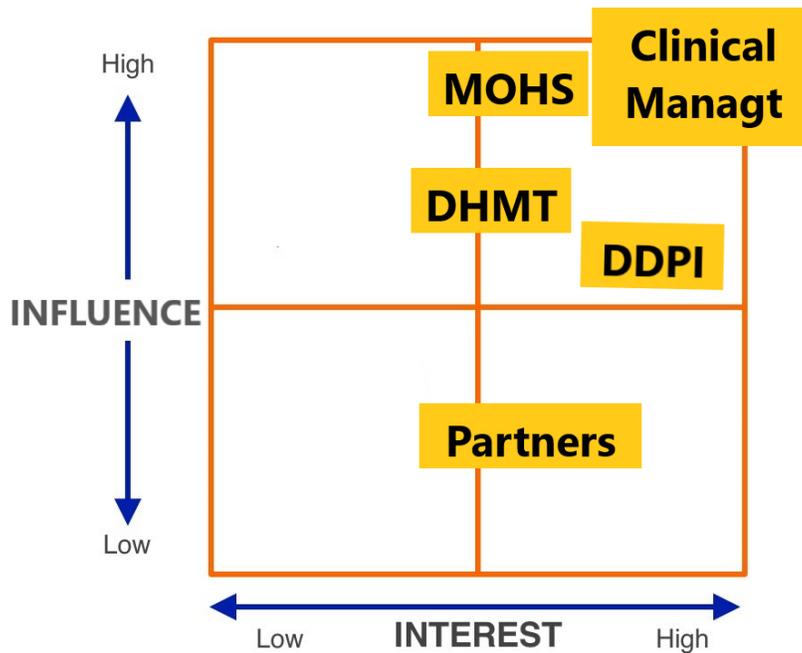
Template

Stakeholders are mapped according to their influence and their interest in the project implementation. It is recommended to keep it up to date as the initial mapping might change over time.



Example

This example illustrates how the mapping might look like for an EMR implementation. The clinical management team members at the facility are the most important group of stakeholders as they are most impacted by the EMR system and they have great influence on its outcome. The MOHS and its affiliates are very important as they need to be at least informed, while some of them such as the DPPI are key collaborators that need to be informed and involved. For an accurate mapping of the ministerial stakeholders and their level of involvement, it is recommended the EMR implementer and the MOHS define the mapping together before the project starts. The aim of this mapping is to make sure that stakeholders with the most influence are kept interested and adequately involved.

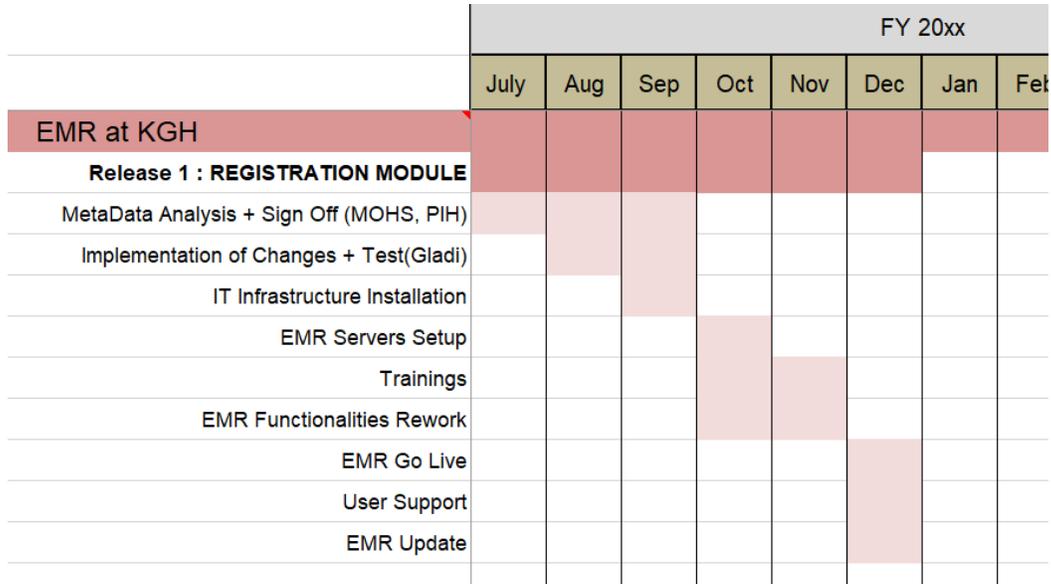


3. High Level Project Timeline

Below is an example from the Wellbody Clinic EMR Implementation in Kono district by Partners In Health (PIH). The project roadmap is divided into software releases that coincide with the major milestones. The roadmap is usually the outcome of the project inception that is led by the implementer before kickoff.

EMR Milestones	EMR Modules
Pre-Implementation: [1 Nov - 11 Dec]	Preparation before Rollout
Release 1: [11 Dec - 21 Jan]	OPD + Triage
Release 2 : [21 Jan - 11 Feb]	ANC Registration/Triage + OPD expansion
Release 3 : [11 Feb - 24 Feb]	ANC Visits + Maternity
Release 4 : [24 Feb - 13 Mar]	Lab Order/Results + Pharma Dispensing
Release 5 : [13 Mar - 31 Mar]	HIV follow up Patient referral/Discharge Summary

The figure below is a detailed project timeline for each release that will be required in later planning stages. This is also an example from PIH for the EMR implementation plan at Koidu Government Hospital in Kono.



4. The National Digital Health Strategy for Sierra Leone (2018-2023)

<https://mohs2017.files.wordpress.com/2019/02/sl-national-digital-health-strategy-nov-2018.pdf>