REPUBLIC OF UGANDA
MINISTRY OF HEALTH

GUIDELINES FOR THE IMPLEMENTATION OF THE ELECTRONIC MEDICAL RECORDS SYSTEM

DIGITALIZATION OF HEALTH FACILITY OPERATIONS

CLINICAL, ADMINISTRATION & FINANCIAL

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Table of Contents

Foreword **vi**

Preface **vii**

Acknowledgement **viii**

Abbreviations and Acronyms **ix**

Key Definitions **x**

1.0 Introduction **1**

1.1 Background 1

1.2 Goal 2

1.3 Purpose 2

1.4 General Objective 2

1.5 Specific Objectives 2

1.6 Scope 2

1.7 Methodology 3

1.8 Guiding Principles Used to Develop this Document 3

1.9 Policy, Reference Guidelines and International Standards 3

1.10 Revision and Updates 4

2.0 User Requirements, Design and Development **4**

2.1 Overall Architecture 4

2.2 Personas/Actors of EMRS 4

2.3 System Functions 6

2.4 Design Process 7

2.4.1 EMRS Design Principles 8

2.5 EMRS Development Process 9

2.6 System Testing 10

2.7 EMRS Upgrades 11

2.8 EMRS Branding 11

3.1 Implementing EMRS **12**

3.1.1 Public Sector Pre-Implementation Requirements. 12

3.1.2 Private Sector Pre-Implementation Requirements. 13

3.2 EMRS Deployment Phase. 13
3.2.1 Health Facility EMRS Work Plan 13
3.2.2 EMRS Deployment 13
3.2.2.1 Local Area Network and Software Configuration and Installation 14
3.2.2.2 EMRS Deployment End User Training 14
3.3 EMRS Post-Implementation Support 18
3.3.1 Continuous Capacity Building and Mentorship 18
3.3.2 Escalation of System Issues. 19
3.4 Transitioning from Other EMRS to MoH Recommended EMRS 20
3.5 EMRS Change Management 21
4.0 Data Management & Reporting 23
4.1 EMRS Data Management 23
4.2 EMRS Reporting 25
4.3 Private Sector EMRS Specific Requirements 27
5.0 Governance Framework 29
5.1 EMRS Implementation Arrangements 30
6.0 Monitoring and Evaluating the Guidelines 35
6.1 Implementation Guideline Use Monitoring 35
6.2 EMRS Deployment Monitoring 36
6.3 Evaluating the EMRS 38
6.4 Dissemination and Adoption of the Guidelines 39
Appendix A: Readiness Assessment 40
Appendix B: Hospital Walkthrough and ICT Assessment Tool 42
Appendix C: Sample Training Schedule 44
Appendix D: Sample EMRS Deployment Budget 46
Appendix E: EMRS Rollout Checklist 47
Appendix F: Standard Operating Procedure for EMR System Downtime 53
Appendix G: EMRS Support Structure 59
Appendix H: System Change Request Form 61
Appendix I: EMRS Guidelines Use Monitoring Framework 63
Appendix J: EMRS Deployment Monitoring Framework 64

Appendix K: EMRS Evaluation Framework **67**

Foreword

This document presents Electronic Medical Records System (EMRS) implementation guidelines for the health sector. These guidelines are intended to standardize the implementation of the EMRS across Uganda's health system. These guidelines are aligned with the Health Information and Digital Health Strategic Plan 2020/2021-2024-2025 and Ministry of Health Strategic Plan 2020/2021-2024-2025.

The Ministry of Health (MoH) is committed to improving the application of digital health technologies to facilitate the attainment of its overall objective of delivering high-quality health services to all citizens. This aligns with the call of Uganda Vision 2040 and the National Development Plan (NDP) III 2020/21 – 2024/25 which require sectors to adopt Information Communication Technologies (ICTs) to optimize service delivery.

The EMRS therefore, is critical for improving the quality of health service delivery at the health facility level through the use of embedded decision support tools and passive data capture. These guidelines aim to support all stakeholders in the implementation and scale-up of the EMRS within the healthcare ecosystem.

These guidelines shall serve as a framework to ensure the proper governance and leadership, rollout and maintenance of the EMRS, while ensuring its sustainability.

All stakeholders are therefore called upon to adopt and use these guidelines while implementing the EMRS.

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Dr. Henry G. Mwebesa

DIRECTOR GENERAL HEALTH SERVICES

Preface

The Electronic Medical Records System (EMRS) implementation guidelines are a major milestone in the journey towards quality, responsive, accessible, and cost-effective healthcare service delivery at the health facility level. A well-developed digital health information system is a fundamental and crucial component of any health system.

The use of the EMRS is not only a key enabler of direct patient care but also a vital tool in health program monitoring. Therefore, it requires the necessary attention and well-planned investment of resources to realise its function. The EMRS implementation guidelines generally align with the goals, and strategies stipulated in the Uganda Health Information and Digital Health Strategic Plan 2020/21-2024/25.

In the past decade, health service delivery in Uganda has registered tremendous improvement. This can be partially attributed to increased funding, technology evolution and use in the health sector, a transformation which has been progressively acknowledged by the Ministry of Health (MoH), its partners and other key stakeholders. The EMRS shall be implemented as a digital job-aid for health workers with reporting as a passive process hence improving the quality of health service delivery at the health facility level.

All stakeholders are therefore called upon to examine the EMRS implementation guidelines, assess their involvement, and thereafter align their present and future Standard Operating Procedures with the guidelines laid out in this document.

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Dr. Byakika Sarah

Commissioner, Health Services

Department of Planning, Financing and Policy

Acknowledgement

The Ministry of Health expresses its profound gratitude to all divisions, departments and programs, members of the Health Information Innovation and Research Technical Working Group who contributed technical inputs leading to the successful completion of this document. Special appreciation goes to the staff within the Division of Health Information Management (DHIM), Information Communication Technology (ICT) Section and the Clinical Services Department for the overall guidance to ensure that the guidelines are aligned with the Health Information and Digital Health Strategic Plan 2020/21-2024/25 and the Ministry of Health Strategic Plan 2020/21-2024/25.

I acknowledge and thank all development and implementing partners that provided financial and technical support for this process, specifically CDC, USAID, METS, SITES and the University of Warwick. DHIM is grateful for all the support, sacrifice and contribution invested in the successful development of these guidelines.

Finally, the Ministry of Health is grateful to the Local Governments including health facilities and all those institutions and individuals who have not been specifically mentioned above, but who directly or indirectly contributed to the successful development and finalization of these EMRS implementation guidelines.

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Mr. Paul Mbaka

Assistant Commissioner Health Services

Division of Health Information Management

Abbreviations and Acronyms

BPR	Business Processes Re-Engineering
BUHIC	Build Uganda's Health Workers ICT Capacity
DHIS2	District Health Information Software version 2
ELMIS	Electronic Logistic Management Information Systems
EMR	Electronic Medical Record
EMRS	Electronic Medical Record System
ERP	Enterprise Resource planning
HL7	Health Level 7
HMIS	Health Management Information System
HW	Health Worker
ICD	International Classification of Diseases
ICT	Information and Communication Technology
LAN	Local Area Network
M&E	Monitoring and Evaluation
SDP	Service Delivery Point
SMS	Short Message System
SNOMED CT	Systematized Nomenclature of Medicine - Clinical Terms
SOP	Standard Operating Procedure
SRS	System Requirements Specification

Key Definitions

Term	Definition
Business Process Re-engineering (BPR)	A business management strategy focusing on the analysis and design of workflows, and business processes within an organization.
Electronic Medical Record (EMR)	An electronic record of health-related information on an individual that can be created, gathered, managed, and consulted by authorized clinicians and staff within one health care organization.
Electronic Medical Records System (EMRS)	A single system or collection of integrated systems that automate both clinical and administrative processes in the health facility settings.
Functional requirement	A requirement that describes in detail the programmatic or project needs and/or requested behavior of a system or component. It specifies what the finished system or component is expected to do and how a user shall interact with it.
Health Facility	Refers to Dispensary, Health Center, Hospital, Clinic etc.
Health Level 7 (HL7)	A flexible standard by which various health care systems communicate with each other; it is typically used for transmission of patient level data.
International Classification of Diseases (ICD)	A statistical classification system used to assign diagnostic and procedural codes in order to produce coded data for statistical analysis, epidemiology, reimbursement and resource allocation.
Interoperability	Ability for a system to securely communicate and exchange data in an accurate, reliable, and meaningful way with another information system so that the clinical or operational purpose and meaning of the data are preserved and unaltered.
Management Information System (MIS)	A computer-based system that provides managers with the tools to organize, evaluate and efficiently manage departments within an organization.
Non-functional requirement	A requirement that specifies criteria that can be used to judge the operation of a system, rather than specific behaviors.

1.0 Introduction

1.1 Background

The Ministry of Health (MoH) is committed to improving the application of digital health technologies to facilitate the attainment of its overall objective of delivering high-quality health services to all citizens. This aligns with the call of Uganda Vision 2040 and the National Development Plan (NDP) III 2020/21 – 2024/25 which require sectors to adopt Information Communication Technologies (ICTs) to optimize service delivery.

The Ministry of Health has prioritised digital health interventions as laid out in the Ministry of Health Strategic Plan 2020/21 - 2024/25 (HSP). The plan advocates for "Acceleration of health research, innovation and technology development" as a means of improving health service delivery. This has further been detailed in the Uganda Health Information and Digital Health Strategic Plan 2020/2021 - 2024/2025. The vision of the strategic plan is a health sector in Uganda driven by evidence and leveraging digital health to improve efficiency in service delivery.

Digitising health facility operations is aimed at reducing the burden of reporting stemming from the use of paper-based tools and subsequent data quality issues. Significant improvements in health service delivery has been reported in health facilities utilising the Electronic Medical Records System (EMRS). The main achievements registered so far are reduced reporting burden and improved data quality.

However, the processes related to implementation such as service workflow re-engineering, functionalization of health analytics, meaningful information exchange, and governance of EMRS have been mostly undefined to date. As Uganda continues on her journey to implement EMRS nationwide, there is a need for implementation guidelines to direct operationalization and support the achievement of intended results.

1.2 Goal

Health facility planning and operations driven by evidence, leveraging digital health solutions to improve health service delivery.

1.3 Purpose

The guidelines seek to establish an effective, transparent and accountable framework for the implementation of the Electronic Medical Records System.

1.4 General Objective

To standardize the processes and implementation of the Electronic Medical Records System in the health sector.

1.5 Specific Objectives

1. Formulate and functionalise an appropriate governance framework for the implementation of EMRS.
2. Define and standardise the processes for introducing, scaling, transitioning and sustaining the EMRS.
3. To define the minimum functional and nonfunctional requirements for specific digital tools and systems in health facilities.
4. Ensure interoperability of the EMRS with other Ministry of Health data systems to facilitate efficient referral, commodity tracking, reporting and surveillance.
5. Establish appropriate change management strategies to foster the use of the EMRS.

1.6 Scope

All health service delivery points within the health facilities in both the public and private sectors shall follow these guidelines and procedures in their operations. These guidelines are intended for the following audiences:

a. The Ministry of Health Departments and Programs
b. Local Government

c. Public and Private Health Facilities
d. Facility Health Workers
e. Technology and Implementing Partners
f. Development Partners and Donors/Funders
g. Researchers
h. All other Relevant stakeholders

1.7 Methodology

A highly consultative approach was used in the development of the EMRS guidelines. Stakeholders from various entities such as the Ministry of Health (MoH), Local Governments (LGs), Development Partners, Technology and Implementing Partners, Academia and other members of the Health Information Innovation and Research Technical Working Group (HIIRE TWG) supported the generation of a draft which was reviewed and later validated.

The validated guidelines were endorsed by the Ministry of Health's HIIRE TWG and the Senior Management Committee (SMC), and approved by Top Management for implementation within the health sector.

1.8 Guiding Principles Used to Develop this Document

1. Client Centered
2. Equity
3. Privacy and Integrity
4. Efficiency
5. Transparency and Accountability

1.9 Policy, Reference Guidelines and International Standards

These guidelines are premised on the following existing frameworks;

- The National Health Policy (NHP) III
- Ministry of Health Strategic Plan 2021/2025
- Uganda Health Information and Digital Health Strategic Plan 2020/21 - 2024/2025
- Uganda Digital Health Enterprise Architecture, Standards and Knowledge Guidelines

1.10 Revision and Updates

These guidelines shall be reviewed and any proposed changes documented annually to maintain relevance and/or responsiveness to an evolving healthcare ecosystem and context. Relevant sections that shall need to be added to the document shall follow the standard MoH approval processes. A new version number and date of approved updates shall be documented.

2.0 User Requirements, Design and Development

This section details the process for the generation of user requirements that inform the system functionality and subsequent iterative system development and/or enhancement. For the Public Sector, the Division of Health Information Management (DHIM) shall coordinate the user requirements, system design and development process and provide overall guidance during this phase with oversight from the HIIRE TWG. During this phase, the MoH ICT Unit shall be engaged to assess and guide on the system hosting requirements as well as other technical inputs such as security. For the Private Sector, health facility ownership will guide the user requirements, design and development process.

2.1 Overall Architecture

The EMRS is part of the wider Uganda Health Information System architecture ensuring the interoperability of the EMRS with other Ministry of Health data systems to facilitate referrals, commodity tracking, reporting, analytics, and surveillance (including linkage to the eHMIS).

The EMRS fits within the overall enterprise architecture under the applications segment as further described in the Uganda Digital Health Enterprise Architecture, Standards and Knowledge Products Guidelines.

2.2 Personas/Actors of EMRS

The delivery and management of health services at the health facility level involves multiple actors, who play different but complementary roles. The following subsections describe the characteristics and roles of each of the personas of the EMRS.

a) Client

The client is the primary recipient of health services at the health facility level. Health facility clients fall into one or more cohorts defined by sex, age group, pregnancy status, health and nutrition status et cetera. These characteristics should be taken into account when enrolling health facility clients into specific health facility services. Health facility services include but are not limited to casualty and emergency, clinical consultation, radiology, laboratory, pharmacy and dispensary, mortuary, outpatient services including but not limited to immunization, maternal and child health, dental, eye, counseling, family planning, health promotion, nutrition, Antenatal Care (ANC), Postnatal care (PNC), and inpatient services but not limited to maternity, intensive care, among others. Caregivers of clients receiving health services are also included in this group. The clients shall be registered within the EMRS and services delivered to them tracked longitudinally.

b) Health Workers

The Health Worker is the primary agent of health service delivery at the health facility level. Their main role is to provide health facility services while passively collecting key program data. Health Workers shall utilize the EMRS to deliver quality health services and capture and use data for operational decisions such as tracking commodities, defaulters and referrals to higher-level health facilities. Health Workers include Clinicians, Nurses, Records managers, Radiologist, Laboratory Technicians, Surgeons, Consultants, and Supply Chain In charges among others.

c) Health Facility Supervisors

Health Facility Supervisors are responsible for managing the delivery of health services at the health facility level. Health facility supervisors oversee service delivery points within their area of assignment and provide support to other health workers. The involvement in the day-to-day health facility operations is supervisory and aimed at assessing and promoting service quality. Other tasks include training, mentoring and coaching health workers and also performing routine health data quality checks. Health facility supervisors shall access EMRS dashboards and supervisor views constituting key information necessary to provide insights on how best they can supervise and support the health workers.

d) Local Government

The Local Government shall be responsible for the management of healthcare programs at the local government level. The Local Government shall lead and coordinate the implementation of the EMRS at local government level (districts and cities). The Local Government shall access the EMRS through dashboards and reports for routine performance monitoring and evaluation, program monitoring, support supervision and reporting to enable evidence-based decisions.

e) Ministry of Health

The national-level team at the Ministry of Health is charged with the responsibility of system administration, technical programming aspects, supervision, resource mobilization, and planning. Escalation of any issue concerning the EMRS shall follow the application hierarchy right from the health workers at the health facility level to the national level.

2.3 System Functions

The software requirements and system functionality documentation shall be developed and maintained as the Electronic Medical Records System Software Requirements Specification document. The document shall be updated quarterly based on user feedback, design sessions, User Acceptance Tests, logged system issues, user requirements review, consultative engagements with key stakeholders, following Health Management Information System (HMIS) revision among others.

Overall, the patient workflows within the EMRS shall follow the Uganda Clinical Guidelines.

Below is a summary of key functionalities as a minimum and that shall further be customized according to the user requirements documentation.

Patient Registration and Management	● Registration of patients or clients. ● Managing new and already existing patients in the system. ● Assign a unique identifier to new patients.

Client Referral	● Internal referrals within the facility from one unit to another or amongst the different consultants with-in the same unit. ● Referrals to facilities below the level of the referring facility, at the same grade or a grade above.
Stock Management	● Commodity dispensing, adjustments and stock status monitoring in stores, pharmacy, laboratory and wards.
Disease Surveillance	● Reporting suspected cases of notifiable diseases and events of public health interest.
Analytics and Reporting	● Generating real-time case-based and aggregate client reports and analytics to drive evidence-based decision-making.
Data & Process Validation	● Validation rules that shall enable the verification of data and processes to ensure adherence to set standards before a user is able to save a record. ● Management of patient records.
Decision Support	● Functionality to ensure that the health worker's decision-making capability is improved.
System administration and Security	● Configuring the system with organizational hierarchies, users, user roles, commodities and security mechanisms. ● Should be interoperable with approved Ministries, Department and Agencies information systems. ● Ensure health data protection, privacy and confidentiality.

2.4 Design Process

A strong system design is crucial to the development and functionalization of the EMRS to produce real-time quality information for patient information management and decision-making. Through the design process, developers and programme teams understand the healthcare processes, persona user stories, unique data use requirements for each persona, the different healthcare workflows and

how they are delivered at the health facility level, the way users interface with the EMRS, and how to continue to build for interoperability.

The human-centred design approach and analytical development methods will be used to understand the user requirements while considering the bottlenecks and challenges that users face.

The human-centred design takes a bottom-up approach and focuses on understanding an intervention's users or stakeholders. It seeks to understand how people do their work, how they perceive their health services, and how they experience challenges and may envision solutions.

While the analytical approach focuses on breaking down the process into the elements necessary to solve it and takes a top-down approach. An analytical approach will often require an expert mindset (consultant/technology firm) to collect information about how the intervention works in a linear, causal process. The outcome is information-oriented, resulting in a user requirements document or report.

Therefore a participatory approach that allows users and stakeholders to contribute to the design and development process will be used in a blended manner, that is to say, utilizing both human-centered design and the analytical approach.

For the Public Sector, the Division of Health Information Management will lead the design and development process working with other relevant partners, departments and programs such as the Clinical Services Department, Maternal and Child Health Department, Expanded Programme on Immunization, AIDS Control Program, Tuberculosis and Leprosy Program, Environmental Health Department, Malaria Control Division, Nutrition Division among others.

For the Private Sector, health facility ownership will lead the design and development process following established guidelines and standard operating procedures.

2.4.1 EMRS Design Principles

The EMRS design principles shall guide every step throughout the EMRS design and development processes.

1. **Usability:** Design and develop the EMRS application in a way that shall minimize the complexity for end users interacting with it.
2. **Scalability:** Should be capable of continuing to perform as the EMRS scales both vertically and horizontally over time in terms of enrolling end-users, data management and use.

3. **Availability:** Ensure both system and data is available to digital health applications and their end users whenever needed (within the bounds of confidentiality) to guarantee client safety and business continuity.
4. **Interoperability**: Foster interoperability of the EMRS with other relevant digital health systems as per the digital health enterprise architecture.
5. **Collaboration:** Adopt a governance approach that includes multi-sectoral stakeholders in the decision-making and management of EMRS design and development.
6. **Open standards:** Use internationally accepted standards that promote interoperability for data, workflows, and technology.
7. **Data quality and integrity:** Follow accepted data standards and create measures to uphold the integrity and reliability of data captured, processed or stored by the EMRS.
8. **Ethics:** Equity, safe use, data privacy and protection: These principles are vital for ensuring the social inclusion of the EMRS.
9. **Access control:** Enforce mechanisms to restrict access to both the system and data stored within the system.

2.5 EMRS Development Process

The development process will follow a streamlined Software Development Life Cycle (SDLC). A Systems Requirements Specifications (SRS) document detailing both functional and non-functional requirements will be developed in line with the user requirements gathered.

The SRS document will then inform the Systems Design Document (SDD). Both documents will be presented to the stakeholders including target user departments or units for validation and sign-off.

The System development process will, where possible, employ locally available resources to reduce reliance on external sources. It is, however, recognized that some desired technical skills and capacity may not be available within the Ministry of Health, sponsoring or implementing organisation or in the country and will be outsourced according to the Government of Uganda procurement guidelines where applicable or otherwise according to the sponsoring entity's procurement guidelines.

To ensure a user-centered design approach and quality software, the Agile development model will be applied during the development process with extensive consultation and interaction with the end users. Key stakeholders will be engaged during these steps from the Ministry of Health relevant

departments and other line state agencies including but not limited to the Ministry of Information Communication Technology and National Guidance (MoICT&NG), National Information Technology Authority Uganda (NITAU), National Identification and Registration Authority (NIRA), Uganda Bureau of Statistics, and Local Governments to ensure interoperability and that other key requirements for the system are addressed.

2.6 System Testing

The EMRS testing will comprise both internal system tests that will focus on technical aspects of the system and User Acceptance Testing (UATs) where feedback on the developed/improved system shall be solicited.

a) Internal system tests

The Internal system tests will focus on technical aspects that will ensure system performance such as integration testing, unit testing, and functional and non-functional testing among others. These tests will be conducted by the technology partners, the MoH ICT Section and DHIM. A report on internal tests will be developed, maintained and signed off by the Ministry of Health (DHIM).

b) User Acceptance Testing

User Acceptance Testing (UAT) will be part of the software development process that focuses on real-world testing by the intended end users.

UATs will be conducted for every software developed, revised workflows, new features, integrations, system enhancements or upgrades.

A UAT report will be compiled and shared with relevant stakeholders through existing governance structures, the report will incorporate feedback from users and the proposed system improvements.

A meeting with relevant stakeholders will be held to discuss the report and a road map to address the issues raised will be agreed upon.

The User Acceptance Testing report will be signed off once all the raised issues are addressed and validated by the user departments. For the Public Sector, the Division of Health Information Management will be responsible for the sign-off of UATs while for the Private Sector, the ownership of the health facilities will sign off the UTAs.

2.7 EMRS Upgrades

The EMRS shall be updated from time to time to ensure enhanced system performance. System upgrades shall be categorised into major upgrades and minor upgrades.

All upgrades shall be tested comprehensively to minimise system downtime. For major upgrades, the EMRS shall be upgraded annually to the most stable update available and the version shall be updated in the software inventory system.

All health facilities implementing EMRS shall have the same version of the system and therefore a mechanism shall be put in place to ensure uniformity in rolling out updates for EMRS across all health facilities.

2.8 EMRS Branding

Public Sector EMRS shall be branded to have a national outlook consistent with the national information systems for purposes of ownership.

The EMRS shall have the following branding;

1. The Uganda Emblem and Flag
2. White Background
3. Link to the Ministry of Health's Health Information System Privacy Notice
4. MoH Contact Details
    a. Website - https://www.health.go.ug
    b. Email - hmissupport@health.go.ug
    c. Address - Ministry of Health, P.o.Box 7272, Plot 6 Lourdel Road, Kampala - Uganda

The office in charge of communication at the Ministry of Health shall guide further on the EMRS branding to ensure a national outlook.

EMRS in the Private Sector shall be branded following the guidance on branding by the ownership of the health facilities where the EMRS is to be deployed.

3.1 Implementing EMRS

3.1.1 Public Sector Pre-Implementation Requirements.

This section guides the requirements and activities that need to be done before implementation activities start.

1. **EMRS National Rollout Roadmap**

   The rollout of EMRS shall be aligned to the National Digitization Roadmap developed and updated by the Ministry of Health. The roadmap details areas of priority, timelines, rollout plan and geographical coverage.

2. **Implementation Approval by MoH**

   Implementation of the EMRS in the public sector shall be approved by the Ministry of Health to ensure alignment with the National Digitization Roadmap.

   The Ministry of Health is responsible for providing overall coordination of all parties involved in the process, including but not limited to taking the lead in inception, reviewing progress, continuing implementation efforts, and monitoring compliance with all EMRS to be implemented. All parties intending to implement EMRS should seek guidance and approval from MoH before engaging Local Governments. As part of the approval process, the implementation plan shall be presented to the EMRS Working Group responsible for coordinating the implementation of the EMRS.

   Private sector implementers of the EMRS shall be guided by the MoH on how best to achieve alignment with the National Digitization Roadmap and for further technical support.

3. **Readiness Assessment**

   A readiness assessment using the Readiness Assessment Tool (**Appendix A**) for the proposed health facilities shall be conducted to check the readiness of the facility to support the rollout of the EMRS. This shall check if resources are planned to support the rollout of the EMR in the selected health facility and this includes but is not limited to; finances, human resources, hardware, and software. A detailed hospital walk-through focused on the Information Communication Technology (ICT) needs for the health facility utilising the ICT assessment

template in **Appendix B** shall also be conducted to quantify the ICT gaps and inform the budgeting process.

4. **National Trainer of Trainers**

   A national team shall be comprehensively trained following an updated standard training guide on the use and support of the EMRS before the rollout of the EMRS at the national and sub-national levels. This is to ensure there are adequate human resources at the national level to support further training and mentorship at the health facilities that have adopted the use of the EMRS. A comprehensive database of national trainers shall be maintained and updated regularly to include trainers from the health facility levels to avoid attrition of the Trainer of Trainers.

3.1.2 Private Sector Pre-Implementation Requirements.

Private Sector pre-implementation requirements shall be guided by the ownership of the health facilities which shall also determine the choice of EMR to be deployed.

3.2 EMRS Deployment Phase.

3.2.1 Health Facility EMRS Work Plan

The health facility with the support of the MoH and partners shall develop a detailed EMRS deployment work plan and budget following the sample training schedule in **Appendix C** and sample EMRS deployment budget in **Appendix D** detailing how the health facility shall roll out and coordinate the deployment of the EMRS within the health facility.

The work plan shall clearly indicate when the deployment shall be scheduled, the resources to support the deployment, and key persons leading on activities among others. The plan shall also include how the entire exercise shall be supervised and supported including pre and post-deployment support.

3.2.2 EMRS Deployment

In this phase, the EMRS shall be introduced to the National and Regional Referral Hospital Management, Local Government leadership and Health Facility Teams Leadership . This stage shall include training of health teams and the deployment of the EMRS shall strictly observe 100% digitisation of the health facility for efficient health service delivery, reporting, and accountability.

3.2.2.1 Local Area Network and Software Configuration and Installation

Deployment of the EMRS shall include the following installation of the computing infrastructure including the Local Area Network (LAN) and computing devices like servers, deploying and configuring the new EMRS software in its target environment and EMRS software acceptance testing.

EMRS deployment end-user training shall not commence until all the needed computing infrastructure i.e LAN has been installed within the health facility and tested for functionality.

The computing infrastructure installations shall be signed off the health facility in charge once successful tests have been conducted with a test report shared with the health facility in charge and the Ministry of Health IT Section or the respective private sector health facility ownership.

Once the computing infrastructures have been installed, the next step is the configuration and installation of the EMRS software. The installation shall include server and software installation. This shall be done before the commencement of the EMRS deployment training.

The health facility IT staff shall be trained on how to manage the installed computing infrastructure before handover of the same to the health facility administration.

3.2.2.2 EMRS Deployment End User Training

The EMRS deployment training shall include the following: basic computer training, EMRS software end-user training and ICT governance training for managers. This shall follow the processes below;

a) Entry Engagements

National and Sub-national level leadership engagement to introduce the program, seek political support, and discuss resource mobilization shall be held. The leadership to be targeted at the various levels shall include but not be limited to the following Hospital Directors, CAO, RDC, LC5, DHO, DISO, DPC, District Biostats, and Health Assistants among others that shall apply to all Local Governments. This shall apply to similar structures for cities and municipal councils. Where regional and local government level partners exist within the Regions and Local Governments, these shall be part of the engagements as well.

For the Private Sector, engagements shall be guided by the health facility ownership.

b) Device Custody and Management Plan:

Information Communication Technology devices procured by MoH or partners shall be declared to the national and sub-national leadership before hand over to the facilities. At the national and regional levels, the inventory shall be captured within the health facility inventory list. While at the local government level, the ICT equipment shall be captured within the local government and health facility inventory lists for purposes of tracking.

All devices shall be engraved to enable easy identification and tracking, the engravement numbers for the ICT equipment shall be captured within the inventory lists.

The ICT devices handed over shall be distributed according to the Health Facility EMRS Digitisation Plan and ensure all service points are well equipped. The devices shall also be redistributed depending on the need of the health facilities to ensure rational use of the ICT equipment.

Sensitive equipment like servers shall be maintained by ICT National level teams, Hospital Information Technology staff and Local Government ICT staff. Any other cadre shall seek clearance for example Partner ICT staff shall seek clearance from the health facility leadership.

Both private and public health facilities shall plan and budget for maintenance costs associated with the continued use of the EMRS.

c) On-Boarding Training

1. Pre -Training/Preparation Phase

The training team shall ensure that all requirements detailed in the EMRS deployment checklist (**Appendix E**) are met ahead of the training.

2. Regional and Local Government Level Training of Trainers

The trainer of trainers and supervisor training shall follow the updated standard training guide. Participants to be trained as ToTs and supervisors shall include, IT Officers, Biostatisticians, Medical Records Officers, Clinicians and Partner

Representatives. ToTs and Supervisors shall be trained on the EMRS for a **minimum of five (5) days** following the training guide and training scheduled (**Appendix C)**.

3. Training of Health Workers

The health workers' training shall follow the established training guide that shall entail all the service areas in EMRS appropriate for the level of the health facility. Health workers shall be trained on service areas for a minimum of five (05) days and on the digital aspect for a minimum of eight (08) days in class not exceeding 65 health workers each.

The eight days training on digital aspects shall include the basic ICT training aligned to the Build Uganda's Health Workers ICT Capacity (BUHIC) curriculum. The ICT basic training is aimed at providing basic computer skills needed for users to use a computer. Where possible, the ICT basic training shall be conducted prior to the training of health workers on EMRS by the national or local government level teams.

The training on health workers shall be conducted on a training instance that shall be easily distinguishable from the production or live system. Health Workers shall be availed with training credentials to the training instance once training on the digital aspect commences.

Health workers shall be subjected to a mandatory test before and after training on the EMRS to assess the extent of knowledge transfer. A minimum of 70% shall be obtained by a health worker before successful completion of the training.

Failure by the health workers to obtain the mandatory 70%, the health workers shall be re-trained on the service areas and the EMRS and subjected to a second test.

Failure by a health worker to obtain the mandatory 70% pass mark on a second attempt, the health worker shall be monitored closely and mentored during their use of the EMRS within the health facility.

d) On-Boarding to the Production EMRS

1. **Configuration and Health Workers Activation in the Production/Live Instance**

   Upon completion of training of health workers or targeted system users, their accounts shall be configured with their user profiles in the production/live instance of the EMRS and their training accounts deactivated in the demo/training system.

2. **Tooling and Reintegration into the Facility Structure**

   The trained users shall be equipped with the necessary work tools including but not limited to the digital job aids, EMRS user guide, links to important resources like the Ministry of Health E-Learning platform among others for reference purposes and further support.

   The trained health workers or targeted system users shall switch to the use of the EMRS within five (5) days after the successful completion of the EMRS training.

   After the five (5) days of transition, the HMIS manual registers shall only be used as a backup mechanism in the event the EMRS is non-functional as per the Standard Operating Procedures of the EMRS Downtime as indicated in **Appendix F**. Once the EMRS functionality has been restored, all the data captured using the manual registers shall be transferred as the Standard Operating Procedure.

e) Deployment Phase Closure and Signoff

Once the training has been concluded or aborted, the health facility leadership shall be briefed on the progress, findings and recommendations of the deployment phase.

An activity report shall be generated by the technical team supporting the EMRS deployment and signed off by the health facility in-charge or any other person delegated by the health facility in-charge. A copy shall be kept at the health facility and another shared at the national level by the team lead within 7 days of the closure of the activity.

All accountabilities shall be retired and outstanding issues settled within 14 days after exit from the local government or health facility.

3.3 EMRS Post-Implementation Support

3.3.1 Continuous Capacity Building and Mentorship

This section includes modalities of conducting continuous capacity building and mentorship post-deployment of EMRS. Relevant courses targeted at building health workers' capacity post-EMRS deployment training shall be uploaded on the Ministry of Health eLearning platform to enable virtual training. This shall be accessed https://elearning.health.go.ug/. The portal shall be kept with updated EMRS training courses like basic ICT skills courses i.e. Build Uganda's Health Workers ICT Capacity (BUHIC) and EMRS courses for health workers to access online for purposes of refresher training. This shall be part of the sustainability plan to ensure the building of health workers' capacity.

The online training portal shall be supplemented by the following activities;

a) Support Supervision and Mentorship

A team from the National Level guided by reports generated from the EMRS shall make support supervision visits to targeted EMRS-implementing health facilities quarterly. Intern, implementing health facilities shall conduct quarterly support supervision to targeted health facilities under their supervision.

The Ministry of Health Standard HMIS Support Supervision tool shall be used for this purpose and findings thereafter discussed with all stakeholders with clear action points and well-defined timelines.

The health facility administration shall routinely perform support supervision and give feedback on areas of improvement and areas of good performance.

b) Quarterly Performance Review Meetings

The EMRS performance review meeting shall be integrated into the local government and health facility quarterly performance review meetings to review the general performance of facilities, EMRS performance, uptake, data quality gaps identification, and develop improvement plans.

c) Refresher Training

1. One full day monthly training for a minimum of three months consecutively after the

initial deployment of the EMRS shall be conducted and thereafter a minimum of three quarterly refreshers shall be held. The training shall majorly be informed by the system changes, knowledge gaps identified in terms of system utilization, staff changes, poor performance as guided by the monthly report, complex workflows and modules as identified by the Health Workers (System Users) or their supervisors, and new modifications in existing workflows among others.

2. Thereafter yearly refresher training is recommended to address any area of interest as may be pointed out by the national and subnational levels or informed by changes to the system.
3. Training on any new or updated workflow or system shall be scheduled on a need basis.

d) Health Information System Support Teams

Further capacity building of the health facility staff shall be built through the Health Information Systems (HIS) support teams. The HIS Support is a multi-sectoral approach to harness resources relating to infrastructure, human resources, and overall capacity for the proper functioning of digital health solutions.

Health facilities shall leverage support from both the government and partners to address their capacity gaps. The HIS Support teams shall be linked to the national level through the levels of support.

3.3.2 Escalation of System Issues.

System users shall utilise the support structures in place and communication channels to escalate any system issue, downtime or feature that is needed for continued improvement of the EMRS. The support structure is 5 tier (0-4) to support the various levels of EMRS implementation with the escalation procedures in **Appendix G.**

The tier three (3), expert technical support at the national level shall be engaged through official communication channels established and elaborated below;

1) MoH Call Center

The call center shall be the first point of contact for all help requests that originate from the end users of the EMRS at different levels. In the event that the call center team is unable to

resolve the issue, they shall be responsible for escalating tickets to the respective support teams. Issues shall be logged in the call center Customer Relationship Management (CRM) software for tracking and management until they are resolved. The current available toll-free number is 0800-100-066.

2) **Help Desk**

   The Ministry of Health help desk shall be utilised to support the help desk functions of logging and tracking the EMRS end-user requests that come in, delegation to a responsible person for resolution, escalation of complex issues and managing the feedback to the end users. The Ministry of Health help desk shall be accessed through the URL:https://helpdesk.health.go.ug/

3) **Emails**

   EMRS end users shall request help or inquire about EMRS through the official HIS support email address is hmissupport@health.go.ug

4) **Health Information System Community of Practice**

   HIS Community of Practice online platform accessed through https://cop.health.go.ug/ shall be utilised to solve common system issues. Some of the system user issues could have been solved in the past and the solutions exist on the HIS Community of Practice webpages. Any new system issue shall be posted and solutions proposed by stakeholders to facilitate knowledge sharing and promote practical solutions.

Other information channels like phone calls, and social media like WhatsApp and Text messages shall be utilised to escalate system issues for users to be able to get the needed support.

3.4 Transitioning from Other EMRS to MoH Recommended EMRS

Transitioning of health facilities using the organization or disease-specific or non-comprehensive EMRS shall follow sections 3.1 to 3.2 with the following emphasis;

1) Local Government engagement meetings shall involve the affected health facility supervisors and any partners supporting the specific EMRS to be discontinued.
2) An inventory of the already issued devices used in the rollout of the EMRS to be discontinued shall be handed over to the local government management for inclusion in the local government inventory and tracking.

3) The health facilities shall work with technical teams on the ground to ensure the database from the EMRS to be discontinued is backed up and a copy kept by the health facility on an encrypted device. A copy of the same shall be kept at the Ministry of Health data centre as a backup mechanism.
4) Private health facilities shall ensure that the data from the EMRS to be discontinued is backed up and safely kept following the ICT policy or backup procedures in place.
5) In some cases, with clearance from the Ministry of Health for public health facilities, the old EMRS may be kept functional and operational depending on the unique need the EMRS is servicing i.e it may be specialized and may not warrant replacement within a specific clinic of speciality. In that case, two EMRS shall be utilized within the health facilities until further guided by the Ministry of Health.

3.5 EMRS Change Management

This guideline ensures standardized methods; processes and procedures are used for all changes, and maintain proper balance between the need for change and the potential detrimental impact of changes. Effective change management is very crucial in Health facility settings for controlling changes to EMRS and other supporting systems within the live Health facility environment.

Changes to all information processing facilities, systems, software, or procedure shall be strictly controlled according to formal change management procedures.

1. **Change Initiation:** All system changes shall be initiated by filling in the system change request form (**Appendix H**) form, which shall be signed by the respective heads of department.
2. **Change Authorization:** Authorization for any changes, whether urgent or not, shall be given by the head of the Division of Health Information Management. If satisfied that the reason for the change is sound and that there is no adverse effect as a result of the change.
3. **Testing of Changes:** All testing shall be done from a test environment. No change shall be applied to the live/production environment without having been tested in the test environment.
4. **Change approval:** The concerned user departments shall check the system to see whether the results produced are as expected and a user acceptance testing (UAT) form shall be signed off.

5. **Change Scheduling:** To minimize disruption to the normal working operations of the health facility, no changes shall be effected in the system during normal working hours unless absolutely necessary. All changes shall be scheduled during weekends, public holidays or after business working hours.
6. **Change Communication:** All planned system changes shall be communicated in advance to the concerned parties to minimize business disruption and inconveniences. For the avoidance of doubt, no scheduled system change should be effected in the live EMRS during a busy business cycle.
7. **Change Recovery and Safety Measures:** Before effecting any change in the production environment, a backup on a clearly labelled storage media shall be taken and kept for good. In the event that the change made produces unexpected results, the backup taken before the change was effected has to be used to restore the system to the point before the change.
8. **Change Documentation and Tracking:** All system changes, whether approved or not shall be documented and filed. The documentation shall include a duly completed and signed-off "change request form", the test results and any other comments/documents used.

4.0 Data Management & Reporting

Effective data management for EMRS is critical to ensure data accuracy, security, privacy, and accessibility while maintaining compliance with legal and regulatory standards.

Compliance with the Personal Data Protection and Privacy Act 2019 is critical as the EMRS collects individual-level data which is classified as personal data according to the law. To ensure compliance with the law, the Uganda Health Data Protection, Privacy and Confidentiality Guidelines shall be followed while implementing the EMRS in the health facilities. Below is further guidance on specific activities;

4.1 EMRS Data Management

1. **Data Entry and Standardization**
    a. All data entered into the EMRS shall on a minimum conform to the primary national Health Management Information System (HMIS) tools approved by the Ministry of Health.
    b. Health facilities shall implement regular audits and training programs for users to ensure accurate and timely data entry.
2. **Data Security**
    a. The EMRS shall implement a Role-Based Access Control (RBAC) to limit access to sensitive data based on job roles and responsibilities.
    b. User credentials (username and password) shall not be shared with any other person besides the account holder.
    c. Regular security assessments shall be conducted periodically to identify and mitigate vulnerabilities in the system.
    d. Only health facility staff shall have access to the individual level data or records for clients within their health facility. The district and national levels shall have access to system reports with the exception of the time during responses to public health emergencies like outbreaks for surveillance purposes. However, only access to relevant data shall be granted.
    e. Official or approved emails shall be used to share EMRS reports to avoid disclosing sensitive information.

f. **Section 3** of the Ministry of Health ICT Policy Guidelines shall be followed to ensure system and data security.

3. **Data Backup and Recovery**
    a. Automated backups for the EMRS at the health facilities shall be established with offsite storage for disaster recovery. The backups shall be conducted on a daily basis during the off-peak hours to minimise system interruption.
    b. All system and data backups shall be tested on a monthly basis to ensure they are functional.
    c. The data backup, recovery and disaster recovery plan shall follow **Section 9** Ministry of Health ICT Policy Guidelines.
4. **Data Sharing**
    a. All data requests shall be addressed to the Director General Ministry of Health.
    b. The Uganda Health Data Access, Sharing and Use Guidelines shall be followed to ensure data is shared securely while maintaining data protection, privacy and confidentiality.
    c. Any health data requests for research and innovation purposes shall require administrative clearance by the Ministry of Health and this shall follow the Uganda Health Data Access, Sharing and Use Guidelines.
5. **Data Retention, Archiving and Disposal**
    a. The data retention, archiving and disposal shall follow **Section 5.6** of the Uganda Health Data Protection, Privacy and Confidentiality Guidelines.
6. **Data Audit Trails**
    a. All EMRS shall maintain detailed audit logs that record all system activities, including data access, modifications, and deletions. Logs shall be tamper-proof and regularly reviewed.
    b. For purposes of accountability, mechanisms shall be implemented to track and address unauthorized access or suspicious activity identified in audit logs.
7. **Incident Management and Response**
    a. A data breach shall be reported to the Personal Data Protection Office and the Ministry of Health immediately after becoming aware of it.
    b. Management of data security breaches shall be in accordance with Section 5.7 of the Uganda Health Data Protection, Privacy and Confidentiality Guidelines.

c. Further incident management and response shall be handled according to **Section 10.0** of the Ministry of Health ICT Policy Guidelines.

8. Health Information Exchange

a. EMRS shall ensure compliance to the Uganda Health Information Exchange and Interoperability Guidelines for seamless data sharing across the healthcare providers. By adhering to established standards and guidelines, the EMRS guarantees that patient information is exchanged accurately, efficiently, and confidentially. This commitment to the health information exchange standards as stated in the Uganda Digital Health Enterprise Architecture, Standards and Knowledge Guidelines not only enhances coordination and continuity of care but also promotes trust and reliability in the management of electronic medical records.

b. The EMRS implemented within the health facilities shall be integrated with DHIS2 for seemingless reporting. The health facilities shall adhere to the reporting timelines as detailed in **Section 4.3** of these guidelines below.

c. To achieve a single source of truth, the EMRS shall integrate with the National Health Information Exchange (NHIE) Registries i.e National Health Facility Registry, National Health Products Registry, National Health Workers Registry and the National Client Registry.

4.2 EMRS Reporting

The reporting requirements shall be based on the approved national HMIS tools. The reports shall be for purposes of synthesis, monitoring of usage and functionality. The data shall be pushed from the EMRS to the electronic Health Management Information System (Uganda eHMIS/DHIS2) on a monthly basis following the schedule below;

1. All data captured in the EMRS shall be synchronised or pushed automatically daily to the EMRS servers based at the health facilities..
2. The HMIS reports generated from the EMRS shall be pushed to Uganda eHMIS/DHIS2 every 7th of every month following.

3. Local Government and health facility level health managers shall review and validate the pushed EMRS datasets in Uganda eHMIS/DHIS2 from 8th - 15th of every month for purposes of ensuring completeness and accuracy.
4. Uganda eHMIS/DHIS2 shall be locked for entry or validations of data past 15th of every month to allow for analysis of consistent data for the reporting period.

All the synchronised data shall be accessed through the Uganda eHMIS/DHIS2. For real time data from the EMRS, dashboards (https://emrs-dashboards.health.go.ug/) shall be utilized to access indicator performance for various administrations at various levels.

Annual, Quarterly and Monthly performance reports indicating various indicators as per the National HMIS reporting format shall be produced and accessed within Uganda eHMIS/DHIS2. The expected reports with the frequency to be submitted by the EMRS is detailed in the Table 02 below;

Table 02: National HMIS Reports to be submitted through the EMRS

Sn	Report Code	Report Description	Frequency
1	HMIS 033b	Weekly Epidemiological Surveillance	Weekly
2	HMIS 097b	VHT/ICCM Quarterly Report	Quarterly
3	HMIS 097c	VHT/ICCM Monthly Report	Monthly
4	HMIS 104	NTDS MDA Implementation Report	Bi-Annual
5	HMIS 105	OPD Monthly Report	Monthly
6	HMIS 105a	Specialized Outpatient monthly report	Monthly
7	HMIS 105B.1	Child Immunization Addendum Report	Monthly
8	HMIS 105C	Palliative Care Monthly Report	Monthly
9	HMIS 106a	HIV Quarterly Report	Quarterly
10	HMIS 107a	Sub County Annual Population Projection Report	Annual
11	HMIS 107c	Health Facility Human Resource Inventory	Annual

12	HMIS 107	Health Unit Population and Annual Report	Annual
13	HMIS 108a	Specialised Inpatient Monthly Report	Monthly
14	HMIS 108	IPD Monthly Report	Monthly
15	HMIS 110	District Health Facility WASH Report	Quarterly
16	HMIS 127b	Visceral Leishmaniasis Inpatient Monthly Report	Monthly
17	HMIS 128b	Visceral Leishmaniasis Outpatient Monthly Report	Monthly
18	HMIS MAL 002	Malaria Vector Monthly Reporting Form	Monthly

4.3 Private Sector EMRS Specific Requirements

Implementation of the EMRS in the private sector shall enhance the efficiency and quality of healthcare services, streamline patient record management and offer private healthcare providers with a robust, secure, and user-friendly platform to access and update patient information in near real-time. The EMRS shall not only reduce administrative burdens like reporting but also facilitate better coordination and continuity of care, ultimately leading to improved patient outcomes.

Below are the specific requirements besides the general guidance on EMRS implementation to be adhered to by the Private Sector.

1. Certification of the Private Sector EMRS by the Ministry of Health to ensure system security, and compliance to standards i.e. Uganda Digital Health Enterprise Architecture, Standards and Knowledge Guidelines, Uganda Clinical Guidelines and other relevant guidelines.
2. The certified EMRS shall integrate with the national electronic Health Management Information System (eHMIS)/DHIS2 to facilitate mandatory reporting into the national reporting system. The certified EMRS shall also integrate with the national core health registries i.e. National Health Facility Registry, National Client Registry, National Health Productions Registry and National Health Workers Registry.
3. The certified EMRS shall produce at a minimum the national HMIS reports to enable reporting to the national eHMIS/DHIS2 as outlined in Section 4.2 of the guidelines.

4. All Private Sector certified EMRS shall submit birth and death notifications to the national reporting system (electronic Health Information Management System/DHIS2)
5. The Private Sector certified EMRS shall submit client-level data to the Ministry of Health Data central reporting system (i.e. eHMIS/DHIS2 and National Data Warehouse) during public health emergencies such as pandemics, outbreaks, or other public health emergencies. The Government of Uganda retains the authority to request or sanction a copy of the health data by the EMR for purposes of epidemiological and reporting purposes.
6. EMRS and its health data shall not be hosted on the cloud outside of Uganda without the approval of the Personal Data Protection Office and the National Information Technology Authority Uganda (NITAU). This shall be done in accordance with the Data Protection and Privacy Act 2019.
7. All processed health data by the EMRS shall be owned by the Government of Uganda but held in trust by the data controller in this case the ownership of the health facility.
8. The health facility clients reserve the right to access their health data or records at no cost besides printing costs.
9. Health data access by Non-Government third parties shall be authorized by the Ministry of Health and shall follow the Uganda Health Data Access, Sharing and Use Guidelines.
10. The EMRS health data shall be used for research and innovation purposes in accordance with the National Guidelines for Research involving Humans as Research Participants. Ministry of Health shall provide administrative clearance for the use of the EMRS health data for research and innovation.
11. Compliance to the guidelines by the private sector health facilities shall be monitored through health facility self-assessments every quarter submitted to the Ministry of Health. External assessment shall be conducted annually by the Ministry of Health.

5.0 Governance Framework

The Governance of EMRS shall follow the existing governance and management structures at the national and decentralized levels, as summarized in Figure 3.

Technical oversight is the mandate of the Division of Health Information Management (DHIM) under the Department of Planning, Financing and Policy which guides and coordinates all stakeholders involved in health data collection, processing and storage. This function is similarly decentralized at the Local Government level, as summarized in Figure 3. The main task of the Health Information Innovation and Research Technical Working Group (HIIRE TWG) is reviewing and advising on Health Information System (HIS) and Digital Health policy-related and strategic related issues from the user departments and other stakeholders.

The Ministry of Health (MoH) has Technical Working Groups (TWGs) in its governance and management structures which act as advisory committees to Departments and the Senior Management Committee. The TWGs serve as structures to deliberate on, review and advise on policy, strategic and technical issues within the Ministry of Health.

National governance and management structures	Local Government level governance & management structures
Top Management Committee	Technical Planning Committee
Department of Planning, Financing and Policy Division of Health Information Managment (DHIM)	District Health Team
Health Information, Innovation and Research (HIIRE) TWG	Extended District Health Management Team

Figure 3: Governance Structure

The Health Data Collaborative, a subcommittee of the HIIRE TWG shall be charged with the coordination of the implementation of the EMRS. Specifically, under the Health Data Collaborative (HDC) Subcommittee, the Health Sector Digitization Coordination Working Group supports the HDC in the coordination of the EMRS implementation within the country. The day to day operations

shall be handled under the EMR Implementation Technical Working Group of the Health Sector Digitization Coordination Working Group.

All the other HIIRE TWG subcommittees like the Data Management Subcommittee and Digital Health Subcommittees shall provide technical input towards the implementation of the EMRS in the country.

The Digitisation Steering Committee chaired by the Permanent Secretary of the Ministry of Health has been established as a special committee to ensure fast tracking of the implementation of the EMRS and other digital initiatives in the country.

Governance of the Private Sector EMR implementation shall be under the leadership of the ownership of the health facilities and will interface with the Governance Structure illustrated in Figure 3 through the HIIRE TWG.

5.1 EMRS Implementation Arrangements

EMRS implementation shall require that all the responsibilities of all stakeholders are spelt out in order to streamline the implementation arrangements and strengthen the governance framework.

The table below spells out the different responsibilities of different entries at different levels.

SN	Entity	Level	Responsibility
1	Top Management	National	● Strategic leadership, guidance and oversight. ● Approval of EMRS for use in the health sector. ● Monitoring and Supervision of EMRS implementation
2	Senior Management Committee (SMC)	National	● Strategic leadership, guidance and oversight. ● Endorsement of EMRS for use in the health sector. ● Monitoring and Supervision of EMRS implementation
3	Health Information, Innovation and Research (HIIRE) Technical Working Group	National	● Approve EMRS for piloting ● Recommend EMRS to SMC for full scaleup ● Monitoring and Supervision of EMRS implementation ● Give technical guidance and quality assurance ● Ensure the EMRS conform to set standards ● and guidelines. ● Review and recommend developed EMRS standards, and guidelines for approval by the SMC.
4	MoH/Planning, Finance, Policy Department	National	● Coordinate implementation of EMRS ● Recommend EMRS for pilot and use following a technical evaluation. ● Prioritize areas of implementation in line with the Digital Health and Health Information Strategic Plan ● Coordinate and ensure EMRS data and system management with the support of stakeholders. ● Quality assurance of EMRS ● Coordinating integration of EMRS with other system ● Authorizing changes and modification to the EMRS ● Supervision of implementation teams. ● Develop standards and guidelines for EMRS implementation ● Coordinate capacity building programmes with stakeholders on EMRS ● Coordinate the development and implementation of a sustainability plan for EMRS with stakeholders.
5	MoH/IT	National	● Provide hosting infrastructure for EMRS ● Security of EMRS and hosting environment ● Ensure data and EMRS backup ● Recommend hosting strategies for EMRS ● Coordinate with external entities in case of outsourced hosting for the EMRS

			● Coordinating and Managing access to EMRS hosting environments/backend. ● Coordinating and Managing access to EMRS
6	MoH/User Departments	National	● Participate in the EMRS requirements specification ● Programmatic guidance on functionality of the EMRS ● Participate and sign off on user acceptance tests for EMRS ● Resource mobilization and funding for the EMRS
7	Ministry of ICT&NG	National	● Strategic leadership and guidance. ● Advise and guide on technologies for EMRS technologies. ● Monitoring and Supervision of digital health initiatives. ● Resource mobilisation and funding for EMRS implementation ● Assess the gaps in HR capacity.
8	Ministry of Energy and Mineral Development	National	● Strategic leadership and guidance on energy solutions. ● Advise and guide on clean energy to power EMRS. ● Plan and ensure that health facilities are connected to the national electrical grid. ● Monitoring and Supervision of power sources for health facilities. ● Resource mobilization and funding for power solutions for EMRS implementation ● Guide and advise on power backup solutions for the EMRS implementation.
9	Partners	National/ Local Government	● Technical assistance for implementation of EMRS ● Resource mobilization and funding for implementation of EMRS ● Capacity building of MoH and Local governments on management and use of the EMRS. ● Participate in the development of standards and guidelines for the EMRS implementation. ● Support monitoring and evaluation of the EMRS. ● Participate in the EMRS implementation roadmap. ● Support the optimisation, implementation and adaptation of the EMRS

10	Local Governments	District/Cities/ Municipality/ Subcounty	● Lead the implementation of the EMRS at the local government level ● Coordination of implementation at local government level (districts and cities) with partners ● Supervision of implementation teams ● Participate and sign off on EMRS user acceptance tests. ● Implement the EMRS sustainability plan with the support of MoH and stakeholders. ● Resource mobilization. ● Performance Monitoring and evaluation
11	Health facilities	Regional/ District/Cities/ Municipality/ Subcounty	● Ensure periodic data quality assurance and assessment. ● Support health workers on the use of EMRS ● Conduct capacity building of the health workers on EMRS ● Generate list of users of EMRS for approval by the Department Planning, Financing and Policy. ● Supervision of health workers within their catchment area
12	Digitization Coordination Working Group	National	● Guiding on EMRS implementation modalities ● Coordinate EMRS stakeholders. ● Joint planning, monitoring and evaluation of the EMRS ● Make recommendations on the development and implementation of the EMRS.
13	EMR Implementation Technical Working Group		● Discuss the implementation experiences for the different EMRS implementing health facilities. ● Resolve operational challenges affecting EMRS implementation. ● Document EMRS issues, new system requirements and features and share with the Division of Health Information Management. ● Review EMRS performance reports for implementing health facilities. ● Make recommendations on the development and implementation of the EMRS.
14	Technology developers	National	● Development of EMRS and other functional-based health tools based on user requirements. ● Testing of EMRS instances and training of users ● Conduct installation and customisation of EMRS in health facilities

			● Coordination of EMRS upgrade, maintenance and scalability ● Ensure user friendly, reliable and robust EMRS environments.
15	Private sector	National	● Software and hardware provision to support EMRS implementation. ● Training and support services ● Financial investment ● Research, innovation and development ● Market competition and improvement ● Comply with EMRS national guidelines
16	Academia	National	● Research ● Training ● Monitoring and Evaluation ● Come up with Innovations to address EMRS implementation challenges.

6.0 Monitoring and Evaluating the Guidelines

Monitoring and Evaluation is vital to ensure the successful implementation and smooth operation of EMRS. As part of Monitoring and Evaluation, quality assurance exercise shall run throughout the life cycle of the EMRS implementation, especially during installation and configuration of the EMRS infrastructure (software and hardware), training of staff on EMRS and deployment of the EMRS to ensure compliance with the national EMRS implementation guidelines. Compliance with the guidelines shall be monitored through health facility self-assessments every quarter submitted to the Ministry of Health. External assessment shall be conducted annually by the Ministry of Health. Furthermore, it is necessary to track and evaluate the implementation and functioning of the system in order to understand how well the implementation objectives have been met and the effect of EMRS on the day-to-day health facility operations.

6.1 Implementation Guideline Use Monitoring

Monitoring the use of the Guidelines for Implementing the EMRS shall be based on a specific framework designed to track compliance and effectiveness. Important to note is that dissemination and training on the use of the guidelines is a key requirement before monitoring its use can become a practical reality. Therefore, the guidelines shall be monitored using three major parameters, namely, dissemination, training, and compliance. These are described further below and shall be tracked and assessed to measure guideline use. The guideline-use monitoring framework consists of the parameters or components, key monitoring questions, result statements, indicators, and means of verification.

- **Dissemination:** Refers to broadcasting the guidelines to a target audience through printed or electronic media such as print, electronic documents, or other forms of media as appropriate. Copies of the guidelines shall be printed and distributed at national and sub-national levels. The electronic copy of the guideline shall be uploaded on the Ministry of Health Knowledge Management Portal for public access and consumption.
- **Training:** Refers to orienting and/or sensitizing key stakeholders on the key components of the guideline document including its value and their roles and responsibilities to ensure awareness and accelerate compliance.

- **Compliance:** Refers to the state of implementing the EMRS in accordance with established guidelines or standards, or the process of becoming so (compliant).

Refer to **Appendix I** for a detailed Guideline-Use Monitoring Framework.

6.2 EMRS Deployment Monitoring

The EMRS implementation is anchored within the overall Uganda Health Information and Digital Health Monitoring and Evaluation Framework. Notably, it is critical to continue monitoring EMRS deployment nationwide to ensure that the software is working as it should, every activity is implemented as planned, and that external factors are not affecting the potential effectiveness of the EMRS intervention.

Findings from deployment monitoring activities shall be synthesized, disseminated, and remedial action taken to address identified challenges. This shall ensure optimization of EMRS implementation across board and foster successful evaluation efforts. Consequently, four (4) key parameters of EMRS deployment monitoring shall be considered, namely, functionality, stability, fidelity, and quality. They are described further below and shall be tracked and assessed to ensure that the intervention is "doing things right".

Similar to guideline-use monitoring, the EMRS deployment monitoring framework shall consist of parameters or components, key monitoring questions, result statements, indicators, and means of verification.

- **Functionality:** *Refers to the degree to which EMRS provides functions that meet stated and implied needs when used under specified conditions, or the ability of EMRS to support the desired intervention.* For instance, the desired functionality of the EMRS application based on agreed upon user requirements. Monitoring functionality shall be done pre- and post-deployment to ensure adequate system functionality at all times. Pre-deployment monitoring shall entail testing and providing feedback on various aspects including but not limited to skip patterns, validation checks, form schedules, form content, user interface design, data export/import functionality, data accuracy, and dashboard calculations. Post-deployment and/or at a later maturity stage (i.e., where the EMRS applications have been fully designed and only enhancements are required to meet evolving policy changes and information needs), basic system functionality monitoring shall be conducted before introducing the EMRS to

new users (e.g., a different cadre of health workers) and new geographic areas that might pose different levels of connectivity or when using new technologies.

- **Stability:** *Refers to the likelihood that EMRS functions shall not change or fail during use or the ability of EMRS to remain functional under both normal and anticipated peak conditions for data loads*. Monitoring stability shall be done concurrently with functionality monitoring both pre- and post-deployment. Initial (pre-deployment) system stability monitoring shall be conducted during quality assurance testing sessions before the EMRS is declared ready for deployment (field-ready). Post-deployment, stability shall be monitored to mitigate any events that may result in improper delivery of the EMRS intervention such as unexpected crash or stop, slow response times especially during peak times or when overloaded, and any erratic performance hindering management and use of EMRS. Considering that the EMRS heavily relies on physical (non-cloud-based) servers based at the health facilities for operation, server outage shall be monitored. Considering stability is a critical aspect to ensure successful implementation of EMRS intervention, continued stability monitoring processes shall be automated and systems configured accordingly to enable proactive and timely reactive response.
- **Fidelity:** *Refers to a measure of whether or not an intervention is delivered as intended in terms of technical and user perspectives.* For instance, the technical fidelity of EMRS (i.e., functionality and stability) and the enabling environment such as any external barriers that might cause it not to function as intended, and compliance of EMRS end-users to stipulated data use and system administration standard operating procedures. Monitoring fidelity of EMRS intervention shall occur throughout implementation with the required level of effort gradually decreasing depending on the time it takes to identify and resolve issues. Standard monitoring procedures and reporting mechanisms shall be established and automated to aid timely decision-making.
- **Quality:** *Refers to the measure of excellence, value, conformance to specifications, conformance to requirements, fitness for purpose and ability to meet or exceed expectations.* For instance, the standards related to capabilities of EMRS end-users and content of the inputs used for the programmatic interventions that eEMRS is designed to deliver such as algorithms for decision support, data collection forms, and reports. This content should be of

the highest quality possible informed by existing practice, literature and formative research in the local context to increase effectiveness of the EMRS intervention. EMRS quality monitoring shall focus on ensuring (a) data quality and regularity by checking for outliers of non-compliant users; and (b) quality of content to be delivered is as expected and inline with existing standards and appropriate for participating communities.

Refer to **Appendix J** for a detailed EMRS Deployment Monitoring Framework.

6.3 Evaluating the EMRS

The evaluation shall entail any measures that shall be taken and analysis performed to assess;

a) The interaction of users and/or the health system with the EMRS intervention and strategies
b) Changes attributable to the implementation of EMRS.

Any commissioned evaluations focused on EMRS shall be designed to ensure assessment and evidence generation on its usability, effectiveness, value for money and affordability at the very least, depending on the degree of maturity i.e, early or middle or late stage. The following evaluation components shall constitute the EMRS evaluation framework in addition to the evaluation types:

- **Feasibility:** Assess whether EMRS works as intended in various contexts and health facility levels across Uganda.
- **Usability:** Assess whether the EMRS is used as intended.
- **Effectiveness:** Assess whether the EMRS achieves the intended results in an uncontrolled (non-research) setting.
- **Implementation research:** Assess the uptake, institutionalization, and sustainability of EMRS in Uganda, including policies and practices.

Depending on EMRS degree of maturity and evidence needs, several evaluation types categorized as formative or summative may be commissioned and/or conducted.

- **Formative evaluations:** Studies aimed at informing the design and development of effective intervention strategies conducted before or during implementation of an intervention.
- **Summative evaluations:** Studies conducted at the end or a certain phase of the intervention to determine the extent to which expected outcomes have been achieved.

Refer to **Appendix K** for a high-level EMRS Evaluation Framework.

6.4 Dissemination and Adoption of the Guidelines

The framework shall guide the collection of information regarding the implementation of the EMRS to facilitate reporting, feedback, and dissemination.

a) Dissemination and adoption of the guidelines

The EMRS implementation Guidelines shall be disseminated for adoption through:

1. Presentation of the guidelines to stakeholders.
2. Posting of the guidelines on the MoH websites and the electronic Library (Knowledge Management Portal) for access by the stakeholders.
3. Organising quarterly workshops to train stakeholders and innovators.
4. Leveraging on EMRS activities like refresher training etc to disseminate the guidelines.

Appendix A: Readiness Assessment

No.	Service Area e.g. Registration, Eye Clinic, etc.	No. of Available Computers	Is service Area Using the System (Yes/No)	Challenges Faced in that Area	Support Given	No. Trained / Mentored	Next Steps

	Server Assessment												
SN	Type	HDD	RAM	CPU	OS (Windows, Linux)	Service Provider	Support period	Warranty period	Life span	Version of OS	Virtualization Technology	Software applications	Is the server connected to a Backup system?

Server Purpose		
Hardware	Manufacturer	
	Model	
	Support Level	
Operating System		
OS Version		
RAM		
CPU	Type	
	# of Processors	
	Cores/Processor	
	Speed	

Internal Disk	**Type, Speed, Size, and # of Disks**	
	Total Raw Size (GB)	
	Useable Size (GB)	
	Disk Configuration	
	Free Space (GB)	
External Disk	**Type, Speed, Size, and # of Disks**	
	Total Raw Size (GB)	
	Useable Size (GB)	
	Disk Configuration	
	Free Space (GB)	
Installed Software		

Appendix B: Hospital Walkthrough and ICT Assessment Tool

Introduction

Health Facility Details	
Local Government	
Sub-county/Division	
Village/Ward	
Name Facility	
Facility Level	
Name of Health Facility Director/MS	
Tel No. of Incharge	
Name of IT or Data person	
Tel No. of Contact person	
Delete all the information in read and replace with information in that hospital	

Service Points

Information on Point of service areas (inpatient, administration,wards service areas etc)										
POINT OF SERVICE (Ward name eg Male surgical ward, Pead ward)	**No. of beds (where applicable)**	**Description of work area (e.g consultation, administrative)**	**Does area requisition commodities from store (Yes/No)**	**How many health workers are supposed to sit/work in this room**	**No of existing functional desktops in the room**	**No. of functional existing Laptops in the room**	**No. of existing Tablets in the room**	**No. of Required Computers**	**No. of Required Laptops**	**No. of Required Tablets**

Wireless LAN Assessment

Wireless/ LAN Access Points								
Location (Department, Section,)	**LAN Availability**	**Existing Wireless Points**	**No. of Users**	**Status**	**Indoor (Existing)**	**Outdoor (Existing)**	**Comments**	**No. of Switches Needed**

Appendix C: Sample Training Schedule

TENTATIVE TRAINING SCHEDULE REGIONAL REFERRAL

1. MEETING ADMINISTRATORS {
2. MEETING HEAD OF UNITS
3. TRAINING OPD MODULES
4. TRAINING IPD MODULES
5. RADIOLOGY
6. LAB
7. PHARMACY
8. STORES
9. MORGUE

Date	Module	Department	Time
	• Patient Management • Nursing (administering treatment etc)	Records & Nurses	2:00Pm
	Consultation	Doctors & Clinicians	**Two sessions** Morning from 09:00Am – 12:00pm Afternoon Session from 2pm – 4pm
	Radiology	Radiographer	9:00 am – 12 pm
	Lab	All Lab Staff	**Two Sessions** Morning From 9Am – 12Pm Afternoon From 2Pm – 4Pm
	• Inpatient & Theatre • Ward Management (NICU, Labour Monitoring, ICU)	Doctors Clinicians Theatre Staff Nurses	**Two Sessions** Morning From 9Am – 12Pm Afternoon From 2Pm – 4Pm
	Pharmacy & Dispensing	Pharmacists & Dispensers	**Two Sessions** Morning From 9Am – 12Pm Afternoon From 2Pm – 4Pm

	Supply chain Management	All Store Staff	Two Sessions Morning From 9Am – 12Pm
			Afternoon From 2Pm – 4Pm
	Employee Portal (All Staff)	All Ward In-Charges	**Two Sessions** Morning From 9Am – 12Pm Afternoon From 2Pm – 4Pm
	Support & Customization Set and Identifying the Focal Person	Hospital IT and Trainers	**Two Sessions** Morning From 9Am – 12Pm Afternoon From 2Pm – 4Pm
	Feedback meeting with all the Staffs	Hospital IT and Trainers All Staff	8:30Am

Appendix D: Sample EMRS Deployment Budget

Detailed Budget and Model for Software Deployment for a Single Health Facility							
1.9	**Health facility**	**Unit Cost**	**Units**	**Unit of Measure**	**Frequency**	**Unit of Frequency**	**Amount**
1.9.1	**Project Initiation** (Definition of Scope, Team Charter, Project plan, Hospital Workflow Workshop, Project Role and Responsibilities, Computer & Networking Infrastructure Assessment)	175000	2	Persons	1	# of days	350,000
1.9.2	**Solution Design** (Requirements Gathering, Gather Information about end users and Approvers, Price and Service Lists, Inventories, Services Packaging & Insurance Categorization)	175000	2	Persons	2	# of days	700,000
1.9.3	**Staff Training** (Front Office and Outpatients Staff Training, Inpatient Staff Training, Administrative Staff Training, Management Training)	175000	3	Persons	8	# of days	4,200,000
1.9.4	**Implementation** (Server Installation & Configuration, End User Computer Customization, Network Configuration)	175000	2	Persons	3	# of days	1,050,000
1.9.5	**Customization & Realization** (Template Branding, HR & User profiles creation, Accounts Customization, Pricing and Service Packaging, Inventory and Assets Registration, Insurance Customization)	175000	3	Persons	5	# of days	2,625,000
1.9.6	**System Testing** (Outpatient Mock Operation, Inpatient Mock Operation, Billing and Accounting & Human Resource optimization)	175000	2	Persons	1	# of days	350,000
1.9.7	**Project Closure** (Sign-off)	175000	2	Persons	1	# of days	350,000
1.9.8	Fuel	5500	190	Kms/Liters	1		1,045,000
1.9.9	Communication	100000	2	Persons	1	# of days	200,000
1.9.14	**Subtotal**						**10,870,000**

Appendix E: EMRS Rollout Checklist

No	Question	RESPONSE
1	MoH EMRS rollout team	1. 2. 3.
2	Local Government	
3	Sub County	
4	Facility name	
5	Level	
6	Authority	
7	ED/Director/MS/In-charge	Name: Role: Phone Contact:
8	EMR system used	ð Clinic Master ð eAFYA

Description

The EMRS Rollout planning checklist is intended to aid the trainers in planning for EMRS implementation. It can be used to plan for the EMR system go-live event and to identify any issues that need to be addressed beforehand.

Instructions

Keep updating it daily. A copy to be attached as part of the report.

	Section	Check(☒)	Date	Comment
1.0	**Section 1: Team Debrief and movement**	☐		
1.1	Discuss the rollout roadmap and movement plan	☐		
1.2	Team code of conduct	☐		
1.3	Discuss the expected output from the teams (Daily activity reports)	☐		
1.4	Required documents are in place (introduction letter, attendance forms, printed checklist, infrastructure tool etc)	☐		
2.0	**Section 2: Inception**			
2.1	Engage the hospital Management which includes the administration, the local government health officials by calling and sending them an email.	☐		
2.2	Hold a meeting with Director/DHO to explain the rollout and required support	☐		
2.2a	Get the hospital Organogram, Staff List (Departmental Staff Lists), Units List (OPD & IPD Units), Hospital Layout (should this be available), Departmental Heads Contact information (name, email, tel, designation, unit) to design training agenda	☐		
2.3	Determine the rollout strategy with hospital head	☐		
2.4	Set date for demo to management and kick off meeting	☐		
2.5	Get Implementing Partner Support List from the hospital	☐		
2.6	Reached out to the district for support (Health facilities)	☐		

2.7	Reached out to Implementing Partners for Support	☐		
3.0	**Section 3: Hospital Walkaround and Assessment**	☐		
3.1	Identify and document the different service points, with data points and computers already in place	☐		
3.2	LAN/WLAN Coverage (OPD & IPD): ☐20% ☐40% ☐ 60% ☐ 80% ☐100%	☐		
3.3	Available power options at the facility: ☐Umeme ☐Solar ☐Generator ☐Others…	☐		
3.4	Server/ server room in place and functional	☐		
3.5	IT Equipment in place (Computer, laptops)	☐		
3.6	Count and document the beds in the wards	☐		
3.7	Identify and document the unit stores in the facility	☐		
3.8	Identify and document the hospital workflow	☐		
3.8	Find out the baselines for all units	☐		
3.9	Find out and document the clinic days	☐		
3.10	Look at the physical security (Door locks, burglar proof) and make recommendations	☐		
3.11	Evening Team meetings to review the days' activity and plan for the next day	☐		
4.0	**Section 4: Training schedule:**			
4.1	Work with the focal person to Come up with a training schedule	☐		

4.2	Circulate the schedule to the staff by using the staff communication platform/notice board.	☐		
4.3	Set up training room fully loaded with computers			
5.0	**Section 5: Entry Kick off Meeting**			
5.1	Set up an EMR **implementation kick off meeting** with the Key stakeholders include but are not limited to: Local Government Health Officials, Hospital Directors/Medical Superintendents, Hospital Administrators, Senior Nursing Officers, Records Personnel, Hospital/Local Government IT Office, a Store representative and all heads of departments ***Key Agenda Items for the meeting include: identifying a project focal person at the hospital, Confirmation of equipment delivery and distribution plan, Scope of system deployment, Proposed deployment timelines & activity work plan, Roles of the stakeholders involved and a demo of the system***	☐		
6.0	**Section 6: Basic ICT Skills Training**			
6.1	Users who need the basic ICT Skills training have been identified	☐		
6.2	Training has been Scheduled	☐		
6.3	Training has been carried out	☐		
7.0	**Section 7: EMR System training**	☐		
7.1	Users have been trained according to the schedule by module/cadre.	☐		
7.2	Appointments with users who are not always available at the hospital have been made.	☐		
8.0	**Section 8: IT Equipment Installation and distribution/redistribution**			

8.1	Distribution list for the new equipment (Desktop/laptops) has been made with support from the hospital administration.	☐		
8.2	Desktop/laptop setup in different service points	☐		
8.3	Desktop/laptop configuration	☐		
8.4	Connect the computers to the network	☐		
9.0	**Section 9: System setup (get support from IT and installation team)**			
9.1	The server room and server have been set up and configured	☐		
9.2	The system has been set up on the Server	☐		
9.3	Thin client server has been setup and configuration (Where applicable)	☐		
9.4	Servers have a power backup	☐		
10.0	**Section 10: Go-Live preparation**			
10.1	User accounts have been created for all users	☐		
10.2	Every user has completed the training necessary to use the EMRS	☐		
10.3	Every user has completed basic computer navigation, keyboarding, and other applicable training; provide refresher if necessary	☐		
10.4	The practice support team has been trained and is aware of their roles/functions for go live.	☐		
10.5	Every user has a user ID and password, and they remember them.	☐		
10.6	Every user has been assigned the required rights.	☐		

10.7	Everyone can log on and has the correct privileges.	☐		
10.8	The EMR system has been customized ☐ Stores ☐Lab ☐ Radiology	☐		
10.9	Data has been entered (Stock, supply categories)	☐		
10.10	All service points have the required computers and the EMRS application can be accessed.	☐		
10.11	Communication channels like WhatsApp groups have been set up where users can be supported from.	☐		
11.0	**Section 11: Go-Live**			
11.1	Go-live meeting held with staff to communicate the change and go-live date			
11.2	Units to go live fast have been communicated			
12.0	**Section 12: Post Go-Live**			
12.1	User Hand Holding and mentorship on workstations	☐		
12.2	EMR System User support	☐		
13.0	**Section 13: Closure Meeting with HODs**			
13.1	Shared a report and showing the performance so far.	☐		
13.2	Discussed how the HODs are going to support the users in absence of the MOH team.	☐		

Appendix F: Standard Operating Procedure for EMR System Downtime

Republic of Uganda
Ministry of Health

Standard Operating Procedure (SOP) for Handling Electronic Medical Record (EMR) System Downtime

Objective:

This Standard Operating Procedure (SOP) outlines the protocol to be followed by all health workers when an Electronic Medical Record (EMR) System is down to ensure continuity of care, patient safety, and data integrity.

Key definitions

- *Downtime:* Is a period during which production or business processes come to a halt due to application/ system unavailability, technical glitch, network outage or natural disaster [Adam Marget et al]
- *Uptime:* Is a measure of an application/system's availability to its end users
- *Downtime procedure:* refers to a predefined set of steps that healthcare organisations follow during system or network downtime.

Types of downtime

Planned vs. Unplanned Downtime

Unplanned downtime (also known as unscheduled downtime) is when a lapse in operations occurs because of an unplanned machine, network outage, power outage,

natural disaster or server error. It's outside your control and doesn't abide by the institution's schedule.

Planned downtime (scheduled downtime) is when you schedule these down periods at a convenient time to the institution and minimize any negative impact for the users. It's scheduled, proactive maintenance that allows you to install upgrades and perform routine maintenance in order to ensure optimal functionality of machines and services. This can include replacing old or outdated machine parts, performing regular system updates and patches, and a wide range of other tasks intended to increase the reliability of services.

Types of Planned Downtime

a) Fixed downtime: This adheres to a set schedule- you determine a specific start and stop time for maintenance/ recovery to occur.

b) Flexible downtime: Provides for a window of time during which downtime shall happen, though the exact start time is unknown

Causes of Downtime

There are several causes of downtime. Some of the main causes are explained below:

a) Human Error: Regardless of whether accidental or due to negligence, human error is one of the most common causes of unplanned downtime.

b) Hardware/Software Failure: Obsolete hardware or software increases the chances of application failure and system outage.

c) Device Misconfiguration: Device misconfiguration is another major cause of unplanned downtime.

d) Bugs: Bugs in a server's operating system can impact its performance as well as lead to security issues.

e) Cybersecurity Threats: Cyber threats, including sophisticated ransomware and phishing attacks, are one of the most dangerous and common causes of IT downtime.

f) Natural Disasters: Natural disasters, such as hurricanes, floods and earthquakes, can disrupt power supply and communication or even damage hardware.

How to Prepare for EMRS Downtime

1. Be prepared for EMRS downtime (Be expectant)
2. Train for downtime from the beginning.
3. Create an incidence response downtime plan
4. Practice for an outage
5. Designate a person to document during EMRS downtime
6. Run backups and store backups in different locations
7. Know who to contact in the event of a data breach

Scope:

This SOP applies to all health facilities with an EMR system for patient/client care management.

Responsibilities:

1. **Clinical Staff:**
    a. Adheres to downtime procedures and documentation protocols outlined in this SOP.
    b. Continues to provide patient care using the relevant paper-based processes and registers during downtime.
    c. Communicates effectively with other health workers and patients/clients to ensure continuity of care.
2. **IT Officer/EMRS Focal Person:**

a. Monitors system performance and initiates downtime protocols when necessary.
b. Documents and reports EMR system downtime to the national IT support team using the relevant ticketing system (EMRS Help Desk) or official communication channels in place.
c. Coordinates with the national IT support team and vendors to troubleshoot and resolve downtime issues.

3. **Health Facility In charge**
    a. Oversees the implementation and maintenance of EMR system downtime procedures.
    b. Ensures staff training and readiness for EMR system downtime.
    c. Coordinates with national IT support team and EMR system vendors for technical support and resolution of downtime issues.

Procedure:

1. Initiating Downtime Protocol:
    i. Upon identification of an EMR system failure or outage, the IT Officer/EMRS Focal Person shall assess the situation and determine if downtime procedures need to be activated.
    ii. If downtime procedures are required, the IT Officer/EMRS Focal Person shall initiate the downtime protocol and notify clinical staff via the designated communication channels immediately.
2. Notification and Communication:
    i. Clinical staff shall be notified immediately of EMR system downtime through the health facility's designated communication system (e.g., WhatsApp group, phone call, email, text alerts).
    ii. Clear communication shall be provided regarding the expected duration of downtime and alternative documentation procedures.
3. Transition to Downtime Procedures:
    i. Clinical staff shall transition to paper-based Health Management Information System (HMIS) documentation (registers, forms and reports) and manual processes for patient/client care during downtime.
    ii. HMIS pre-printed paper tools shall be made available at all points of care for use during downtime.
4. Patient Identification and Safety:

i. Clinical staff shall verify patient identification using standard paper protocols to ensure patient safety during downtime.
ii. Allergies, medications, and other critical patient information shall be verified verbally with patients or caregivers during downtime.

5. Documentation and Record Keeping:
    i. Clinical staff shall document patient care activities, assessments, medications, and other relevant information on the HMIS paper-based tools.
    ii. Data captured on the paper tool shall be transferred to the EMRS within 24 hours once the system is restored.
6. Continuity of Care:
    i. Clinical Staff shall collaborate effectively with the EMRD focal person to ensure continuity of care and smooth transitions between shifts during downtime.
    ii. Critical patient information shall be communicated verbally during handoffs and shift changes to ensure seamless care delivery.
7. Monitoring and Resolution:
    i. The IT Officer/EMRS Focal Person shall monitor the status of the EMR system and work with the national IT support staff and vendors to resolve downtime issues promptly.
    ii. Regular updates shall be provided to the clinical staff regarding the progress of downtime resolution and expected system restoration times.
8. Post-Downtime Review:
    i. Following the resolution of EMR system downtime issues, a post-downtime review shall be conducted to assess the effectiveness of downtime procedures and identify opportunities for improvement.
    ii. Lessons learned from EMR system downtime incidents shall be documented, and recommendations for system enhancements or staff training shall be implemented as appropriate.
9. Training:
    i. All clinical staff shall receive training on EMR downtime procedures during orientation and regularly scheduled training sessions.
    ii. Updates and refresher training on EMR system downtime procedures shall be provided as needed to ensure staff readiness and competence.
10. Documentation and Recordkeeping:

i. Documentation of EMR system downtime incidents, including timelines, actions taken, and resolutions, shall be maintained at the health facility or using the systems' issues tracker/ticketing system.
ii. Incident reports and documentation logs shall be reviewed periodically for quality assurance and compliance purposes.

11. Document Review and Approval:

Version	Owner	Author	Publish Date	Name/Title	Signature
1	Ministry of Health	DHIM	12/01/2023	xxx	
2					

12. Dissemination:

This SOP shall be disseminated to all EMR system-implementing health facilities and relevant stakeholders and made accessible through the Ministry of Health's Knowledge Management Portal (KMP). A copy shall also be made available on the Health Facilities' notice boards.

13. Contact the Ministry of Health

Any questions, inquiries or emergencies to raise to the Ministry of Health shall be through the;

a) The Call Center Toll-Free 0800-100-066
b) E-mail: Email: info@health.go.ug
c) Address: Plot 6, Lourdel Road, Nakasero P.O Box 7272, Kampala Uganda.
d) Website: www.health.go.ug/

Appendix G: EMRS Support Structure

Support Tiers	Description	Support team & Resources	Support needs
Tier 0: *Self-help or end-user*	Users identify issues, retrieve support information and attempt to resolve the issue. If they fail to resolve the issue, they report the issue to tier 1 support	**Support team** - End users - Peer support **Resources** - SOPs - User manual - FAQs - Community of practice - Support channels	This level shall require self-support resources to be created, maintained, and updated to support users. Tier 1 personnel shall receive and respond to requests through the available channels.
Tier 1: **Basic technical support**	Support for basic user issues such as solving usage problems and simple user requests that need HIS team involvement. If no solution is available, tier 1 personnel escalate incidents to a higher tier.	**Support teams** - Records Assistants - Health Information Assistants (HIA) - Medical Records Assistants - Data Clerks **Resources** - SOPs - FAQs - Community of practice - User manual - Support channels	Lower-level technical personnel shall be trained to solve known problems and respond to requests using standard guidelines and procedures
Tier 2: **Experienced technical support**	Experienced and knowledgeable technicians assess issues and provide solutions for problems that cannot be handled by tier 1. If no solution is available, tier 2 support escalates the incident to tier 3.	**Technical teams** - Regional Referral Biostats - Regional Bio-stat representative - HMIS HSD managers - District Biostatisticians - IP HMIS managers **Resources** - SOPs - Technical and end-user manuals - Support channels	Support personnel with technical working experience and knowledge of the solution, not necessarily the engineers or programmers of the solution.

Tier 3: **Expert technical support**	Highly experienced or knowledgeable or national experts and technicians assess issues and provide solutions for problems that cannot be handled by tier 2. They duplicate problems and understand possible causes and attempt to provide solutions to the problem. If no solution is available, tier 3 support escalates the incident to tier 4.	**Technical teams** - MoH HMIS Support Team - HIS support teams - Consultants **Resources** - SOPs - Technical manuals - HIS Support channels	Support personnel with high technical working experience, expert knowledge of the solution but may not necessarily be the engineers or programmers who designed and created the solution.
Tier 4: **Developer technical support**	This is the highest technical resource available for problem resolution. The technicians attempt to duplicate problems and define root causes, using product designs, code, or specifications and make new fixes.	**Technical teams** - Consultants **Resources** - Official emails - HIS Support channels	Highly skilled product specialists, and may include the creators, chief architects, or engineers who created the product or solution.

Appendix H: System Change Request Form

THE REPUBLIC OF UGANDA
MINISTRY OF HEALTH

Ministry of Health Information and Communications Technology Section System Change Request Form

Change Request ID: _____ ***Report ID:*** _____			
Originator/Requester (*Name, Position and Contact****):***			
Department/Consultant/Partner:			
Problem Statement: *Provide a brief description of the requested change, for upgrades indicate current and target builds/versions*			
Where & When Changed Requested:	***Date***	***Location***	***Time***
Description of Problem: *Provide a detailed description of the problem, circumstances leading to the requested change*			
Supporting Information: *Provide screenshots of an error or printout of an error in a document / report*			
Reasons and Justification: *Describe the reason why the change has been requested and the justification for the request.*			
Affected Areas: *According to the Perception of the Requester*	***System / Workflow Affected***	***Subsystem / Workflow Affected***	***Documentation Affected***

Downtime Implication: *Will the change cause/require system downtime*			
Alternate Actions: *Describe alternatives to the change according to the Perception of the Requester*			
Priority to Implement: *Describe priority assigned by the requester*			
Approvals			
Change Requester *(Role, Name and signature)*			
Head User Department/Division/Section *(Department Name and Signature)*			
Head Health Information Management Division *(Name and Signature)*			
Head ICT Section *(Role, Name and signature)*			
Assignment			
Engineer Assigned to execute *(Role, Name)*			
Engineer Notes			

Appendix I: EMRS Guidelines Use Monitoring Framework

Guideline-Use Monitoring Framework
Parameter 1: Dissemination
Key Monitoring Questions: *1.1 What is the version of the current guideline document?* *1.2 Has the current guideline document been disseminated?* *1.3 If yes under [1.2] above, through which channels?* *1.4 What is the proportion of target entities possessing at least one copy of the guideline document? – disaggregated by the National, District, Health Facility, Partners.*
Indicator: *% of target entities who received at least one copy of the guideline document, disaggregated by: (a) National; (b) District; (c) Health Facility; (d) Partners*
Means of Verification: *Reports (e.g., dispatch, supportive supervision)*
Result Statement: *Existing version of the Guidelines for Implementing the Uganda electronic Community Health Information System disseminated to key stakeholders nationwide.*
Parameter 2: Training
Key Monitoring Questions: *2.1 Has training on the current version of the guidelines been conducted?* *2.2 If yes under [2.1], what was the proportion of individuals trained on the various components of the guideline document? – disaggregated by (a) National; (b) District; (c) Health Facility; (d) Partners*
Indicator: % of target entities oriented on guideline document, disaggregated by: (a) National; (b) District; (c) Health Facility; (d) Partners
Means of Verification: Reports (e.g., training, supportive supervision)
Result Statement: *Key stakeholders nationwide oriented on the existing version of the Guidelines for Implementing the Uganda electronic Community Health Information System.*
Parameter 3: Compliance
Key Monitoring Questions: *3.1 Are the various target groups implementing EMRS in accordance with established guidelines? Please provide comment by target group and key area as appropriate* ● ***Target Group:*** *(a) National; (b) District; (c) Health Facility; (d) Community Health Workers; (e) Partners* ● ***Key Component:*** *(a) EMRS User Requirements, Design and Development; (b) Implementing EMRS; (c) System and Data Access; (d) Governance Structure (e)Monitoring and Evaluation*
Indicator: *Target entities are compliant with existing versions of the guidelines – disaggregated by (a) National; (b) District; (c) Health Facility; (d) Partners.* *Use Likert scale: 1-5, where 1 = strongly agree, 2 = agree, 3 = neutral, 4
Means of Verification: Reports (e.g., design workshop, training, supportive supervision)

Result Statement: *Key stakeholders nationwide are compliant with existing Guidelines for Implementing the Electronic Medical Records System.*

Appendix J: EMRS Deployment Monitoring Framework

EMRS Deployment Monitoring Framework
Result Statement: *By 2025, the health sector has institutionalized the use of patient-level digital systems at the point of care.*
Parameter 1: Functionality
Key Monitoring Questions: *1.1 Does the technology or system work?* *1.2 Does the technology or system operate as intended?* *1.3 Does the technology or system perform its intended functions effectively?* *1.4 Is the technology effectively adapted to the local context in terms of language, literacy, modifications for network coverage, etc?*
Indicator List: 1. *% service points of care with a functional computing device/computer/laptop at the time of deployment* 2. *% service points of care within a health facility with access to a power source for powering of the EMRS* 3. *# of alternative functional power sources in place* 4. *% end-users with access to local technical support for troubleshooting* 5. *% devices that are not currently operational (misplaced/broken/not working)* 6. *% end-users who are literate in the language used by the digital health intervention* 7. *% data fields or elements from original paper-based system that are captured by the technology* 8. *# hours of initial training on the use of the EMRS attended by end-users* 9. *# hours of refresher training on the use of the EMRS attended by end-users*
Means of Verification: *Reports (e.g., data/performance reviews, supportive supervision, regional/national telecommunication reports, surveys)*
Parameter 2: Stability
Key Monitoring Questions: *2.1 Does the system consistently operate as intended?*
Indicator List: 1. *# hours of system/server downtime over reference period (i.e., last 1 month or 3 months)* 2. *% end-users reporting successful synchronization with server over reference period (i.e., last 1 month or 3 months)* 3. *% end-users reporting failed synchronization with server over reference period (i.e., last 1 month or 3 months)*
Means of Verification: *Reports (e.g., system-generated/audit trail)*
Parameter 3: Fidelity
Key Monitoring Questions: *3.1 How do people interact with technology or systems?* *3.2 Do the realities of the field implementation alter the functionality and stability of the system, changing the EMRS intervention from that which was intended?* *3.3 Has the digital health system or technology been widely adopted?* *3.4 Do the users find the technology easy to use?* *3.5 Do the end-users find the health data/information received from the EMRS intervention useful?* *3.6 Are the end-users able to communicate with the EMRS as intended?*

3.7 Are the end-users responsive to the information received through the system?

Indicator:

1. *% end-users that pass the assessment test during the training phase.*
2. *% end-users who demonstrate proficiency in use of the EMRS*
3. *% intended end-users observed using the EMRS*
4. *# transmissions sent by intended end-users over reference period (i.e., last 1 month or 3 months)*
5. *% end-users who rate the EMRS as "easy to use"*
6. *% end users who rate the EMRS as "transmits information as intended"*
7. *% end-users who report satisfaction with the content of health data/information received via the EMRS*
8. *% end-users motivated/intending to use the EMRS*
9. *# forms/amount of data transmitted by end-users via EMRS within a reference period (i.e., last 1 month or 3 months)*
10. *% data fields or elements/forms that are left incomplete over reference period (i.e., last 1 month or 3 months)*

Means of Verification:

Reports (e.g., system-generated/audit trail, design workshop, training, data/performance reviews, supportive supervision)

Parameter 4: Quality

Key Monitoring Questions:

4.1 Is the content and the delivery of the EMRS intervention of high enough quality to yield intended outcomes?

4.2 How does EMRS improve service delivery?

4.3 How do improvements in service delivery affect health outcomes?

Indicators:

Client-Level;

1. *# minutes (reported or observed) between EMRS prompt received about programmatic intervention and seeking care from provider (e.g., HW, midwife, nurse, clinician)*
2. *# days duration of illness episode: disaggregated by illness/condition*
3. *# minutes spent with HW in relation to health intervention at the last visit*
4. *% target individuals or caregivers who report contact with a qualified health-care provider using EMRS in relation to a programmatic intervention over reference period*
5. *% target individuals or caregivers who report adequate knowledge about signs and symptoms*
6. *% target individuals or caregivers who report adequate knowledge about the health issues relevant to a programmatic intervention*
7. *% changes in reported individual level out-of-pocket payments for illness management over reference period (through managing the illness by phone-based consultation instead of visiting a health care facility, e.g., travel cost)*

Provider-Level;

1. *# minutes (reported or observed) for last client counseling about a health intervention using EMRS*
2. *# minutes or hours (reported or observed) spent on health record-keeping about a health intervention over reference period*
3. *# minutes (reported or observed) used per individual HW to report important adverse events (e.g., stock-outs)*
4. *# of HWs who report adequate knowledge of the health issue relevant to a health intervention*

5. *% care standards relating to a health intervention observed to be met using EMRS during client-provider consultation*
6. *% HWs observed to be using EMRS during their patient consultations*
7. *% target HWs who use EMRS in relation to relevant health interventions through tablets over reference period*
8. *Amount of cost savings (estimated) due to improvement in service delivery/efficiency/other factors.*
9. *# clients (average or total) attended by a HW using EMRS over reference period*

Health System-Level;

1. *# minutes (cumulative) over reference period for all HWs using EMRS to enter data related to a health intervention*
2. *# days over reference period for which a HW reports stock-out of a commodity essential for provision of a health programmatic intervention*
3. *% change in reported stock-out events of a commodity essential for service delivery over reference period, disaggregated by relevant health interventions*
4. *% change in data entry errors over reference period*
5. *% target end-users who receive training on management and use of EMRS to deliver quality service delivery, disaggregated by initial and refresher training*
6. *# individuals seeking health care over reference period, disaggregated by relevant health interventions*
7. *% individuals in a specific geographical area who receive health care through EMRS over reference period, disaggregated by relevant health interventions*
8. *% change in costs of transporting HMIS paper forms and manual data entry over reference period*
9. *% change in costs of human resources for data entry*
10. *% change in costs associated with timely and appropriate management of illness*
11. *% changes in reported individual out-of-pocket payments for management of illness*
12. *Total population-level savings in out-of-pocket payments attributed to timely and appropriate care seeking*

Means of Verification:

Reports (e.g., system-generated/audit trail, design workshop, training, data/performance reviews, supportive supervision)

Appendix K: EMRS Evaluation Framework

EMRS Evaluation Framework		
Formative	**Evaluation Type:** Process Evaluation **Objective:** Measure outputs attributed to EMRS intervention activities and inputs; done either as a one-time assessment and/or continuously. **Key Question(s):** ● Is the EMRS intervention operating as intended?	**Timeline:**TBD
	Evaluation Type: Implementation Evaluation **Objective:** Monitor the fidelity of the EMRS intervention holistically or technology system. **Key Question(s):** ● Is EMRS implementation occuring in accordance with the original and existing implementation guidelines and standard operating procedures and/or protocols?	**Timeline:**TBD
Summative	**Evaluation Type:** Performance or Outcome Evaluation **Objective:** Measure the effectiveness of EMRS intervention activities on immediate and intermediate changes in key outcomes, including knowledge, service provision, utilization and coverage. **Key Question(s):** ● Are the health services available? What is EMRS intervention's effect on changes in service delivery? ● Are the health services being utilized? ● Did EMRS increase coverage of the relevant health interventions? Is the target population being reached?	**Timeline:**TBD
	Evaluation Type: Impact Evaluation **Objective:** Measure the long-term net effects or impact of the intervention on key health outcomes, including mortality, morbidity, and disease risk, at the health facility level or higher. **Key Question(s):** ● Were there improvements in disease or mortality patterns, or health-related behaviors?	**Timeline:**TBD
	Evaluation Type: Economic Evaluation **Objective:** Determine a probable value for money from investment made in EMRS roll-out. **Key Question(s):** ● What is the incremental cost-effectiveness of the EMRS intervention as compared to existing services?	**Timeline:**TBD