

SOP: Using KenyaEMR Machine Learning - IIT

Last update: July 2023

Objective: The machine learning module for IIT is used to Predict the risk of patient interrupting treatment (IIT). This job aid will outline how to use the Machine Learning (ML) features in the above use case.

Tasks:

- Pull patient scores from Data Warehouse
- Check IIT High Risk Report
- Check individual patients IIT risk level

Who: Clinician/HRIO/Data clerk/Care providers

Requirements: Working KenyaEMR instance (ver 18.6.X)

Introduction:

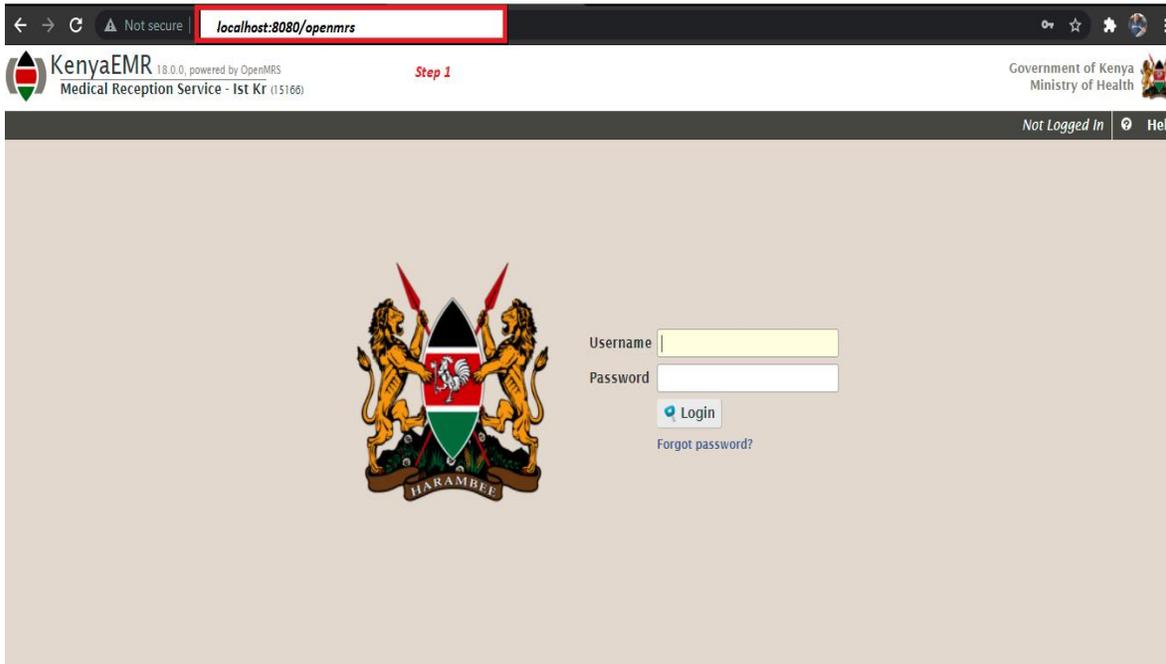
With the advancement of technology, KenyaEMR is evolving towards increased use of Artificial Intelligence (AI) and Machine Learning capabilities to improve care delivery and better patient management. KenyaEMR now employs use of intelligent algorithms to predict likely patient outcomes while in care. This information can be used by care providers to intervene and forestall such undesired outcomes.

Part A: Using Machine Learning in predicting IIT

Step 1: Login to KenyaEMR

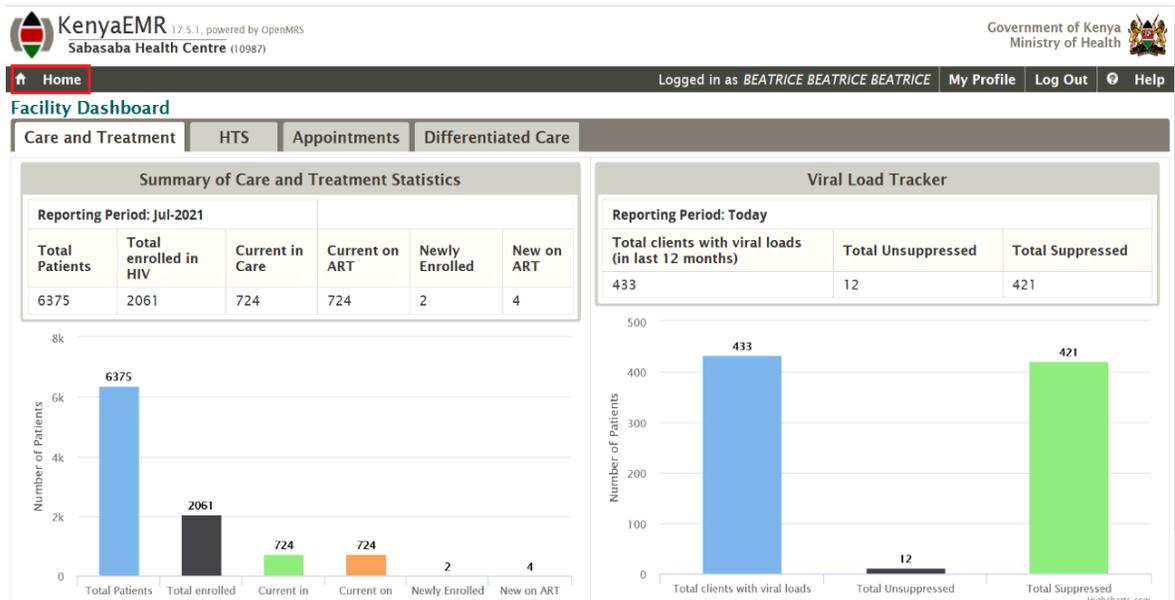
Enter the application server URL system “localhost:8080/openmrs ” and click on the load button or Enter key from the keyboard. On successful loading, you should be navigated to the system login page

Authenticate entry by providing username and password on the fields, and click



“Login” Upon successful login, you shall be navigated to KenyaEMR Home Page

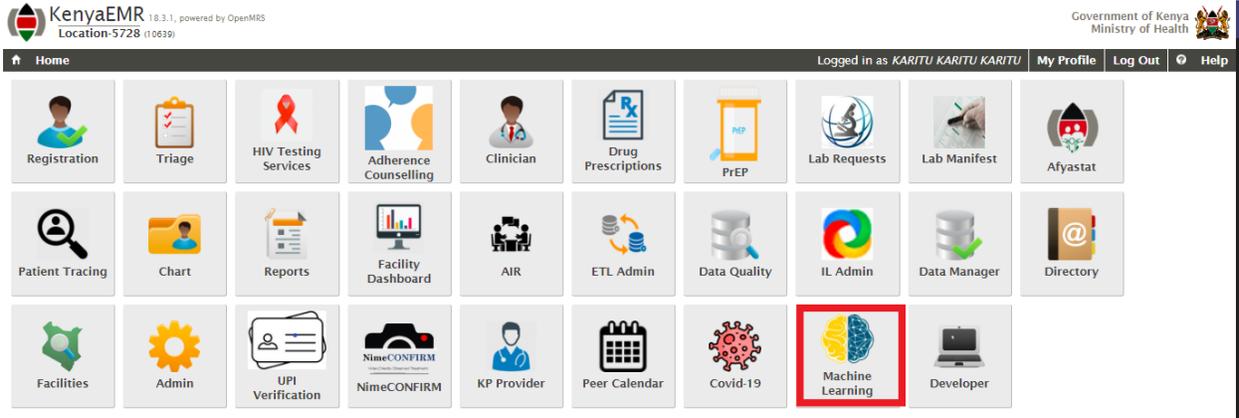
2. KenyaEMR Home page



Once logged-in click on the home tab to access the home page

Step 3: Accessing Machine Learning Application

- Click on the Machine Learning icon on the homepage to open the module.



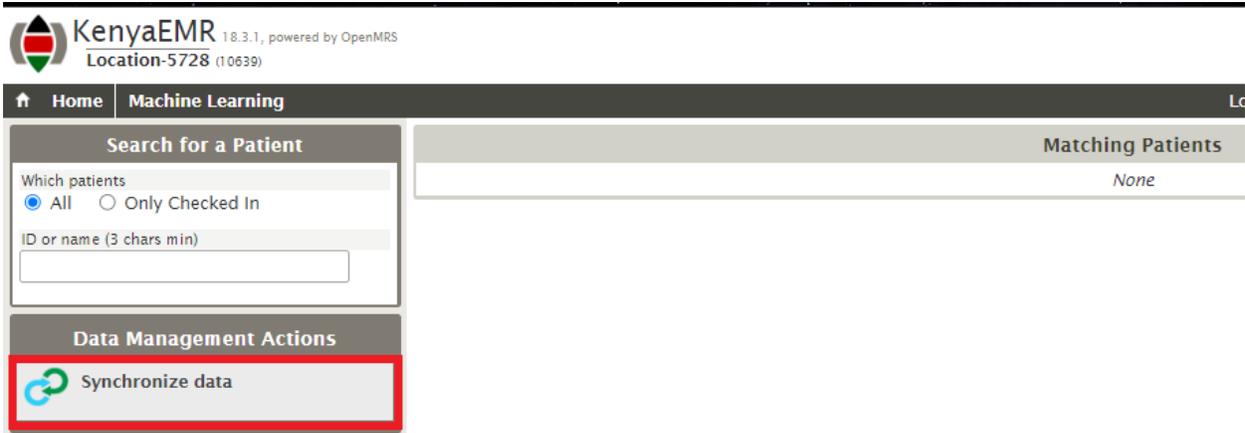
4. Synchronizing Data

There are two ways of synchronizing data for the IIT risk score, i.e., from the NDW to the facility EMR instance and through pulling of the IIT risk scores from the facility EMR instance.

- NDW Synchronization:** The ML algorithm is executed on the data in the DWH then the results are pulled from the DWH to the facility EMR instance. Therefore, the first step is to ensure you pull the latest predictions from DWH before you run the IIT reports.

Steps: Click on Synchronize Data

- This will fetch current information on the local instance.



ML Summary

Total Patients	0
High Risk	0
Low Risk	0
Risk Threshold	0.40

Fetch IIT risk scores from Data Warehouse (NDWH)

ii. Pull Machine Learning Summary

On synchronizing for the first time, one will see either an empty ML summary, or information from the last update done from Data warehouse. As shown below

- To get the latest IIT risk scores, click on the **'Pull Patient Scores'** button as shown above give the fetch process some time to complete before proceeding

ML Summary

Total Patients	2987
High Risk	623
Low Risk	2364
Risk Threshold	0.40

Fetch IIT risk scores from Data Warehouse (NDWH)

33%
 296/888

b) Facility EMR synchronization:

To pull IIT risk scores from the EMR click on the "Generate IIT risk scores" button as captioned below and allow the EMR a couple of seconds to generate the scores based on the TX Curr of the facility.



Once all the IIT scores have been pulled, click on **'Update Summary'** to update the ML summary. An updates summary will look something like this.

ML Summary

Total Patients	2987
High Risk	623
Low Risk	2364
Risk Threshold	0.40

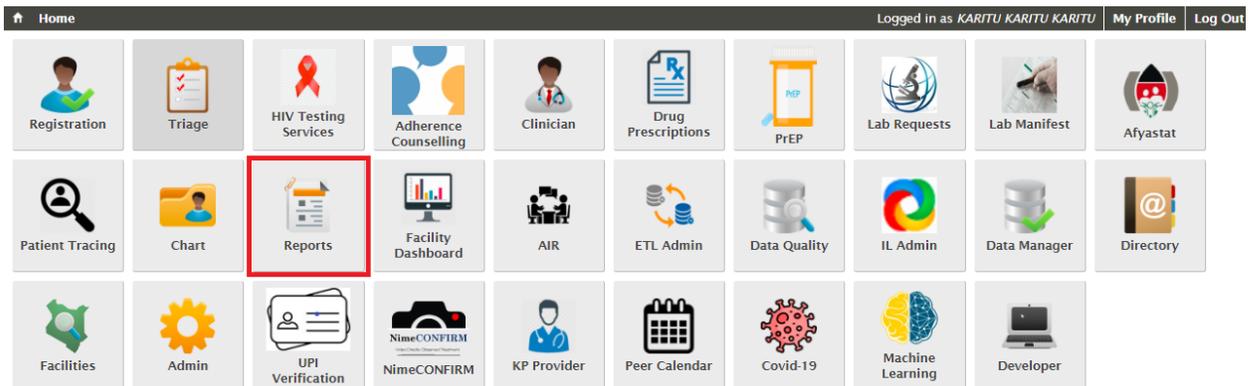
Fetch IIT risk scores from Data Warehouse (NDWH)

Success fetching summary!

Update Summary Pull Patient scores

5. Access IIT High Risk Report

- Go back to the KenyaEMR Homepage by clicking **"Home"**
- Navigate and click on **'Reports'** icon to open the reports module



- Under Common reports, the **IIT High Risk** Report can be accessed under Common Reports tab as shown in Fig 6.2 below
- Click on IIT high risk to open the next page

Common	Cohort Analysis	HIV	TB	TPT	MCH - Mother Services	OTZ	OVC	MCH - Child Services	Key Population	PrEP
VMMC										
Indicator						Patient Follow-Up Reports				
<ul style="list-style-type: none"> HTS Monthly Report ART Drugs MOH 731 MOH 745 KDoD MOH 731 Datim Report Differentiated care report for Current in Care Patients Viral Suppression Report for Current on ART Patients 						<ul style="list-style-type: none"> Partner Notification Register Family Testing Register All contacts with undocumented HIV status Children of HIV infected adults with undocumented HIV status PNS contacts with undocumented HIV status SNS contacts with undocumented HIV status IIT high risk Missed Appointments 				

- To run the report, click on IIT High Risk report and click Request Report as highlighted in Fig 6.3, to initiate a fetch of the report shown under queue.

Home Reports Logged in as KARITU KARITU KARITU My Profile Log Out Help

Tasks

- Request report**
- Back to home

Summary

Name: IIT high risk
Description: Patients with IIT high risk

Queue

Requested	By	Report file name	Status	Time taken
None				

Finished

Requested	By	Report file name	Status	Time taken
None				

- Click on Request when the floating window appears.

Request Report

Report
IIT high risk

Request Cancel

- Once the report is finished, you can choose to view the report by clicking View to see the report or click on **CSV** to download it in CSV format as shown in Fig 6.5

Summary				
Name: IIT high risk Description: Patients with IIT high risk				
Queue				
Requested	By	Report file name	Status	Time taken
None				
Finished				
Requested	By	Report file name	Status	Time taken
12-Sep-2022 08:46	KARITU, KARITU KARITU	IIT high risk_Sep-2022	COMPLETED	00:00:22
				View CSV

- **If you click on View, the IIT High Risk report is shown below.**

IIT high risk													
Summary													
Total: 462 Males: 152 Females: 310													
Name	Age	Sex	UPN	Last risk score	Evaluation Date	Enrollment Date	Art Start Date	First Regimen	Current Regimen	Current Regimen Line	Stability	Last Visit Date	Next Appointment Date
Esther njeri, Esther njeri	38	M	1046000012	0.508852422	29/07/2022	23/02/2012	16/06/2015	TDF/3TC/EFV	TDF/3TC/EFV	First line		29/06/2016	21/09/2016
HANNAN, HANNAN	47	F	2063800005	0.448645711	29/07/2022	18/06/2007	12/09/2007	D4T/3TC/NVP	D4T/3TC/NVP	First line		29/04/2008	25/05/2008
KAARA, KAARA	37	F	2063900893	0.539786339	29/07/2022	01/11/2012	27/01/2014	3TC/NVP/TDF	3TC/NVP/TDF	First line		22/10/2015	19/11/2015
REBECCA, REBECCA	59	M	2539000570	0.443037003	29/07/2022	11/03/2015	07/10/2008	AZT/3TC/NVP	AZT/3TC/NVP	First line		04/06/2015	30/07/2015
DANSON, DANSON	32	F	10113117478	0.5373739	29/07/2022	13/11/2011	24/08/2012	AZT/3TC/EFV	AZT/3TC/EFV	First line		19/03/2015	22/04/2015
awor, awor	12	M	10113117479	0.469387561	29/07/2022	14/12/2011	03/01/2012	ABC/3TC/NVP	ABC/3TC/NVP	First line		09/08/2022	21/09/2022
Wangu, Wangu	35	F	10539006886	0.5373739	29/07/2022	07/10/2013	31/10/2013	3TC/NVP/TDF	AZT/3TC/ATV/r	First line		19/06/2018	20/09/2018
WAMBUI MBOGO, WAMBUI MBOGO	37	F	1063900743	0.5373739	29/07/2022	04/07/2011	26/05/2015	TDF/3TC/EFV	TDF/3TC/EFV	First line		23/03/2016	18/05/2016
Nzozo, Nzozo	49	F	1063900757	0.511458755	29/07/2022	23/08/2011	22/09/2011	3TC/NVP/TDF	3TC/NVP/TDF	First line		06/11/2011	06/12/2011
WANGARI NJUGUNA, WANGARI NJUGUNA	40	F	1063900773	0.539786339	29/07/2022	05/10/2011	14/07/2015	TDF/3TC/EFV	TDF/3TC/EFV	First line		14/07/2015	06/08/2015

6. View Patient IIT Score

KenyaEMR also provides access to IIT score for individual patients under the patient clinical profile page. To access the scores, do the following:

- Go to KenyaEMR Homepage
- Click on **Clinician** module as shown in Fig 7.1

The screenshot shows the KenyaEMR homepage with a navigation menu. The 'Clinician' module is highlighted with a red box. Other modules include Registration, Triage, HIV Testing Services, Adherence Counselling, Drug Prescriptions, PREP, Lab Requests, Lab Manifest, Afyastat, Patient Tracing, Chart, Reports, Facility Dashboard, AIR, ETL Admin, Data Quality, IL Admin, Data Manager, Directory, Facilities, Admin, UPI Verification, NimeCONFIRM, KP Provider, Peer Calendar, Covid-19, Machine Learning, and Developer.

- Select or search for a patient enrolled for HIV or any patient.

The screenshot shows the 'Search for a Patient' interface. On the left, there are filters for 'Which patients' (All, Only Checked in) and a search box for 'ID or name (3 chars min)'. Below is a 'Seen Patients' section. The main area displays a list of 'Matching Patients' with columns for patient name, age, DOB, Unique Patient Number, National ID, and status (Outpatient since).

Which patients	Matching Patients																																																
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- Click on the patients name to open their clinical profile page
- One should be able to see their IIT risk score just under the Information section as shown below

Home Clinician

Gachau, Gachau Gachau
 ♀ Female, 32 year(s) (12-Dec-1989)

Fully COVID-19 Vaccinated On ART Lost to Followup Due for CACX Scr

Information

Telephone contact: 9190060911
 Next of kin name: MARGARET NJERI
 Next of kin relationship: Test
 Next of kin contact: 9139393109
 Alternate Phone Number: 9131301693
 Nearest Health Facility: GATUNYU
 cr verification status: Pending

Family History Edit form Obstetric History Edit form

IIT Risk Score

Risk Score	0.0143410135060549
Evaluation Date	25-Aug-2022
Description	Low Risk
Risk Factors	-

7. Individual Patient Chart

This shows the IIT scores over time based on available patient information. To access this, perform the following:

- Go to the Machine Learning Module
- Search for a patient by ID or name

KenyaEMR 10.3.1, powered by OpenMRS
 Location: 5728 (10639)

Government of Kenya Ministry of Health

Home Machine Learning Logged in as KARITU KARITU KARITU My Profile Log Out Help

Search for a Patient

Which patients
 All Only Checked In

ID or name (3 chars min)
 gachau

Data Management Actions

Matching Patients

	Gachau, Gachau Gachau 48 year(s) (DOB 15-Jun-1974)	Unique Patient Number 1063900739	
	Gachau, Gachau Gachau 32 year(s) (DOB 12-Dec-1989)	Unique Patient Number 1025600069 National ID 07798700	Outpatient since 29-Aug-2022
	Gachau, Gachau Gachau 102 year(s) (DOB 01-Jun-1920)	OpenMRS ID MGFN4X	
	Gachau, Gachau Gachau 102 year(s) (DOB 01-Jun-1920)	OpenMRS ID MGFP69	
	Gachau, Gachau Gachau 37 year(s) (DOB 15-Aug-1985)	Unique Patient Number 1064000820	
	Gachau, Gachau Gachau ~25 year(s) (DOB approx 13-Jun-1997)	OpenMRS ID MGR9CC	
	Gachau, Gachau Gachau 54 year(s) (DOB 15-Jun-1968)	Unique Patient Number 1063900795	
	Gachau, Gachau Gachau 102 year(s) (DOB 01-Jun-1920)	OpenMRS ID MGFU7M	

- Select the patient that matches the description to see their risk score progress over time

[Home](#) | [Machine Learning](#) | Logged in as **KARITU KARITU KARITU** | [My Profile](#) | [Log Out](#) | [Help](#)

Gachau, Gachau Gachau | Unique Patient Number **1025600069** | National ID **07798700** | [Close](#)

Fully COVID-19 Vaccinated | On ART | Lost to Followup | Due for CACX Screening

Current visit: **Outpatient since 29-Aug-2022**

Information

Telephone contact: 9190060911
 Next of kin name: MARGARET NJERI
 Next of kin relationship: Test
 Next of kin contact: 9139393109
 Alternate Phone Number: 9131301693
 Nearest Health Facility: GATUNYU
 or verification status: Pending

IIT Risk Score

Risk Score 0.0143410135060549
 Evaluation Date 25-Aug-2022
 Description Low Risk
 Risk Factors -



THE END