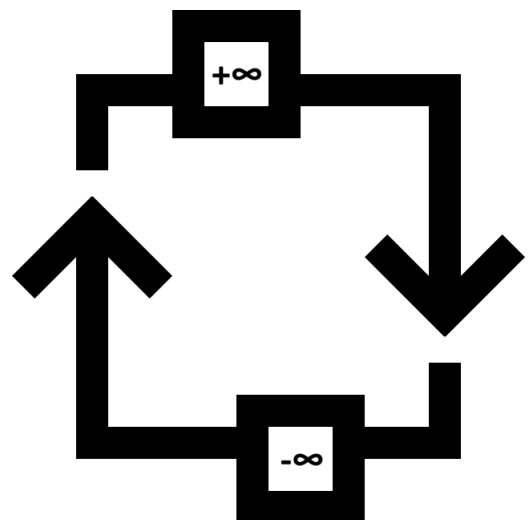


# CONVERGENT ANALYTICS

HEALTH AI SUITE

VERSION: 1



TRACKING

EDITS

Edit	Date	Author(s)	Role(s)
Initial edit	2025-03-24	Sergey Lukyanchikov	Project Owner

APPROVALS

Approval	Date	Approver(s)	Signature(s)
Initial approval	2025-03-24	Sergey Lukyanchikov	NA

## DISCLAIMER

This document provides information required for installation and use of Health AI Suite. The functionality of Health AI Suite is a template to be adjusted to the needs of the user. The user installs and applies Health AI Suite at their own discretion and risk.

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## GENERAL

[Health AI Suite](#) is a bundle of open-source components configured to add AI-centric client-server computations to EMR/HER software. Health AI Suite is currently tested under the following components (a non-exhaustive list of the most important items):

- [OpenEMR \(openemr-7.0.2\)](#)
- [XAMPP \(xampp-portable-windows-x64-8.2.12-0-VS16-installer\)](#)

Prerequisites:

- [AI Orchestration Platform](#) with Stroke Prediction deployed

**IMPORTANT:** the above links are indicative, the components available under those links are not controlled by us. Download at your discretion and risk.

## COMPONENTS INSTALLATION

Before downloading and configuring Health AI Suite, we must download and install open-source components on which Health AI Suite depends:

### OPENEMR

Download and installation instructions: [OpenEMR \(openemr-7.0.2.zip\)](#)

### XAMPP

Download: [XAMPP \(xampp-portable-windows-x64-8.2.12-0-VS16-installer\)](#)

Installation video: [XAMPP](#)

Check that the following additional (next to the ones required for XAMPP setup) PHP extensions are activated:

- cURL

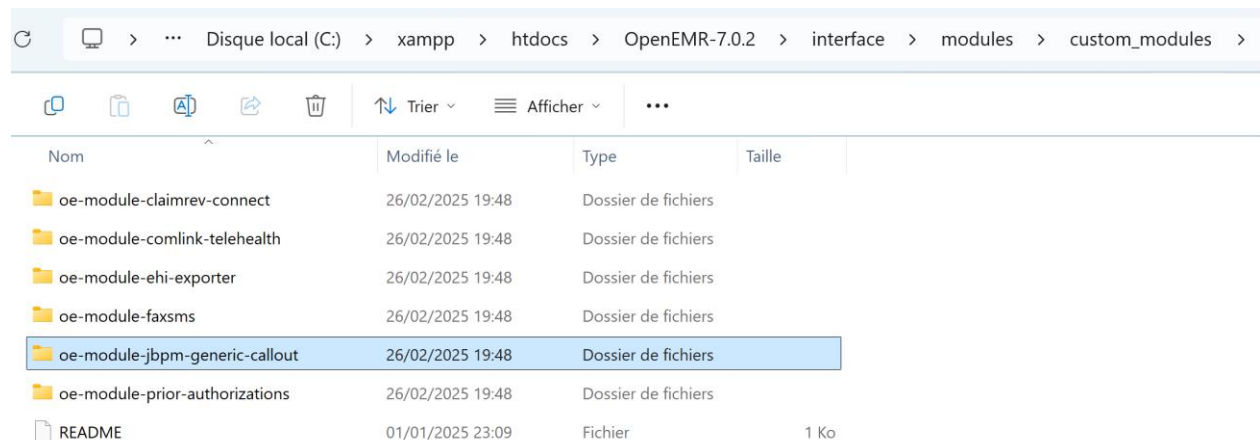
## HEALTH AI SUITE DOWNLOAD, IMPORT AND SETUP

### DOWNLOAD

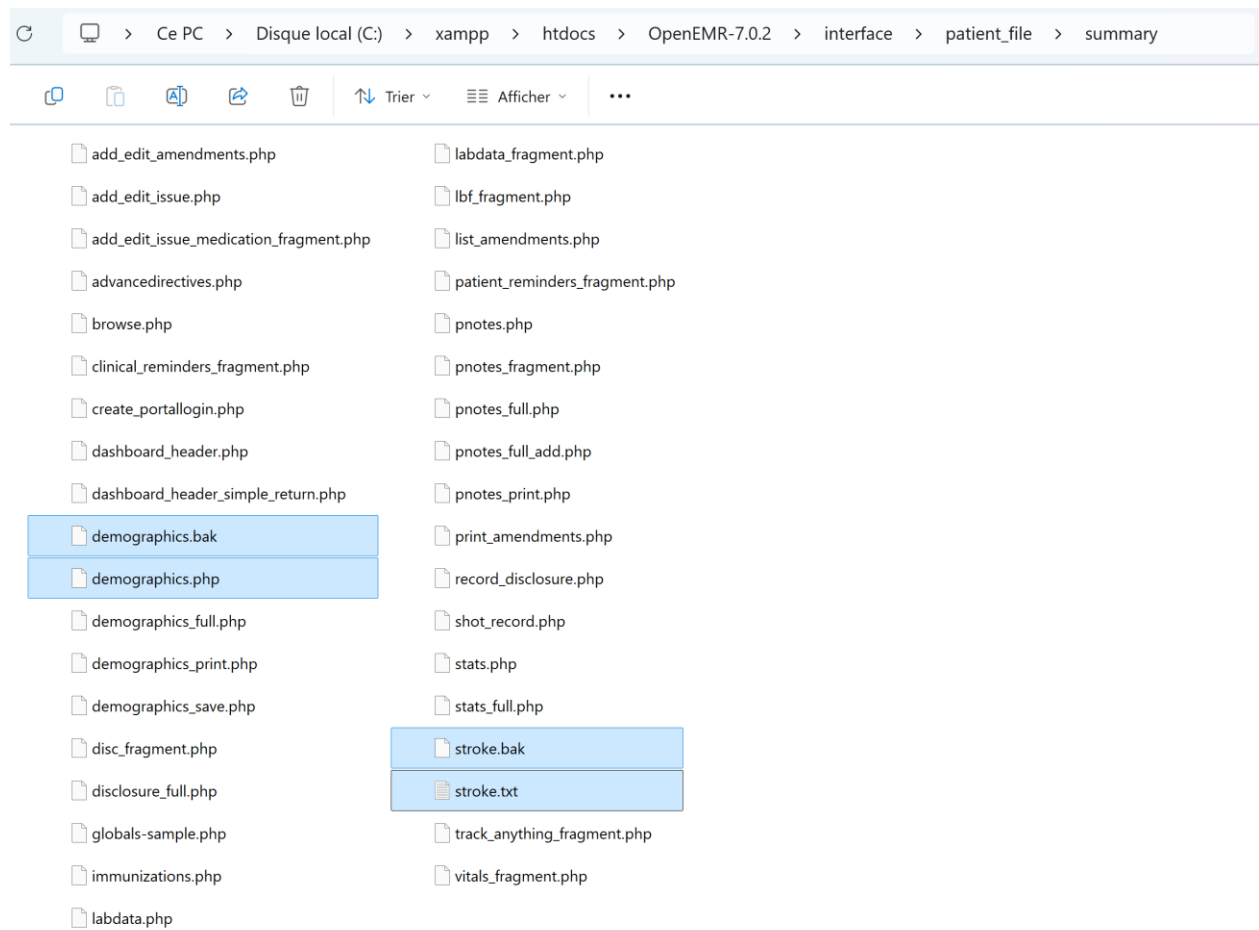
**IMPORTANT:** the below chapters describe a somewhat simplified procedure that is intended to get you up and running as quickly as possible. In particular, importing the downloaded classes in an IDE with subsequent version control setup should be considered for a more elaborate implementation.

We can now download [Health AI Suite \(Health AI Suite v1.zip\)](#). Extract it from the zip file, and:

- move `oe-module-jbpm-generic-callout` folder from the download to your OpenEMR site's custom modules folder, e.g., the folders in `C:\xampp\htdocs\OpenEMR-7.0.2\interface\modules\custom_modules` path should look like below:



- overwrite (having previously backed up `demographics.php`) the files from the download's summary folder to its counterpart in your OpenEMR site, e.g., the files in `C:\xampp\htdocs\OpenEMR-7.0.2\interface\patient_file\summary` path should look like below:



From [Data folder](#) of the same repository, download all the files to a local folder of your choice:



C-NLTX / Open-Source

<> Code

Issues

Pull requests

Actions

Projects

Wiki

Security

Files

master

+

Q

Q Go to file

t

> .settings

▼ Data

column\_map\_openemr.txt

healthcare-dataset-stroke-data-...

healthcare-dataset-stroke-data....

healthcare-dataset-stroke-data\_...

> Programs

Open-Source / Data /

C-NLTX Update and rename healthcare-dataset

Name
..
column_map_openemr.txt
healthcare-dataset-stroke-data-for-import.csv
healthcare-dataset-stroke-data.csv
healthcare-dataset-stroke-data_cleansed.csv

## IMPORT

In phpMyAdmin, import in `openemr` database (or its analog in your OpenEMR site) in `patient_data` table the data from `healthcare-dataset-stroke-data-for-import.csv` file using for column mapping `column_map_openemr.txt` file, previously downloaded from [Data folder](#) of C-NLTX repository. The data in `patient_data` table will look like below:

The first screenshot shows the phpMyAdmin interface with the 'patient\_data' table selected. The table structure is as follows:

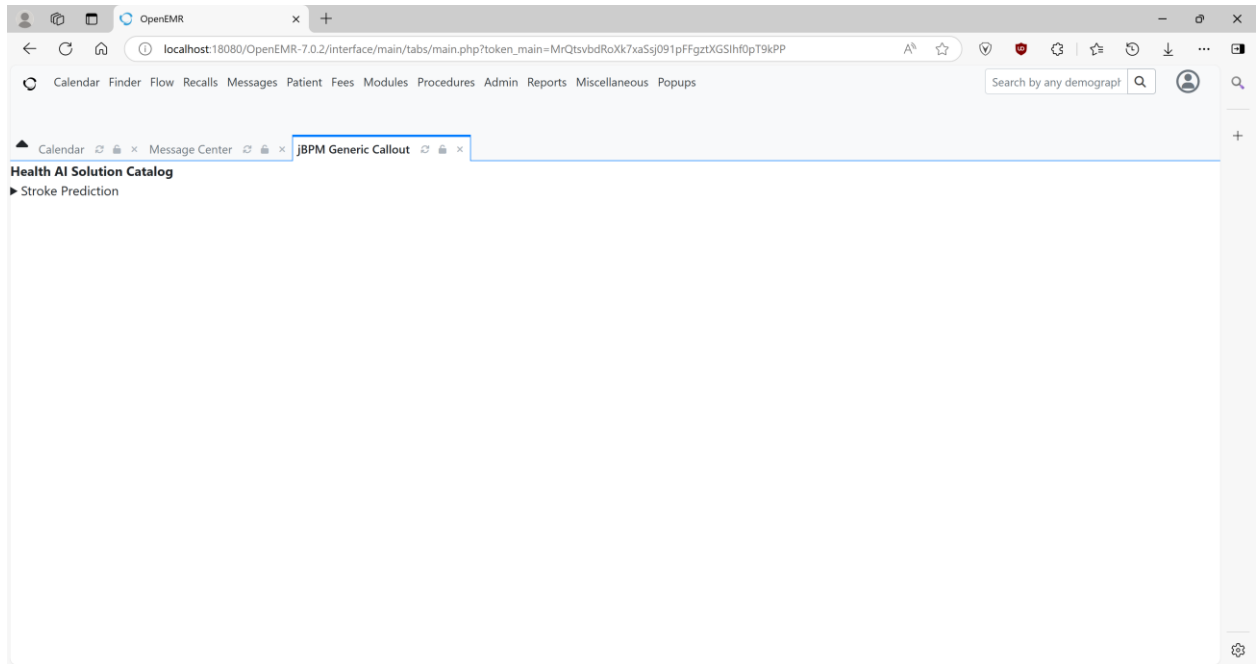
	id	uuid	title	language	financial	fname	lname	mname	DOB	street	pos
<input type="checkbox"/>	Éditer	Copier	Supprimer	10434	0x31303433340000000000000000000000	NA	NA	NA	NA	0000-00-00	NA
<input type="checkbox"/>	Éditer	Copier	Supprimer	27419	0x32373431339000000000000000000000	NA	NA	NA	NA	0000-00-00	NA
<input type="checkbox"/>	Éditer	Copier	Supprimer	60491	0x36303439310000000000000000000000	NA	NA	NA	NA	0000-00-00	NA
<input type="checkbox"/>	Éditer	Copier	Supprimer	12109	0x31323130390000000000000000000000	NA	NA	NA	NA	0000-00-00	NA
<input type="checkbox"/>	Éditer	Copier	Supprimer	12095	0x31323039350000000000000000000000	NA	NA	NA	NA	0000-00-00	NA
<input type="checkbox"/>	Éditer	Copier	Supprimer	12175	0x31323137350000000000000000000000	NA	NA	NA	NA	0000-00-00	NA
<input type="checkbox"/>	Éditer	Copier	Supprimer	8213	0x38323133300000000000000000000000	NA	NA	NA	NA	0000-00-00	NA
<input type="checkbox"/>	Éditer	Copier	Supprimer	5317	0x35333137000000000000000000000000	NA	NA	NA	NA	0000-00-00	NA
<input type="checkbox"/>	Éditer	Copier	Supprimer	58202	0x35383230320000000000000000000000	NA	NA	NA	NA	0000-00-00	NA
<input type="checkbox"/>	Éditer	Copier	Supprimer	56112	0x35363131320000000000000000000000	NA	NA	NA	NA	0000-00-00	NA
<input type="checkbox"/>	Éditer	Copier	Supprimer	34120	0x33343132300000000000000000000000	NA	NA	NA	NA	0000-00-00	NA
<input type="checkbox"/>	Éditer	Copier	Supprimer	27458	0x32373435380000000000000000000000	NA	NA	NA	NA	0000-00-00	NA
<input type="checkbox"/>	Éditer	Copier	Supprimer	25226	0x32353232360000000000000000000000	NA	NA	NA	NA	0000-00-00	NA
<input type="checkbox"/>	Éditer	Copier	Supprimer	70630	0x37303633300000000000000000000000	NA	NA	NA	NA	0000-00-00	NA
<input type="checkbox"/>	Éditer	Copier	Supprimer	13861	0x31333836310000000000000000000000	NA	NA	NA	NA	0000-00-00	NA
<input type="checkbox"/>	Éditer	Copier	Supprimer	68794	0x36383739340000000000000000000000	NA	NA	NA	NA	0000-00-00	NA
<input type="checkbox"/>	Éditer	Copier	Supprimer	64778	0x36343737380000000000000000000000	NA	NA	NA	NA	0000-00-00	NA

The second screenshot shows the 'patient\_data' table with additional columns: 'occupation', 'phone\_home', 'phone\_biz', 'phone\_contact', 'phone\_cell', 'pharmacy\_id', 'status', 'contact\_relationship', 'date', 'sex', 'referrer', and 'referrerID'. The data rows are as follows:

	occupation	phone_home	phone_biz	phone_contact	phone_cell	pharmacy_id	status	contact_relationship	date	sex	referrer	referrerID
Private	NA	NA	NA	NA	NA	0	NA	NA	0000-00-00 00:00:00	Female	NA	NA
Private	NA	NA	NA	NA	NA	0	NA	NA	0000-00-00 00:00:00	Female	NA	NA
Private	NA	NA	NA	NA	NA	0	NA	NA	0000-00-00 00:00:00	Female	NA	NA
Private	NA	NA	NA	NA	NA	0	NA	NA	0000-00-00 00:00:00	Female	NA	NA
Govt_job	NA	NA	NA	NA	NA	0	NA	NA	0000-00-00 00:00:00	Female	NA	NA
Private	NA	NA	NA	NA	NA	0	NA	NA	0000-00-00 00:00:00	Female	NA	NA
Private	NA	NA	NA	NA	NA	0	NA	NA	0000-00-00 00:00:00	Male	NA	NA
Private	NA	NA	NA	NA	NA	0	NA	NA	0000-00-00 00:00:00	Female	NA	NA
Self-employed	NA	NA	NA	NA	NA	0	NA	NA	0000-00-00 00:00:00	Female	NA	NA
Private	NA	NA	NA	NA	NA	0	NA	NA	0000-00-00 00:00:00	Male	NA	NA
Private	NA	NA	NA	NA	NA	0	NA	NA	0000-00-00 00:00:00	Male	NA	NA
Private	NA	NA	NA	NA	NA	0	NA	NA	0000-00-00 00:00:00	Female	NA	NA
Govt_job	NA	NA	NA	NA	NA	0	NA	NA	0000-00-00 00:00:00	Male	NA	NA
Govt_job	NA	NA	NA	NA	NA	0	NA	NA	0000-00-00 00:00:00	Female	NA	NA
Self-employed	NA	NA	NA	NA	NA	0	NA	NA	0000-00-00 00:00:00	Female	NA	NA
Self-employed	NA	NA	NA	NA	NA	0	NA	NA	0000-00-00 00:00:00	Female	NA	NA
Private	NA	NA	NA	NA	NA	0	NA	NA	0000-00-00 00:00:00	Male	NA	NA

## SETUP

In OpenEMR, add and configure custom `oe-module-jbpm-generic-callout` module by watching the [following tutorial](#). Once done, the added module's tab will look like below:



## HEALTH AI SUITE CUSTOMIZING AND TESTING

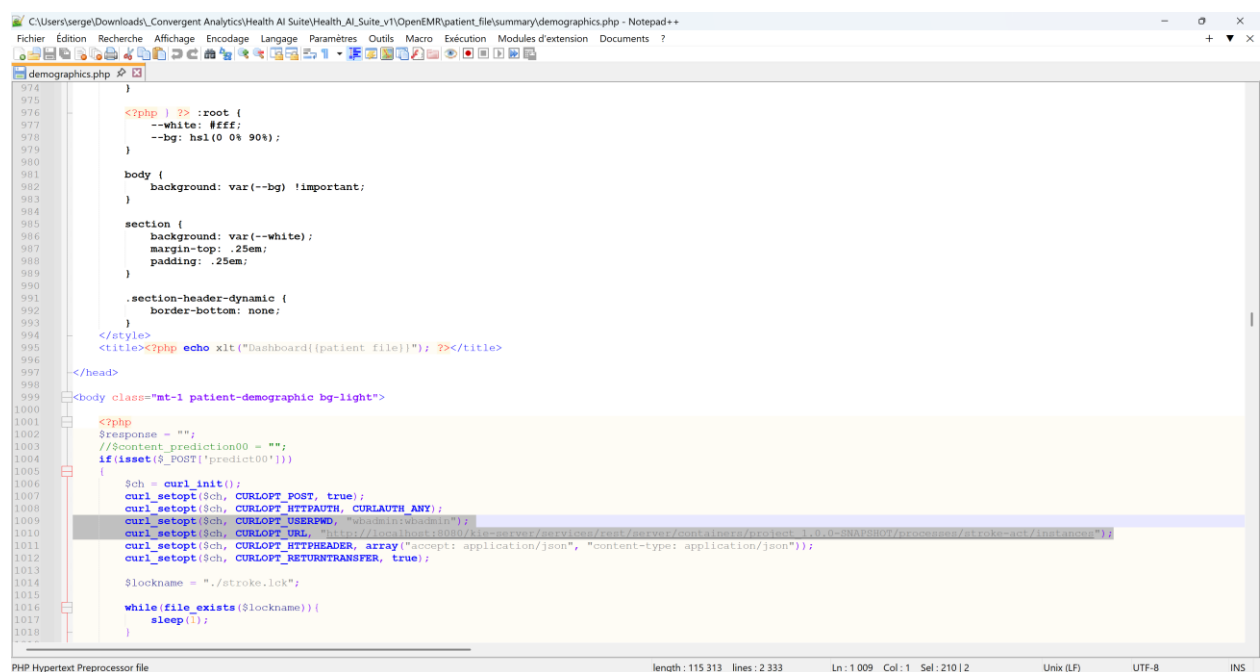
### CUSTOMIZING

Before we can test our Health AI Suite, let us customize the content we have just deployed. In

C:\xampp\htdocs\OpenEMR-

7.0.2\interface\patient\_file\summary\demographics.php, adjust (if needed) the following lines:

- 1009 – adjust the user password for a callout to AI Orchestration Platform
- 1010 – adjust the URL for a callout to stroke-act process deployed in AI Orchestration Platform
- 1079 – adjust the user password for a callout to AI Orchestration Platform
- 1080 – adjust the URL for triggering a query to a process instance in AI Orchestration Platform

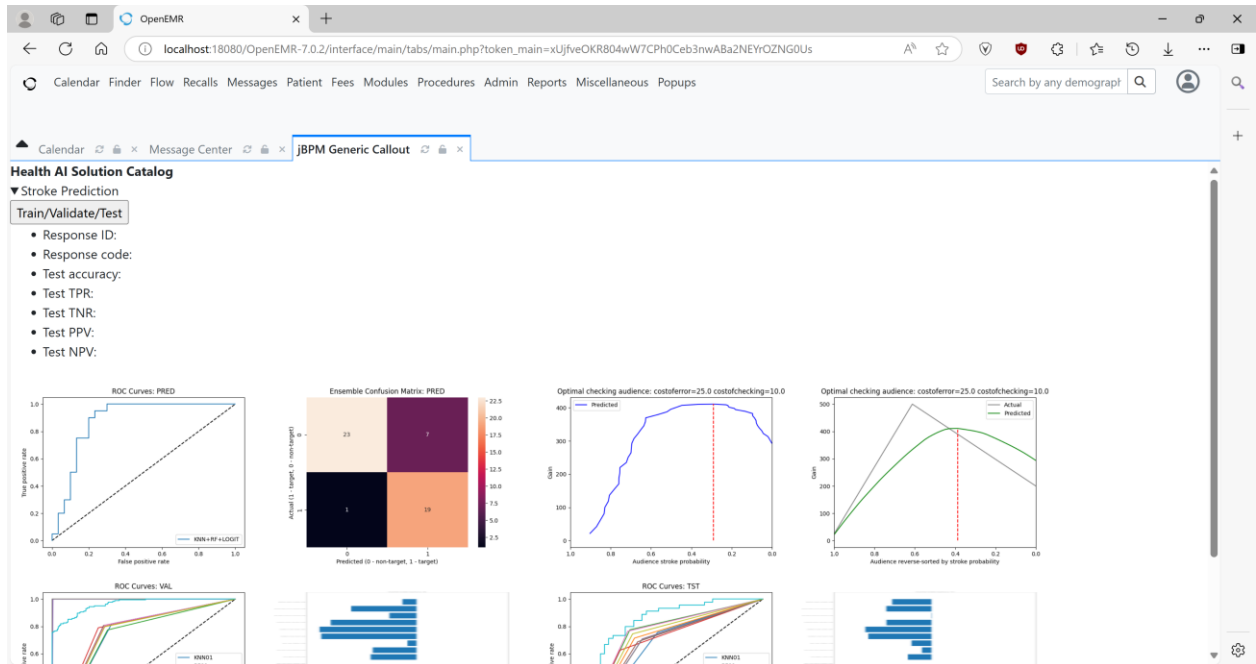


```
1009 $curl_setopt($ch, CURLOPT_USERPWD, "wbadmin:wbadmin");
1010 $curl_setopt($ch, CURLOPT_URL, "http://localhost:8080/sis-server/services/rest/server/containers/project-1.0.0-PHA/PHOT/processes/stroke-act/instance");
```

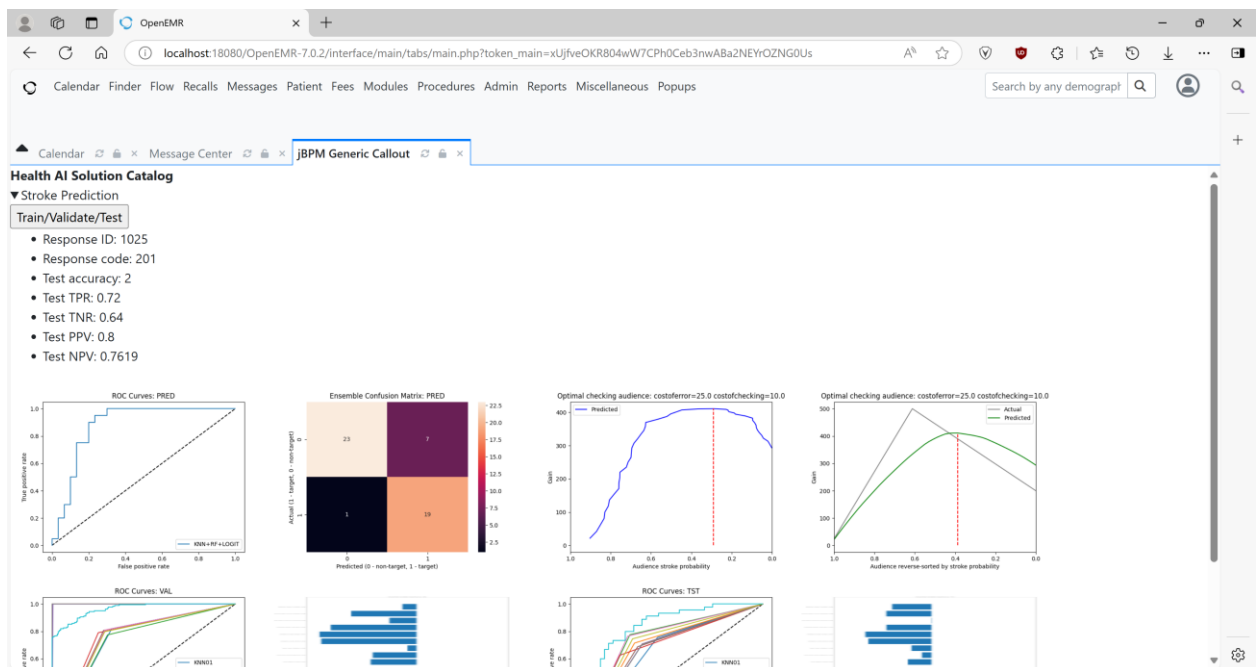
### TESTING

We can now test our Health AI Suite by sending train/validate/test and predict requests from OpenEMR to Stroke Prediction solution that we assume implemented in AI Orchestration Platform.

In OpenEMR, select from Modules menu jBPM Generic Callout item, and click on Stroke Prediction to gain access to Train/Validate/Test button (the graphs shown in the below screenshot will appear once the first callout was executed):



Press Train/Validate/Test button. Once the screen was refreshed (signals that the callout initiated by pressing the button is completed), click again on Stroke Prediction item to visualize the callout results (note the numbers that appeared next to the text labels under Train/Validate/Test button):



If you want to change train/validate/test hyperparameters, click on Parameters, modify the values, and press Submit button:

OpenEMR

localhost:18080/OpenEMR-7.0.2/interface/main/tabs/main.php?token\_main=uWIOyScfBHSikvZjVF5z48CQ7sy5dsVUjqGdqaPD

Calendar Finder Flow Recalls Messages Patient Fees Modules Procedures Admin Reports Miscellaneous Popups

Search by any demograph

Calendar Message Center jBPM Generic Callout

▼ Parameters

1 - number of loop iterations

"C:/xampp/htdocs/OpenE - path to working directory

"['id','gender','ever\_marrie - list of columns to ignore in models

1 - sample balancing ratio

1 - export modeling artefacts to files

1 - number of training runs

1 - number of testing runs

25.0 - average gain per detected target

10.0 - average loss per processed case

0.95 - sample training fraction

1 - training-coupled validation flag

5 - number of folds

0.99 - training sample bagging fraction

"" - array of ensemble weight overrides

1 - training-based ensemble weights flag

0 - validation-based ensemble weights flag

Submit

– once you reopen Stroke Prediction and then Parameters, you will see Input recorded message:

▼ Parameters

Input recorded

1 - number of loop iterations

"C:/xampp/htdocs/OpenE - path to working directory

"['id','gender','ever\_marrie - list of columns to ignore in models

The modified values have now been saved to C:\xampp\htdocs\OpenEMR-7.0.2\interface\modules\custom\_modules\oe-module-jbpm-generic-callout\public\stroke.txt file, and will be used by default for each subsequent train/validate/test callout to AI Orchestration Platform:

The screenshot shows the 'Variables de processus' tab for process instance 1030. The table lists various process variables with their values, types, and last modification dates. Each row has an 'Actions' column with a 'Historique' link.

Nom	Valeur	Type	Dernière modification	Actions
preddraw	1		27-mars-2025 23:01:14	Historique
predfrac	0.95		27-mars-2025 23:01:14	Historique
publish	1		27-mars-2025 23:01:14	Historique
samplestruct	com.discovery.project.Samplestruct@6bd33...	com.discovery.project.Samplestruct	27-mars-2025 23:01:06	Historique
subinterp			27-mars-2025 23:01:42	Historique
test	com.discovery.project.Test@723b34c4	com.discovery.project.Test	27-mars-2025 23:01:06	Historique
testdraws	1		27-mars-2025 23:01:14	Historique
train	com.discovery.project.Train@44e119e9	com.discovery.project.Train	27-mars-2025 23:01:06	Historique
training	1		27-mars-2025 23:01:14	Historique
validate	com.discovery.project.Validate@12ab6d4	com.discovery.project.Validate	27-mars-2025 23:01:06	Historique

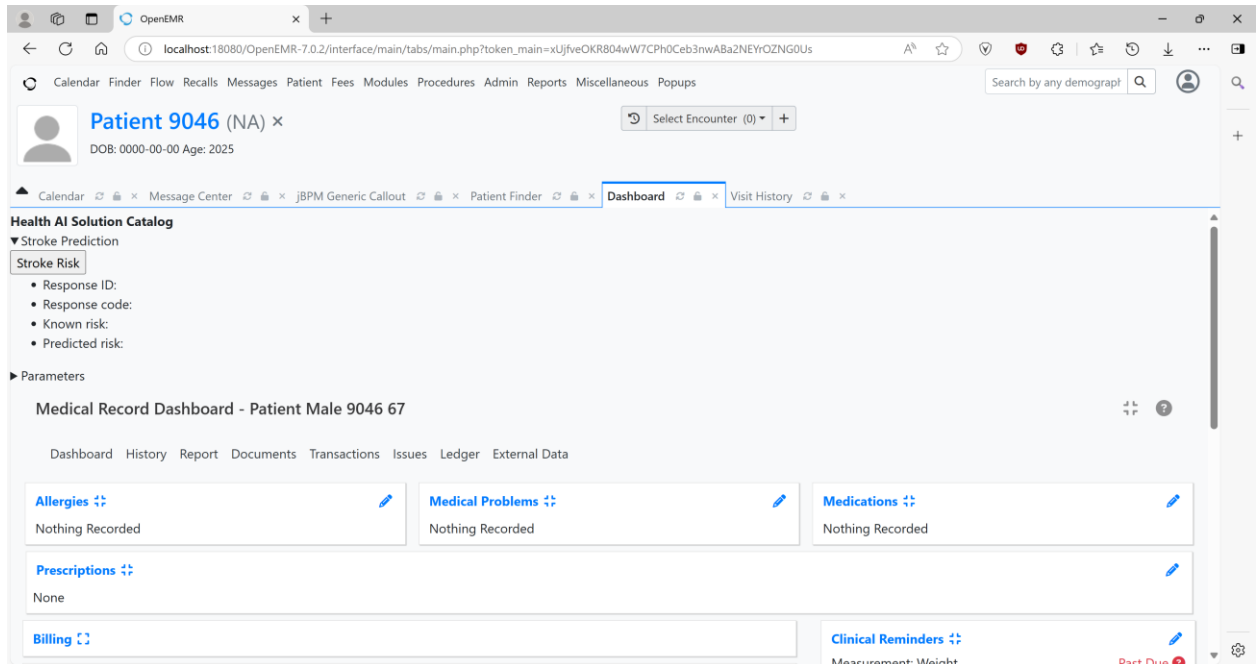
**IMPORTANT:** the saved parameter values can be overwritten in `stroke.txt` file by any user having access to train/validate/test callouts.

Proceed by selecting `Finder` menu item:

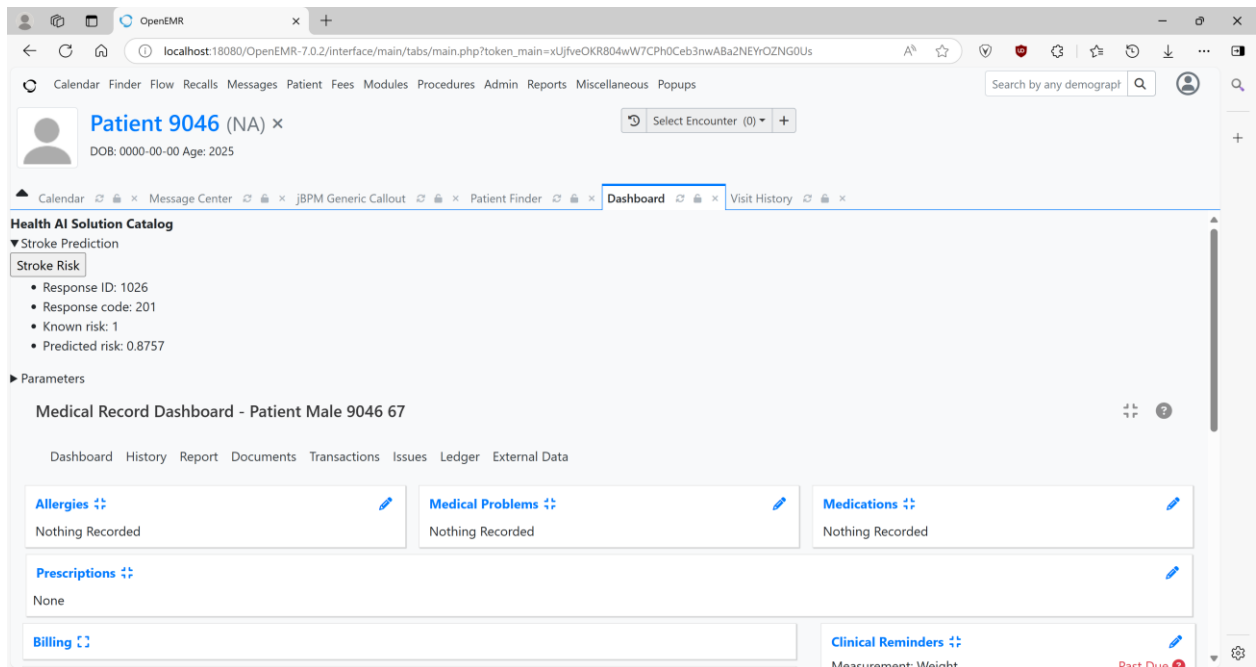
The screenshot shows the OpenEMR interface with the 'Patient Finder' menu item highlighted in the top navigation bar. Below the navigation bar, there are tabs for 'Patient List' and 'Recent Patients'. A search bar is visible above a table of patient records.

Full Name	Home Phone	SSN	Date of Birth	External ID
51676, Patient Female	NA	NA	0000-00-00	NA
9046, Patient Male	NA	NA	0000-00-00	NA
NA, NA NA	NA	NA	0000-00-00	NA
NA, NA NA	NA	NA	0000-00-00	NA
NA, NA NA	NA	NA	0000-00-00	NA
NA, NA NA	NA	NA	0000-00-00	NA
NA, NA NA	NA	NA	0000-00-00	NA
NA, NA NA	NA	NA	0000-00-00	NA
NA, NA NA	NA	NA	0000-00-00	NA

Click on any patient in the list, and then click on `Stroke Prediction`:



Press Stroke Risk button. Once the screen was refreshed (signals that the callout initiated by pressing the button is completed), click again on **Stroke Prediction** item to visualize the callout results (note the numbers that appeared next to the text labels under **Stroke Risk** button):



**IMPORTANT:** if testing by sending concurrent callouts (e.g., from separate OpenEMR users/computers), while a callout is processed by AI Orchestration Platform, a lock file `C:\xampp\htdocs\OpenEMR-7.0.2\interface\patient_file\summary\stroke.lock` is created making any other callouts wait till the current callout is fully processed. If for any reason `stroke.lock` is not deleted automatically and blocks callouts from execution, delete it manually.



