Ministry of Health Uganda

THE REPUBLIC OF UGANDA

OpenMRS HIV/AIDS Database

User Training and Users Manual

OpenMRS is a community-developed, open-source, enterprise electronic medical record system framework intended to aid resource-constrained healthcare environments
www.openmrs.org

This customization of the OpenMRS HIV/AIDS Database has been designed by the National AIDS Control Programme in conjunction with WHO, CDC and Partners in Uganda

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1.0 Introduction

1.1 Overview

The OpenMRS HIV/AIDS database is designed to be a system for HIV/AIDS clinics in Uganda to store and analyze core data specified for collection by the Sexual Transmitted Disease/AIDS Control Programme (STD/ICP) as well as additional more detailed data. It is scalable to be used by a large number of users on a network and to store a large quantity of data.

It consists of a customized version of OpenMRS used for data entry and data storage, coupled with a report and export tool for generating a range of Facility and National specific and other reports as well as for exporting data to District and the STD/ACP in electronic format.

1.2 Functions

The system allows the user to enter the following information

- Patient registration details, contact details
- Detailed forms for visits (adult initial, adult return,). These forms contain the core visit information from the Blue HIV/AIDS care and treatment card.
- Lab related
- Details of counselling and education given (as on back of Blue card)
- Updates on the status / state of patients within the HIV care program (attending clinic / transferred out / lost to follow up / died etc)

The report and export tool provides the following outputs:

- Data checking / validation reports
- Lists of patients who need to be tracked for follow-up
- A range of analysis functions for generating indicators
- Printouts of patient pre-ART and ART registers to allow paper based analysis
- Printouts of cross sectional and cohort reports required by the STI/ACP
- Export to Excel to allow manual analysis
- Export file for sending to District AIDS Coordinators / Regional AIDS Coordinators / NACP if electronic sending option is followed.

The system includes the following facilities

- Facilities to add and manage users of the database and staff of the clinic
- Multi-user system – facility for multiple users on different computers on a network to work with the system at the same time
- Reports available for any date range specified

1.3 Frequently Asked Questions

What is OpenMRS?
OpenMRS is an application which enables design of a customized medical records system with no programming knowledge (although medical and systems analysis knowledge is required). It is a common framework upon which medical informatics efforts in developing countries can be built.

OpenMRS is also a community of people working to apply health information technologies to solve problems, primarily in resource-poor environments. We are a proud community of developers, implementers, funders, and users all trying to make the world a better place by using our expertise to improve the health and wellness of the planet.

Who is OpenMRS for?
OpenMRS is for people that need to implement a medical records system. It is both just a library of API calls and a database and a default implementation of those API calls in the form of a web application.

How much does OpenMRS cost?
OpenMRS is a free, open-source program. All of the core resources needed are open source and freely available.

Where is OpenMRS being used?
OpenMRS is in use around the world. Further implementations are underway in other locations globally through the work of such groups as the Millennium Villages Project and FACES. Nearly twelve million discrete observations have been collected for nearly 50,000 HIV patients with over 550,000 encounters within the AMPATH implementation in Kenya. The Jembi in South Africa is leading the effort to form an implementers group to aid in further implementations.

Why should I use OpenMRS?
At this stage, OpenMRS requires a fairly sophisticated team of implementers to install and run. Such teams in several countries are in the process or considering implementations at this time. We are working toward a pre-built implementation that would allow more clinic sites to take advantage of a sophisticated, scalable EMR without needing the expertise to support and maintain it at a low level. OpenMRS is backed by a data model driven by a concept dictionary, allowing for the collection of coded, reusable data without requiring changes to the data model. Furthermore, OpenMRS is not based on an HIV-centric data model, so it can be adapted for use in tuberculosis, malaria, or general medical care. OpenMRS is based upon a program which has been used effectively for over 30 years at Regenstrief Institute.

What technologies is OpenMRS built on?
OpenMRS is programmed in Java and the core application works through a web-browser. Hibernate is used as an interface layer to the database. Tomcat is used as the web application server. The back end database is currently in MySQL. The system

creates XML schemas for form design. Form design and form data entry is currently done in Microsoft Infopath, HTML, or XForms. When form data entered is submitted, it is converted into a HL7 message before going into the database.

Do I need the Java SDK to run OpenMRS? Or is the Java JRE sufficient?
The JRE is sufficient unless you are planning on doing code development.

Where can I get OpenMRS?
OpenMRS is a work in progress. The source code is always freely available for your review and download. You can find additional download information on the DownloadsWhat is the plan for new features in OpenMRS?
We will post our plans on the Road Map page in the OpenMRS Wiki.
Where can I see a working example of OpenMRS?
Our demo is a basic installation of OpenMRS with some common add-on modules and a sample patient data set. Try it out today!
What if my question isn't answered here?
Drop us a line. Someone will be in touch with you promptly.

1.4 System Requirements

In order to install and use OpenMRS Express:HIV, you must have the following:

- A computer with a 1GHz Pentium IV processor or better, at least 512 Mb of RAM,
- 1Gb of available hard disk space.
- Windows XP SP2 or Windows Vista
- Adobe Acrobat Reader
- FireFox 4
- C drive.

1.5 Installation

Please refer to the manual under C:\Program Files\WHO\....

1.6 OpenMRS Startup and Login

You can start Openmrs in various ways;

- By use of the desktop short cut
- By use of the Program menu via the windows start button->programs-> Openmrs express
- Manually via the web browser;
  With Mozilla firefox open, type "http://localhost:8079/openmrs" if you are working on the server.
  When accessing Openmrs from a computer other than the server type "http://[serverip]:8079/openmrs" where [serverip] is the ip address of the computer that is running the tomcat server that is hosting your instance of OpenMRS.

Figure 1: Mozilla Firefox address bar with the OpenMRS address

2.0 Initial Setup

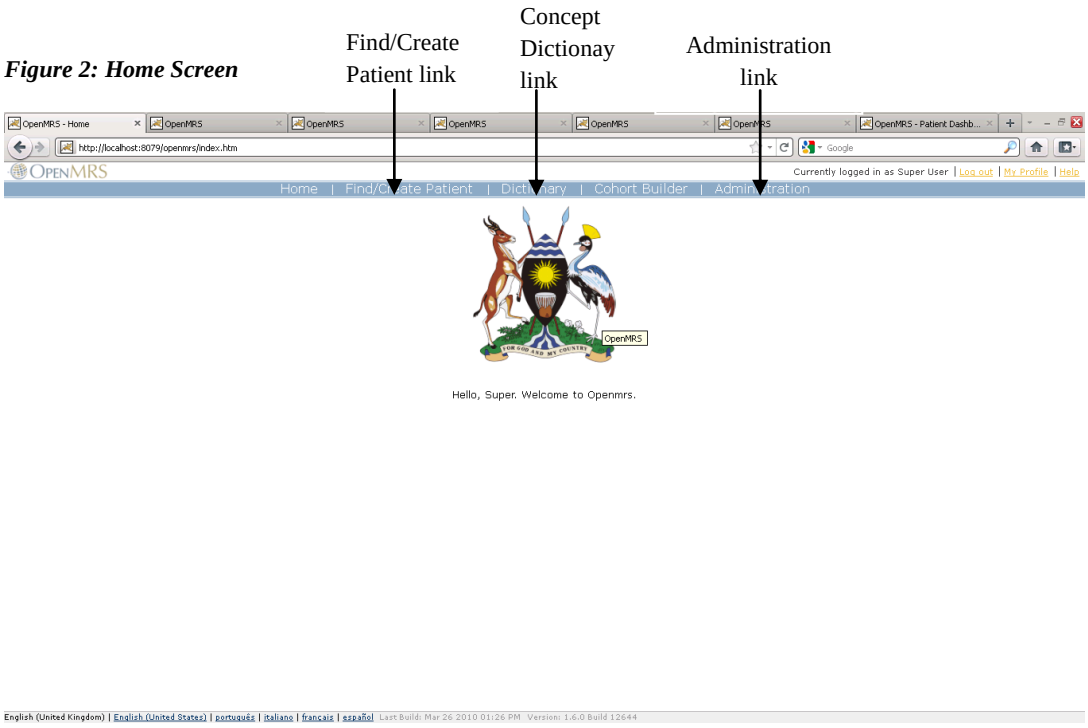
In order to ready the system for production there are some prerequisite customization to be instituted.

2.1 Site profile

As a first user, you will log in using the administration account which allows you privileges to the entire system. Having logged as the first step towards readying the system for production, you will have to set up your site /clinic profile. To set up the profile;

i. From the Home Screen Click the administration link (Figure 2);
ii. Click “Manage Locations”
iii. Click the Current location to edit
iv. Change the name, Description and the other details accordingly and save the location: Do not create a new location unless you have a multi site setup. This is for consistency with the reporting otherwise you will have to edit the reports to reflect this new site profile.

Figure 2: Home Screen



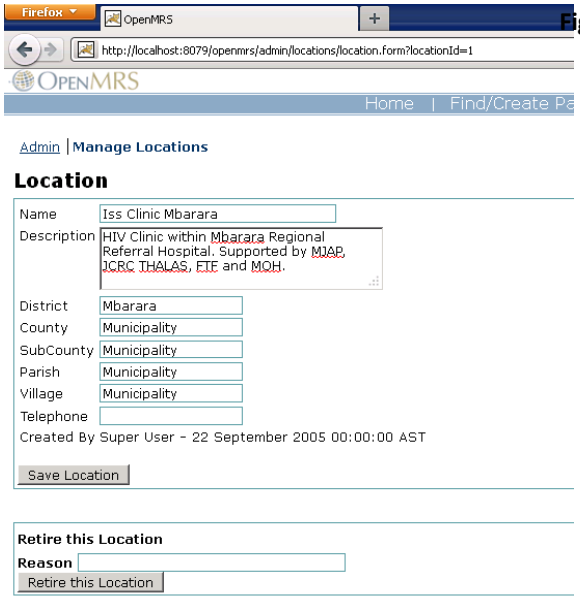


Figure 3

To the left is a screen shot of the Site Profile creation/editing form

2.2 Users

Users in OpenMRS are persons who will be using the system. These may include, Data Managers, Data Entrants, Providers, System developers etc. NOTE: Users are **NOT** patients and creation of either is very different. To create/edit a user;

i. From the Administration link, click "Manage Users" to open the form as shown below. Note the list of users already in the database and take caution not to duplicate these users. ALWAYS SEARCH THE DATABASE FOR A USER BEFORE YOU CREATE THE USER TO AVOID DUPLICATION.
ii. Clicking an existing user will open the user editing page where you can edit the user's details.
iii. To add a new user, click "Add user" which will open the user creation page as shown in the figure below.
iv. Enter the user details as instructed and select the user role/roles.
v. All fields are required except the "Middle name".
vi. Make sure to enter password not less than 8 characters or otherwise the system will reject them.
vii. For user name you could follow the firstInitial LastName convention for consistency. With this convention, Denis Ssempiija will have the user name dssempijja etc
viii. To add a secret question and answer for the users account, click "Show Advanced Options"

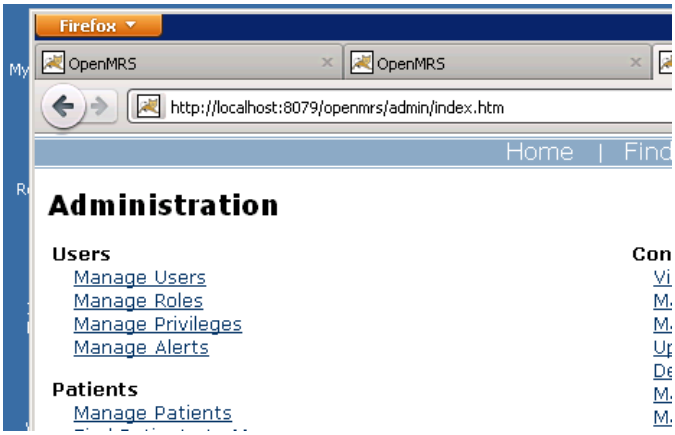


Figure 4: Administration Page showing the Section for User Administration

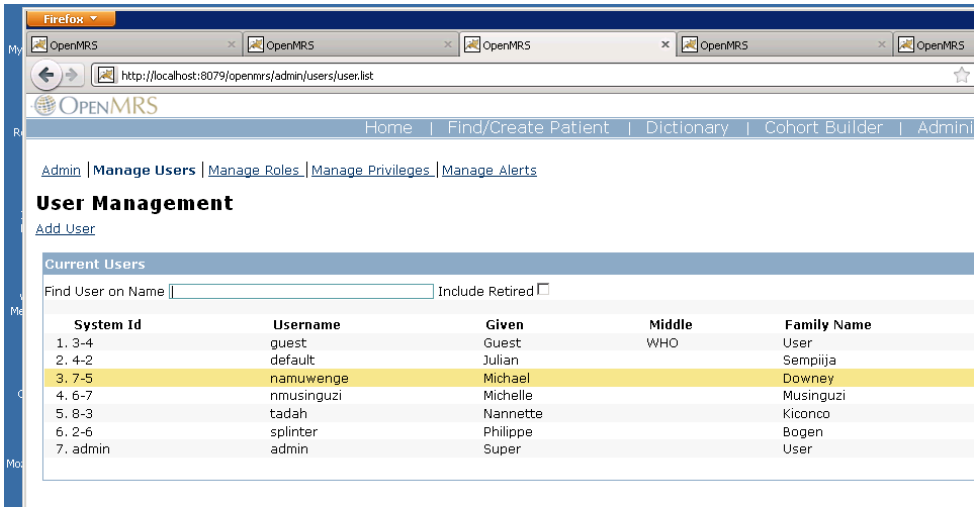


Figure 5: List of Users already in system

2.3 Providers

A provider is a user with the “Provider” role. To define a provider, select a user and edit to add the “Provider” role. Note that these users with the provider role will appear in every provider/clinician drop down

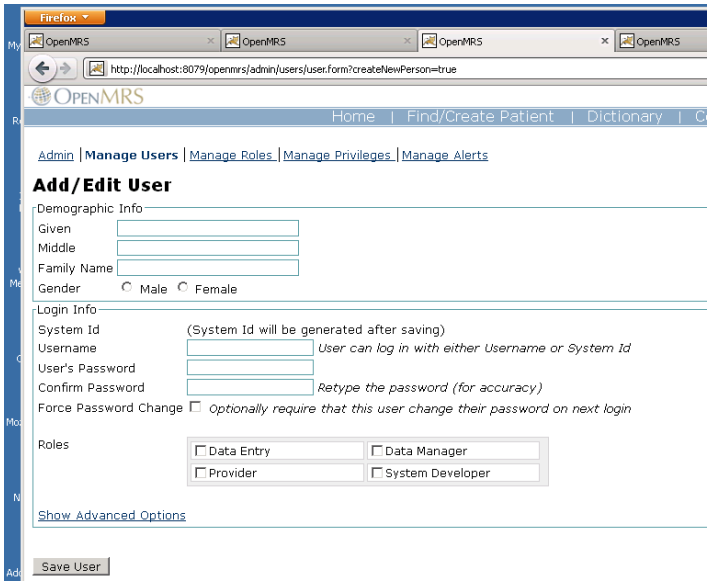


Figure 6: The Edit/Add User form. The set a user as a provider, check the provider role.

2.4 Patient Identifier Types

The system has 4 identifiers preloaded;

i. The Chronic *HIVCare/HIVCare Number* is the default facility unique identifier that the clinic uses to uniquely identify its registered patients. Every patient registered at this clinic MUST have this identifier and a patient will not be saved without it.
ii. The *ART Identifier* is the unique identifier of patients within individual ART providers at site. Use this identifier to uniquely identify patients within a program at your clinic. If for instance MOH, JCRC, MJAP and Uganda Cares provide Anti retroviral therapy at your clinic and have different identifiers for their particular patients. This Identifier is not mandatory.
iii. *PMTCT Identifier* is the ANC identifier for pregnant mothers as issued by their ANC Care Clinic
iv. *TB Identifier* is the District TB identifier for those TB patients who have such an identifier.

Editing/Adding new Identifier Types:

In the event that you have an identifier other than those mentioned in (ii)-(iv) above you can create an additional identifier as follows;

i. Through the administration link click Manage Patient Identifiers
ii. Click "*Add Patient Identifier Type"* to create a new Identifier
iii. Click the respective identifier to edit.

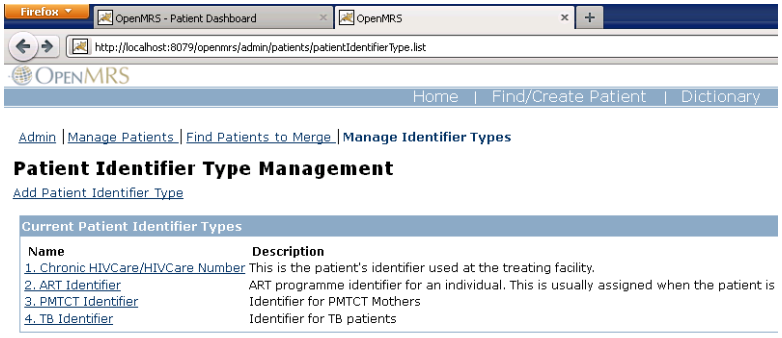


Figure 7: Identifier Type Management Page

3.0 Data Entry

In order to enter a record you MUST create the patient whose record you intend to enter if the patient has not been created yet

3.1 Patient Registration

i. To create a patient, click the *"Find/Create Patient link"* to search for and ascertain that the patient does not exist.

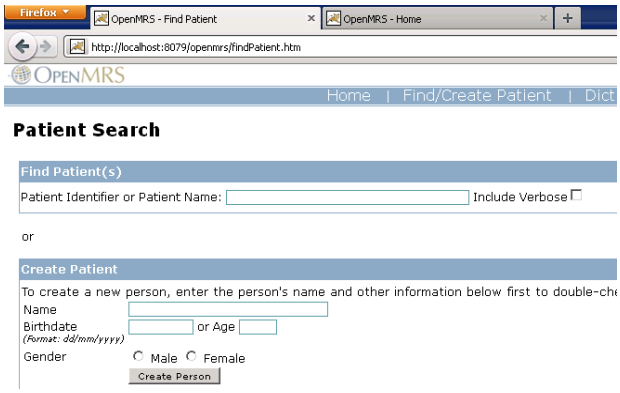


Figure 8: Patient Search/Creation Page

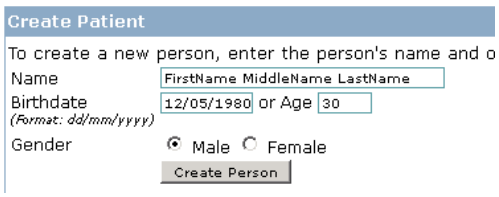


Figure 9: Name entry format

i. If the patient does not exist, Go back to the Find/Create Patient page and under the "Create Patient" section; Type the patient's names in the Name field. Type all names in the order "Christian/First Name" "Middle Name" "Family Name/Given Name/Last Name" without the as in the figure above.
ii. Enter the birth date and/or the patient's age.
iii. Select the Gender and click "Create Patient"

iv. On the next page enter the patients' clinic identifier and select the identifier location which is your site name. For Patients with additional identifiers click "Add Identifier" to provide this additional identifier.
v. Enter the Patient Address: NOTE that this address is not your site address but rather the patient's address which can be a different district from that of the site/clinic.
vi. Enter the Health Facility District and marital status
vii. Check if deceased and
viii. Finally save the patient and you will have successfully created a patient

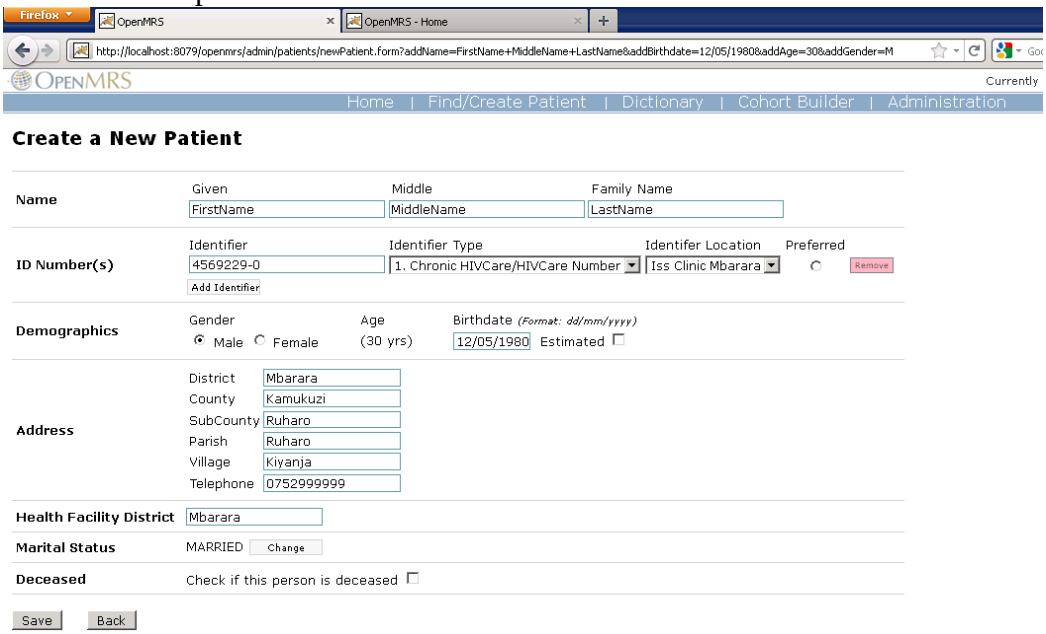


Figure 10: Patient Detail Entry Page

After you have saved, you will see the patient dashboard for that patient. In the patient dashboard, click on "Demographics" and at the end of the screen you will see options to "edit patient"

3.2 Searching for a patient and viewing the patient dashboard

In order to work on a patient (enter forms, manage observations, update status etc) you must first search for the patient.
Choose "Find/Create Patient".
Enter some letters of his or her name and a list of patients matching will appear.

Click on the patient you want and you will see that patient's "patient dashboard". The options in the patient dashboard which you will be using most are "Overview", "Encounters", "Demographics" and "Forms".

3.3 How to enter/view/edit an encounter

i. Search for the patient from the Find/Create Patient link. You can search by name or identifier (any of the identifiers). Search is real-time in that it returns results as you type the name or identifier
ii. To filter for particular patients by name type the first few initials of either names, a space and the first few initials of the other name and you should get the result filtered to that specific criteria.
iii. Select the patient and you will be taken to the patient dashboard
iv. To enter/create an encounter click the "form entry" tab to reveal the forms available for entry.
v. Select the form and enter the data. See Forms section for a detailed description of the forms

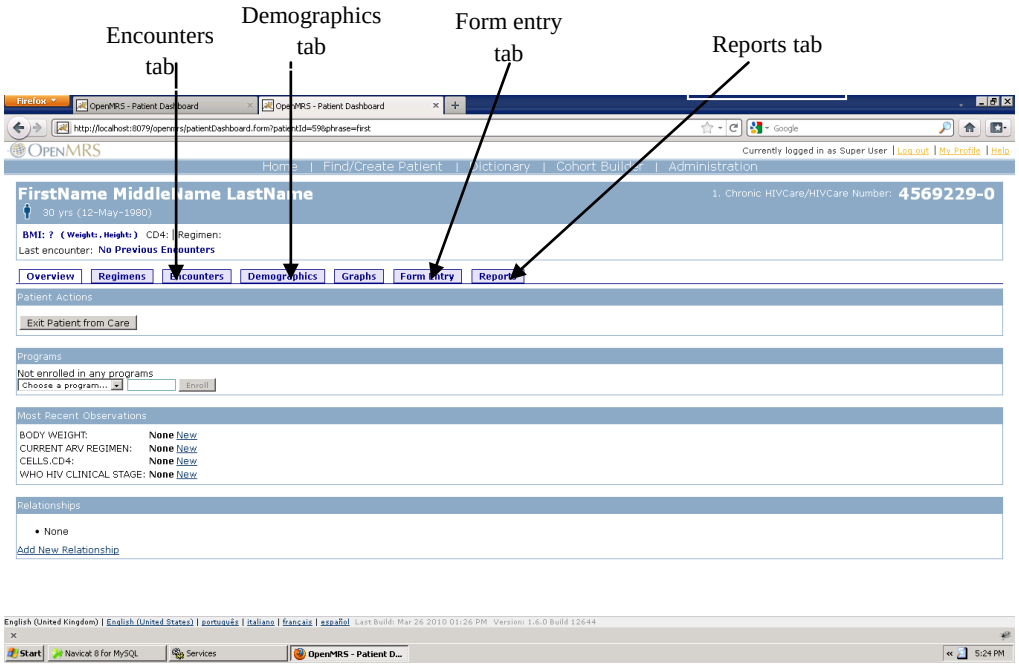


Figure 11: The patient Dashboard

v. To edit an encounter click the encounters tab to reveal entered encounters and click the edit icon for the respective encounter

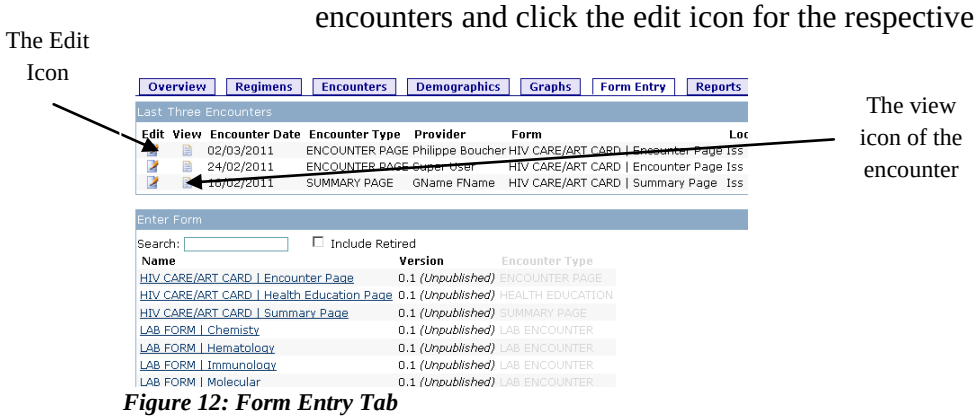


Figure 12: Form Entry Tab

vi. To delete an encounter, click the view icon of the respective encounter and select delete at the upper right of the encounter view mode as shown in the figure below

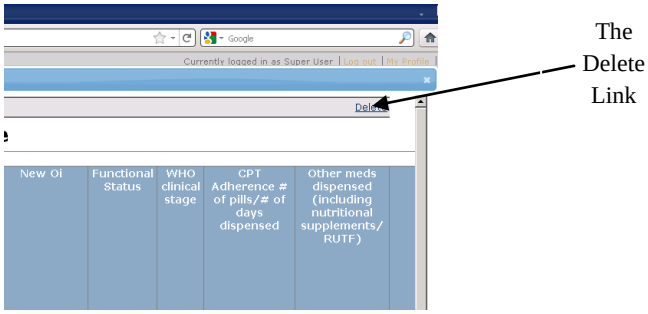


Figure 13

3.4 Forms

Entry screens were developed with the idea that they should look like their paper equivalents as much as possible. They are developed using custom html tags as implemented by the HTML form entry module. These forms were optimized for Mozilla Firefox 4. You may notice usual behaviour with lower versions of Mozilla and browsers other than Mozilla. You are encouraged to use MOZILLA FIREFOX 4.0 for the best database browsing experience.

3.4.1 Form types

i. HIV CARE/ART CARD | Summary Page: This is the front page of the MOH card
ii. HIV CARE/ART CARD | Encounter Page: This is the page on MOH card that takes the visit details
iii. HIV CARE/ART CARD | Health Education Page: This is the page that takes the health education information as collected on the MOH card just below the summary page
iv. LAB FORM | Chemisty: This is lab entry form specific for chemistry results
v. LAB FORM | Immunology: This lab form is specific for Immunology results like CD4 and CD4% etc
vi. LAB FORM | Hematology: This form is for entry of Hematology results like Hemoglobin etc

3.4.2 Data entry

i. Summary Page

The data in blue below are populated as entered from the patient creation page. Note that a number of fields are a must enter and you will not be able to save any encounter unless these fields have been entered. The following are required fields

a. Health Unit
b. Clinical Team leader
c. HIV enrol date

There are some other rules specific for certain fields or sets of fields which must be met for the record to be saved.

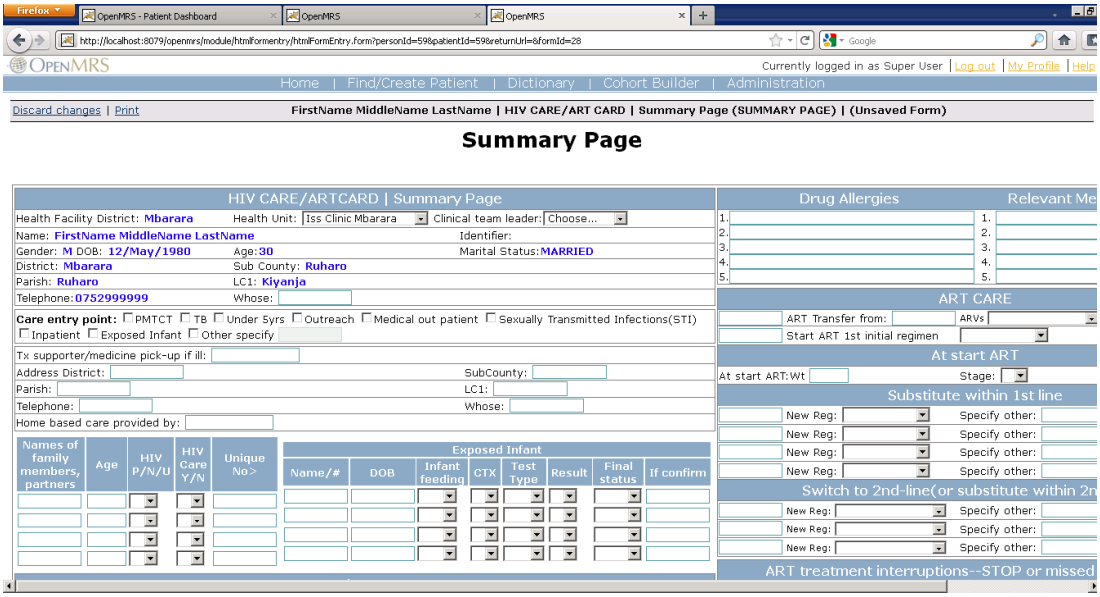


Figure 14: Summary Page

Click the "Enter form" button (as in picture below) at the bottom of the page to save the encounter.

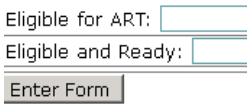


Figure 15: The Enter Form Button

ii. Encounter Page

The encounter Page like the summary has some required fields. These include but may not be limited to;

a. The encounter location field at the top left corner is required but will be pre populated with your site profile name by default
b. The Encounter date below the scheduled? Check box
c. The provider field is also required for the form to save successfully
d. Various other fields may have different validation rules which must be met whenever values are entered on those fields. E.g Return date cannot be in the future and the record will not save unless this condition is fulfilled.

Click the "Enter form" button to save the record.

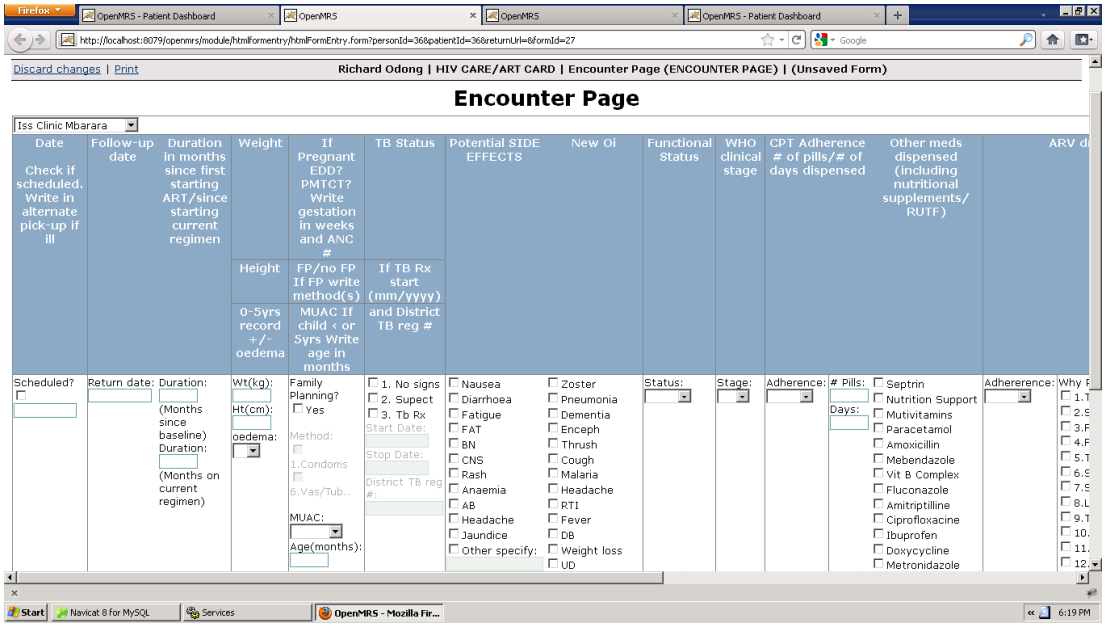


Figure 16: The Encounter Page

iii. Health Education and the Lab forms

By now you hopefully know that every form has at least 3 required fields;

a. Site/Location name which is usually pre populated with the site profile name
b. The Encounter date
c. The provider

3.4.3 Editing/Deleting encounters/visit

Editing visit

i. On the patient dashboard and under the encounters tab; click the edit icon of the encounter that you wish to edit and the encounter will pop up in the form exactly like that you used when you first entered that encounter. Make the necessary changes and click the “save changes” button at the bottom left of the form.

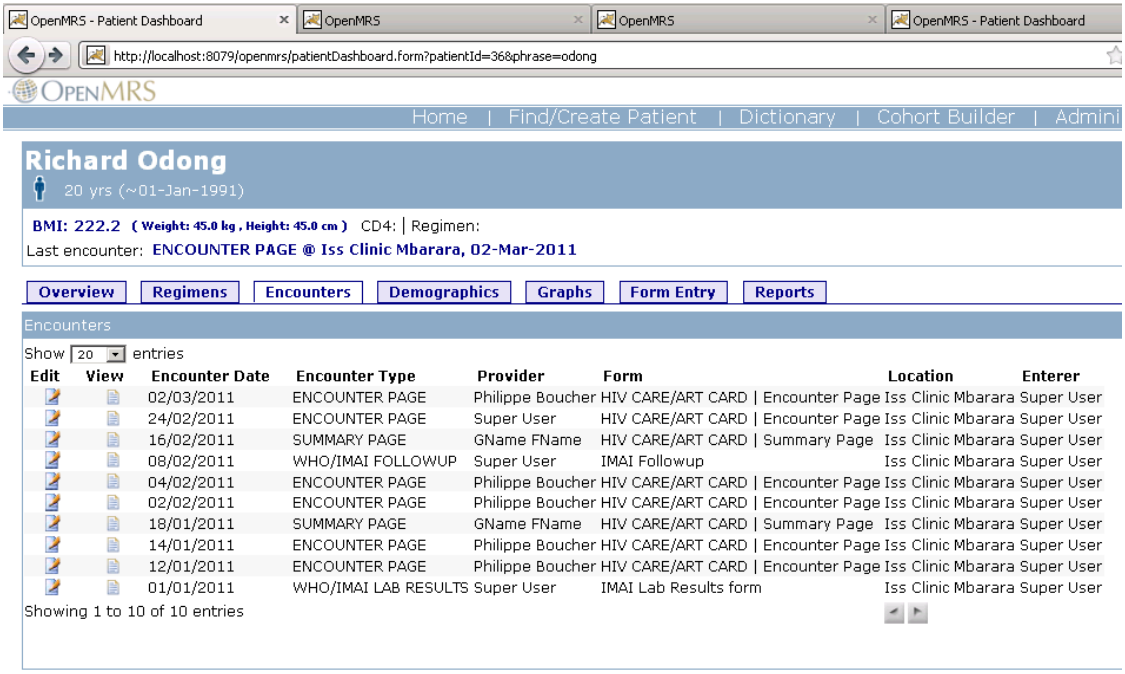


Figure 17: The Encounters Tab under the Patient Dashboard

1. To delete an encounter/visit; click the view button of the respective encounter and select delete at the top right of the window that opens. You will be asked to provide a reason as to why you are deleting this encounter.

4.0 Reporting

OpenMRS has various reporting frameworks including BIRT, JASPER reporting and by use of another Reporting tool which is preinstalled with your system. We chose the BIRT reporting for its extensive functionality and ease of use. BIRT reports are run as PDF by default but can also out as spreadsheet and html.

4.1 How to run BIRT reports

i. Under the administration page open “Manage BIRT Reports” under the Birt Reporting module section. DO NOT confuse this with the “run reports” section under reports as this is a difference reporting system.

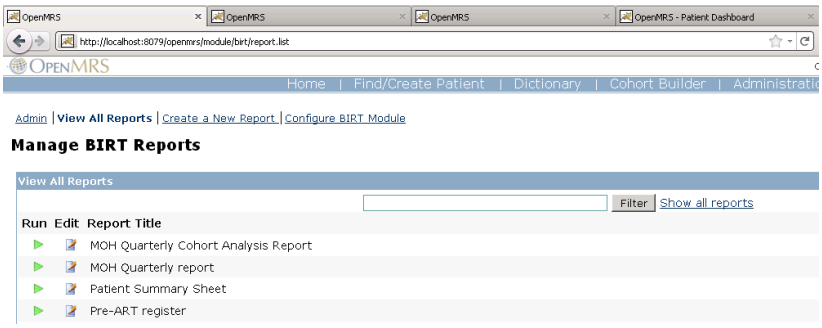
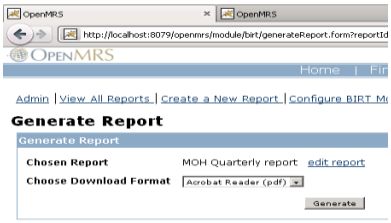


Figure 18: BIRT Report Administration Page

i. Click the run icon of the respective report you intend to produce.
ii. Choose the Download format which by default is pdf
iii. Provide the necessary parameters: NOTE that for date parameters, the format is strictly YYYY-MM-DD. Any other format may yield an

error or wrong results. 2011-5-31, 2011-05-5 are incorrect .2011-05-31is the correct format.

1. 

2. ***Figure 19: Parameter Specification Page***

iv. Click Generate

4.2 Report categories

Note that reports are grouped into three categories, MOH, Site and Patient reports.

i. MOH reports are those meant to be sent to the Ministry of Health.
ii. Site reports are reports meant for individual site consumption
iii. Patient reports are patient centric reports and will also appear under the reporting tab under the patient dashboard. All reports are named with the category prefix e.g MOH reports start with MOH etc. Below is the list of the reports pre installed in the system.

2. MOH Quarterly report
3. MOH Quarterly cohort analysis report
4. Patient summary
5. Site ART Register
6. Site Appointment list
7. Site Missed appointment list
8. Site Lost to follow-up list
9. Site Early Warning Indicators report
10. Site Quality Improvement reports

4.3 Cohort builder/Data exports

The Cohort builder can also generate simple reports; Tutorial will be provided separately and we will endeavour to keep the slides from that tutorial for your reference.

Reporting module
https://modules.openmrs.org/modules/view.jsp?module=reporting

4.4 Form Creation

Please see html form creation tutorial at C:\Program Files\WHO\

4.5 Understanding the form and data dictionary

In order to develop a report or query you have to understand the underlying concepts on the form. You can view the code for a particular concept by;

Searching the concept dictionary. This may be tedious since a concept may be represented in various ways and may turn out confusing as to which of the concepts was used on the form. Use this option if you already know the concept_id from prior knowledge or otherwise use the next option. For

example search the concept dictionary for cd4 and you will get a number of results meeting this search criterion. Which of these do you consider in your queries? Knowing the particular concept_id is key to finding the right data.

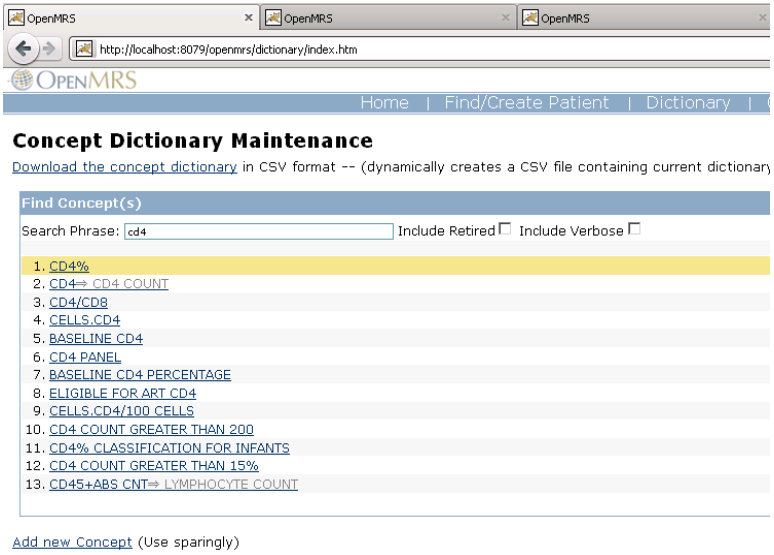


Figure 20: Cd4 Search on the Concept Dictionary

b. Reviewing the form design schema
To view the underlying form concept_ids ; Click Administration->Html form entry->Manage forms and choose a form

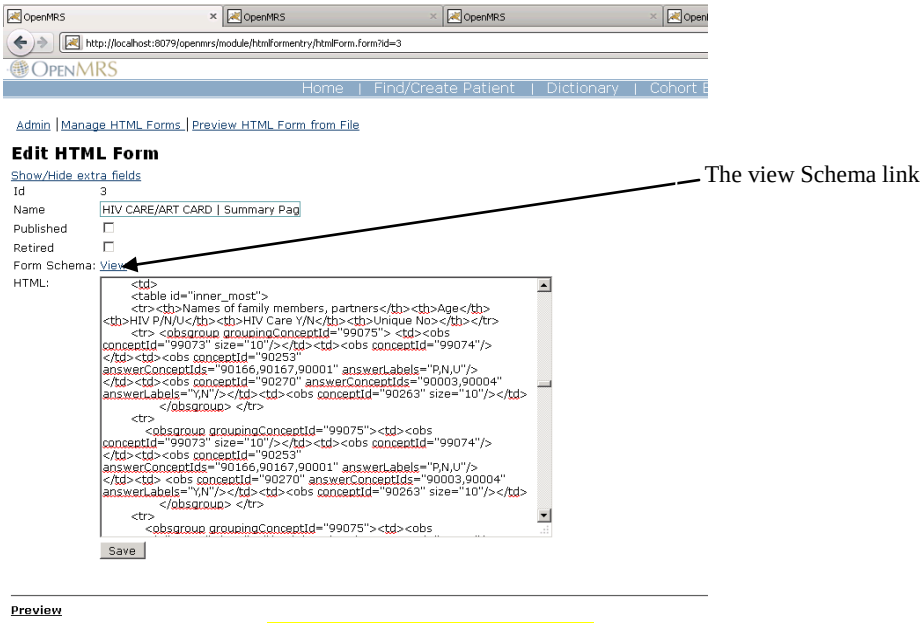


Figure 21:The form code: DO NOT MODIFY THIS CODE

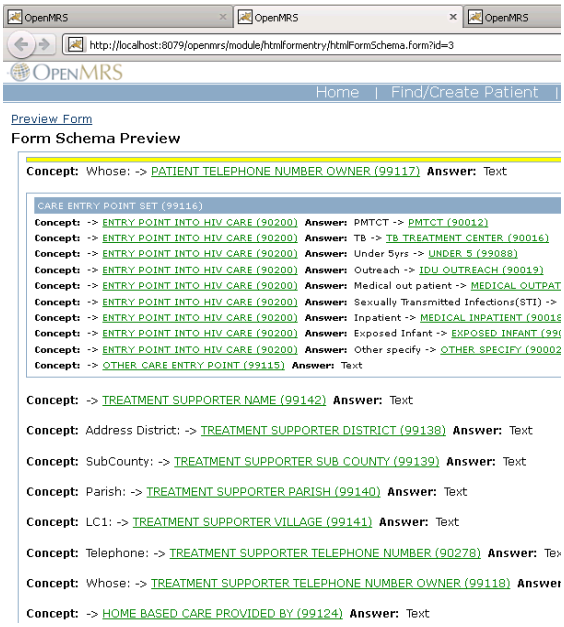


Figure 22: The Form Schema

c. Click the link “view” to view the Form Schema
The figure xx is the schema for Care Entry Point Section from the summary page. Notice the concept Care Entry Point and the Answers PMTCT, TB, Under 5 etc on both figures. The concept_id of the concept set is 99116, the concept_id of Entry point is 90200 with answers PMTCT(90012), TB(90016),Under 5(99088) etc. You have to understand the data model to be to figure all this out perfectly

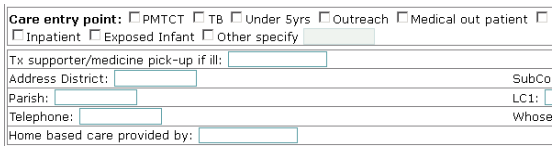


Figure 23: Cross section of Summary Page showing Care Entry Section

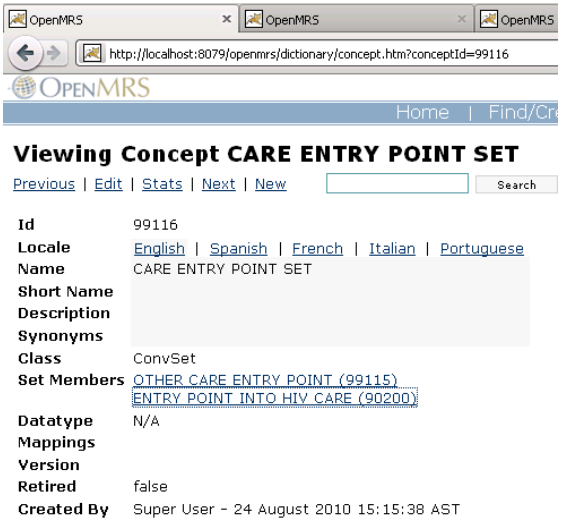


Figure 24: Care Entry Point from the Concept Dictionary

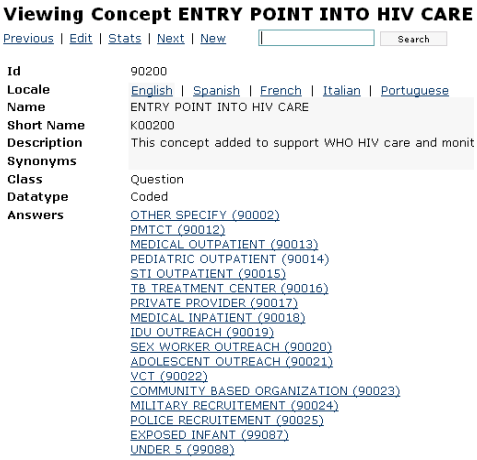


Figure 25: Expanded view of Care Entry Point

To query for all records with care entry point of "Under 5" you would write something like SELECT * FROM OBS WHERE CONCEPT_ID=90200 AND VALUE_CODED=99088 AND VOIDED=0

However to query for all records where care entry point is other specified concept_id=99115 as in figure xx above write something like SELECT * FROM OBS WHERE CONCEPT_ID=99115 AND VOIDED=0

5.0 Data Validation

In addition to validations done during data entry, we have a module to catch inconsistencies within the data that have been entered. Under Administration->Data Integrity module->Run multiple checks to view checks that failed the set criteria.

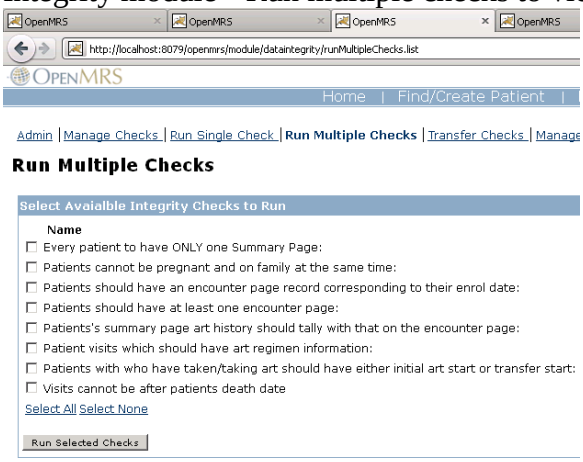


Figure 26: Data Validation Checks

Check "Select All" and click "Run Selected Checks"
In figure xx; 13 records failed the first check whereas the second check was successfully satisfied.

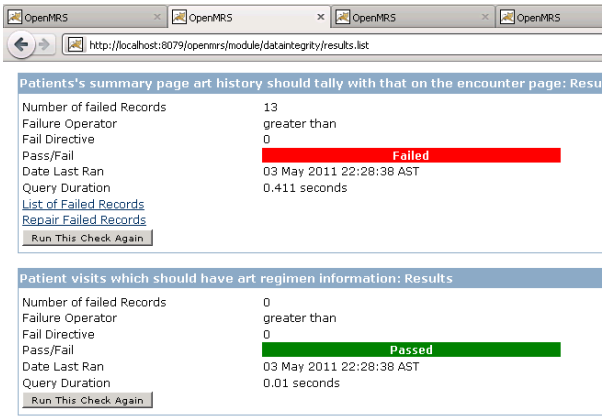


Figure 27: Results from Running Checks

You can create your own custom checks with some simple SQL. In addition you can schedule to run checks at particular intervals of your convenience. It is advisable that all checks are run and pass before you run MOH reports.

6.0 Additional Functionality (MODULES)

OpenMRS has a wealth of modules developed to add functionality to the system. Modules can be downloaded from here. Please pay attention to the module version as different database versions are compatible with different module versions. You will get an error if you try to upload an incompatible module version.
How to install/uninstall a module

d. Download the module
e. Under the OpenMRS administration link, click “Manage Modules” to open the page below

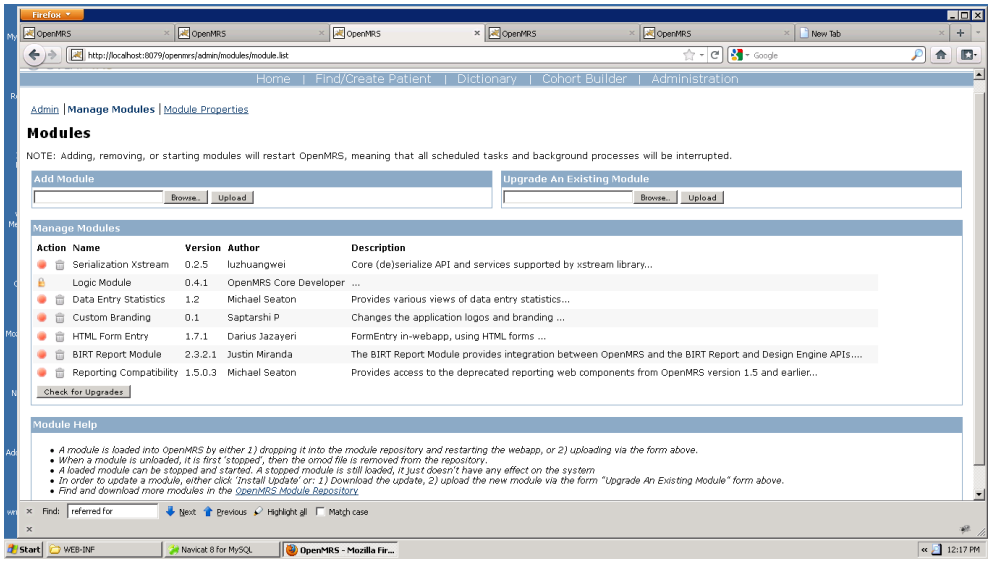


Figure 28: The Module Management Page

f. To add a new module or update an existing module, use the appropriate link. Read the instructions at the bottom of that page in Figure5 for more information.
g. To uninstall a module, stop it by clicking the pink button to the left and finally click the delete module icon

7.0 Database Management

7.1 Data back-ups

i. To create an OpenMRS database backup;Open the Windows “Start” Menu->OpenMRS->Admin->Backup OpenMRS Database

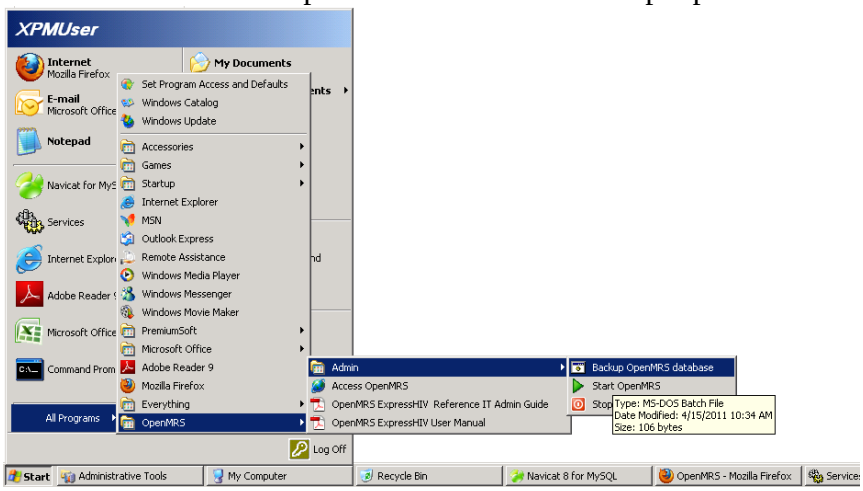


Figure 29: Backup link Through the Start Menu

ii. If OpenMRS is running, it will be stopped. The backup script will generate an encrypted openmrs_express_db_VERSION_TIMESTAMP.sql file, where VERSION is the release version number of the OpenMRS Express distribution and TIMESTAMP is the moment of execution of the backup. User is asked for a location to save a copy of the backup file

7.2 Restore Data from Backup

i. Launch the recover script located in the OPENMRS_HOME/scrip folder which is usually C:\Program Files\WHO\OpenMRS\script

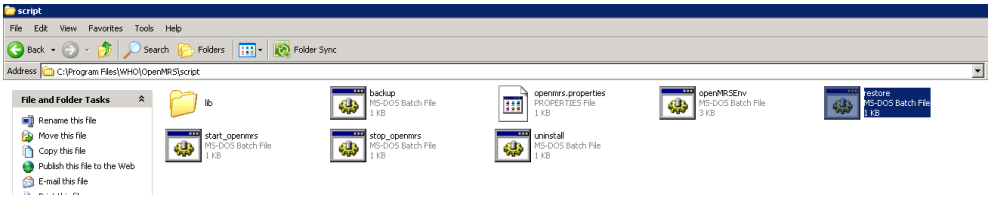


Figure 30: The Restore Script Folder

iii. OpenMRS will stop if it was running. You will then be prompted for the location for the recovery file which you defined in Step (a) above.

iv. The current database will be saved first, the selected backup file decrypted and restored.

7.2 Uninstall the System.

Follow the same instructions as those for restore but run the uninstall script instead of the restore script.

8.0 Troubleshooting FAQ

OpenMRS is not starting

i. Make sure that mysql and tomcat are running
ii. Go to Window start->Control Panel->Administrative Tools->Services
iii. Under services search for “OpenMRS Tomcat” and “OpenMRS MySQL” and make sure they are started or otherwise start them. Double click the Service (Figure 6) to open it. Figure 7 shows that the OpenMRS Tomcat service is started.

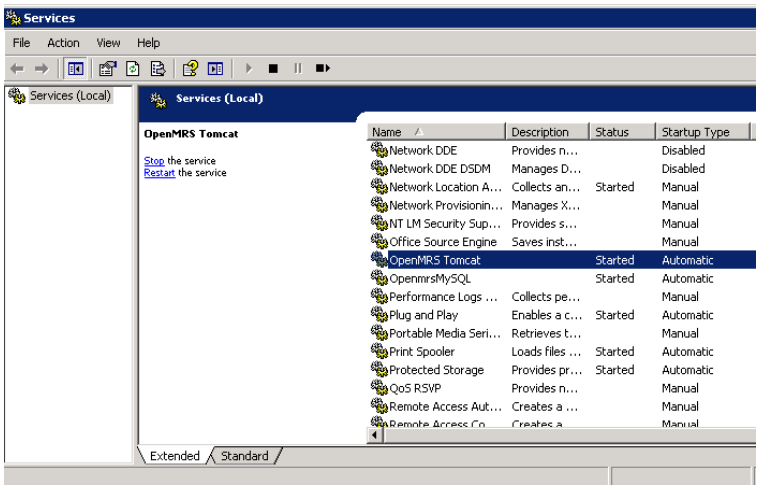


Figure 31: Windows XP Services Management Console

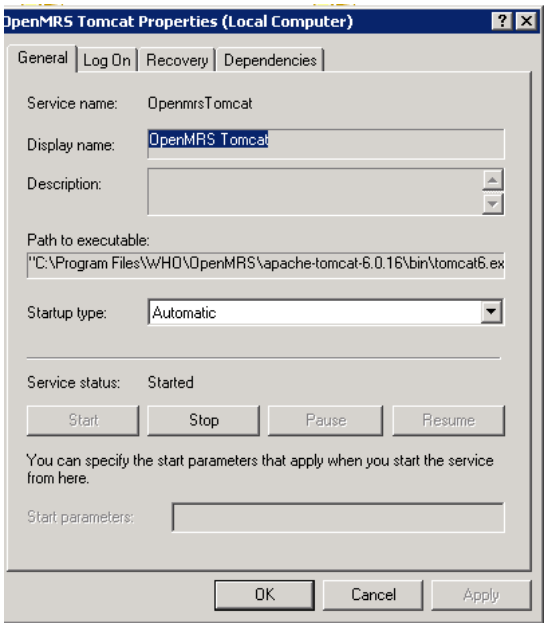


Figure 32: Service Start/Stop panel

v. If both services are running, restart tomcat and start Openmrs again and it should launch successfully
vi. If these steps fail, write to the implementers list on implementers@openmrs.org and make sure to include your tomcat logs(the file stdout.txt) which you can find on your server computer under “C:\Program Files\WHO\OpenMRS\apache-tomcat-6.0.16\logs”

FOR MOST TIMES WHEN THE SYSTEM IS NOT RUNNING OR IS MALFUNCTIONING THIS SOLUTION SHOULD FIX IT 90% OF THE TIME SO BE SURE TO UNDERSTAND IT.

You cannot see forms for entry

i. Make sure that you have the required rights and privileges. Consult your system administrator if you think you don't
ii. Make sure that the HTML form entry module is running. Under the "Adminstration->Manage Modules" look to make sure that the HTML form Entry module is running as show in the picture below. If it is not running, please start it.
iii. If you just installed/upgraded a module, make sure it is compatible with your verison of OPenMRS
iv. If non of the above seems to work, email the implementers at implementers@openmrs.org

v. General Openmrs Implementers list

1. You are encouraged to join the implementers' listserv which is an email group of implementers and developers where implementers get the opportunity to share their challenges and to report bugs, seek guidance from the system developers etc. Membership is obviously free and you can subscribe at…

vi. Openmrs wiki
1. The OpenMRS wiki pages are another resourceful centre with lots of information ranging system setup to module documentation and lots more.

The Patient Registration Page does not show the address like it usually does

This happens whenever you upgrade your system or when you redeploy openmrs.war for some reason. To remedy the situation, copy the file "openmrs-servlet.xml" from xxx and paste it at "C:\Program Files\WHO\OpenMRS\apache-tomcat-6.0.16\webapps\openmrs\WEB-INF" and restart tomcat.

9.0 Farther Trainings and Resources

a. OpenMRS annual implementers meetings
There is an annual implementers meeting held in South Africa for the past 5 years. This meeting gets implementers, developers and would be implementers together for a week of general discussion, implementer experiences, connections etc. There is usually a limited funding for individuals from institutions that are not able to cater for conference attendance and you are welcome to apply for this funding.

b. REACH Informatics trainings
Several times a year, general data management, developer trainings are held in Eldoret under the REACH Informatics programme at the AMPATH Center within MOI University. This site happens to be the birth place of openmrs and usually theses meetings have some specialized OpenMRS training sessions. Module developers are usually invited to conduct training on specific module.