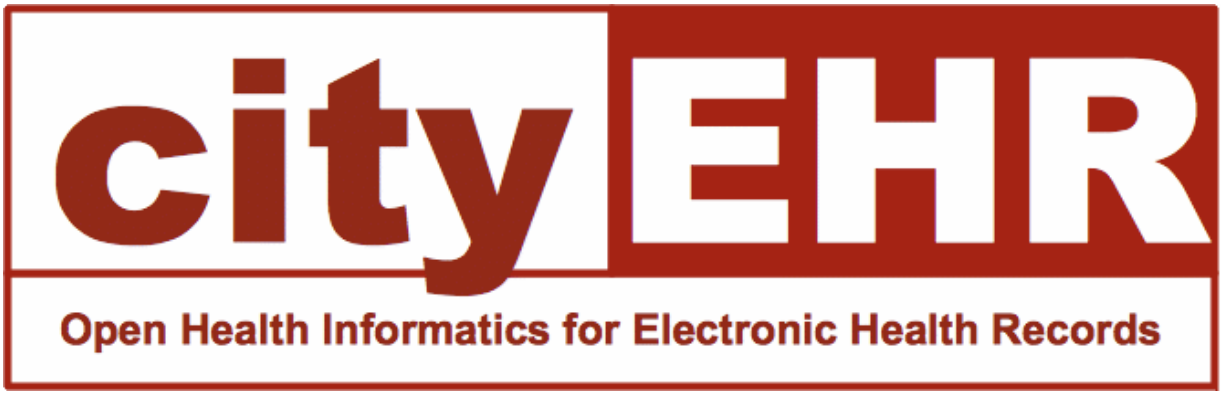

cityEHR Quick Start Guide

Open Health Informatics

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10th September 2022

Table of Contents

Revision History

Date	Version	Changes	Owner
01 Mar 2012	1.0	First Version	JC
24 Sep 2013	2.0	For use outside OHI workshops	JC
10 Jan 2014	2.1	Prepared for first general release	JC
28 Jul 2014	2.2	Updated for new admin features	JC
01 Jul 2015	3.0	Updated and expanded	JC
01 Sep 2015	3.1	Added section on data export	JC
29 Sep 2017	4.0	Updated for cityEHR 1.6 release	JC
02 Feb 2020	5.0	Updated for cityEHR 1.7 release	JC
26 Aug 2020	5.1	Further updates for cityEHR 1.7 release	JC
28 Sep 2021	6.0	Extended to include letters, pathways, directories	JC
04 April 2022	7.0	Major revision	SC
10 Sep 2022	7.1	Updated for latest cityEHR release	JC

1. Introduction

This document describes the basic setup and features of the cityEHR starting from a vanilla installation.

If you don't have an installation of cityEHR yet then you need to follow the instructions in the cityEHR Installation Guide.

With the standard installation running under Tomcat, and if you have the Tomcat server running on your local machine, cityEHR will be available on the URL localhost:8080/cityehr or if running on a remote server, substitute the IP address of your server for 'localhost'.

cityEHR is an XML application which uses declarative code only: xhtml, xml, xforms, xslt and xquery. The source code can be found at

CATALINA_HOME/webapps/cityehr/WEB-INF/resources/apps/ehr

where CATALINA_HOME is the location of your Tomcat installation. If you have cityEHR installed with a different application server or you have changed the locations of the standard installation then you will need to find where the resources/apps/ehr directory is located in your installation.

This Quick Start Guide will refer to the ehr directory above as CITYEHR_HOME, so equivalent to CATALINA_HOME/webapps/cityehr/WEB-INF/resources/apps/ehr

The remaining sections of this Guide show how to register patients, enter and view clinical data, annotate a patient record, view and plot historical data, find patients, create cohorts of patients and export their data.

It also covers some administration functions (there are many such functions and only a few of them are covered in this guide): accessing user resources, generating test data, managing users and creating export data sets.

cityEHR is designed to be completely configurable, allowing clinicians to create enterprise-scale, secure health records systems that gather clinical data to recognised international standards, yet with data sets defined locally, by clinicians themselves.

So the Quick Start Guide also shows you how to create a new EHR system from scratch, including creation of the information model, configuration of patient labels, patient search criteria and cohort selection terms.

2. Verifying the Installation

2.1. Log on

With Apache Tomcat and cityEHR installed, the log on page of cityEHR can be accessed with the Firefox web browser using the address http://localhost:8080/cityehr if you have the Tomcat server running on your local machine or if running on a remote server, substitute the IP address of your server for 'localhost'.

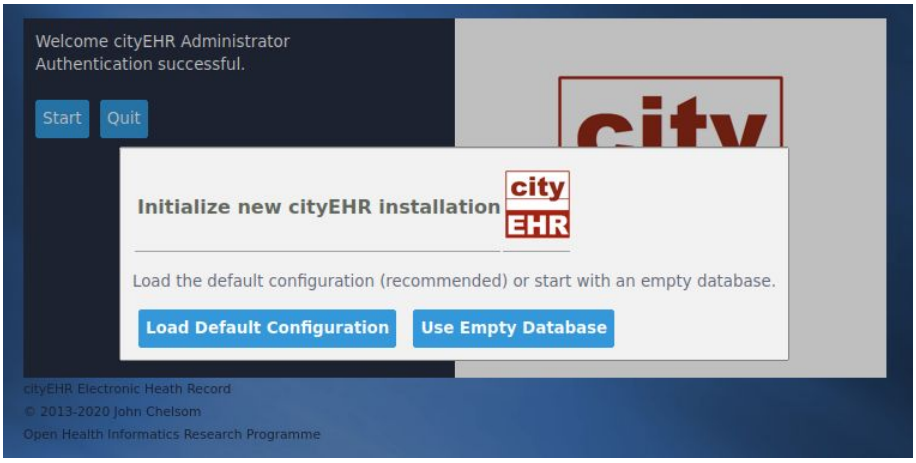
Note that cityEHR 1.7 must be accessed using Firefox only (IE 11, Edge, Chrome and Safari will be supported from version 2.0 onwards).

The base cityEHR installation has a single default user set up with the credentials

username: admin

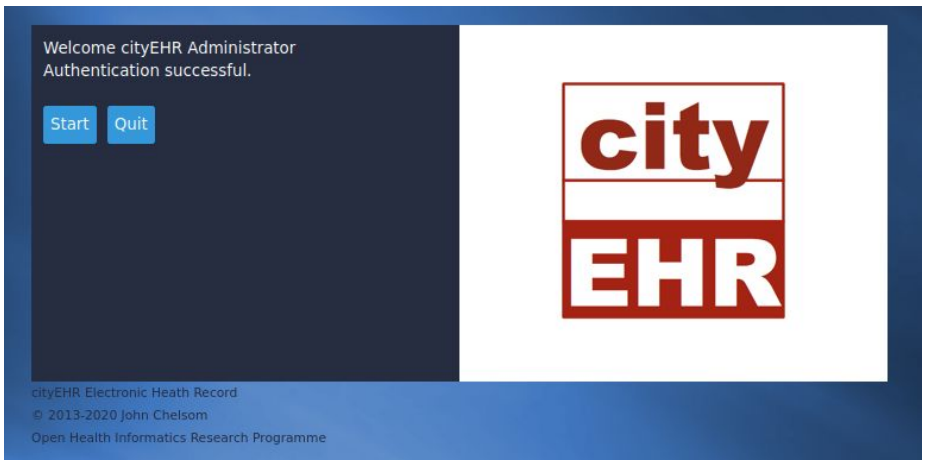
password: password

When you log onto cityEHR for the very first time using the credentials above, cityEHR can build a default application, with an example information model and configuration. You will be prompted to build the default application or start with an empty database; choose the option to build a default application.

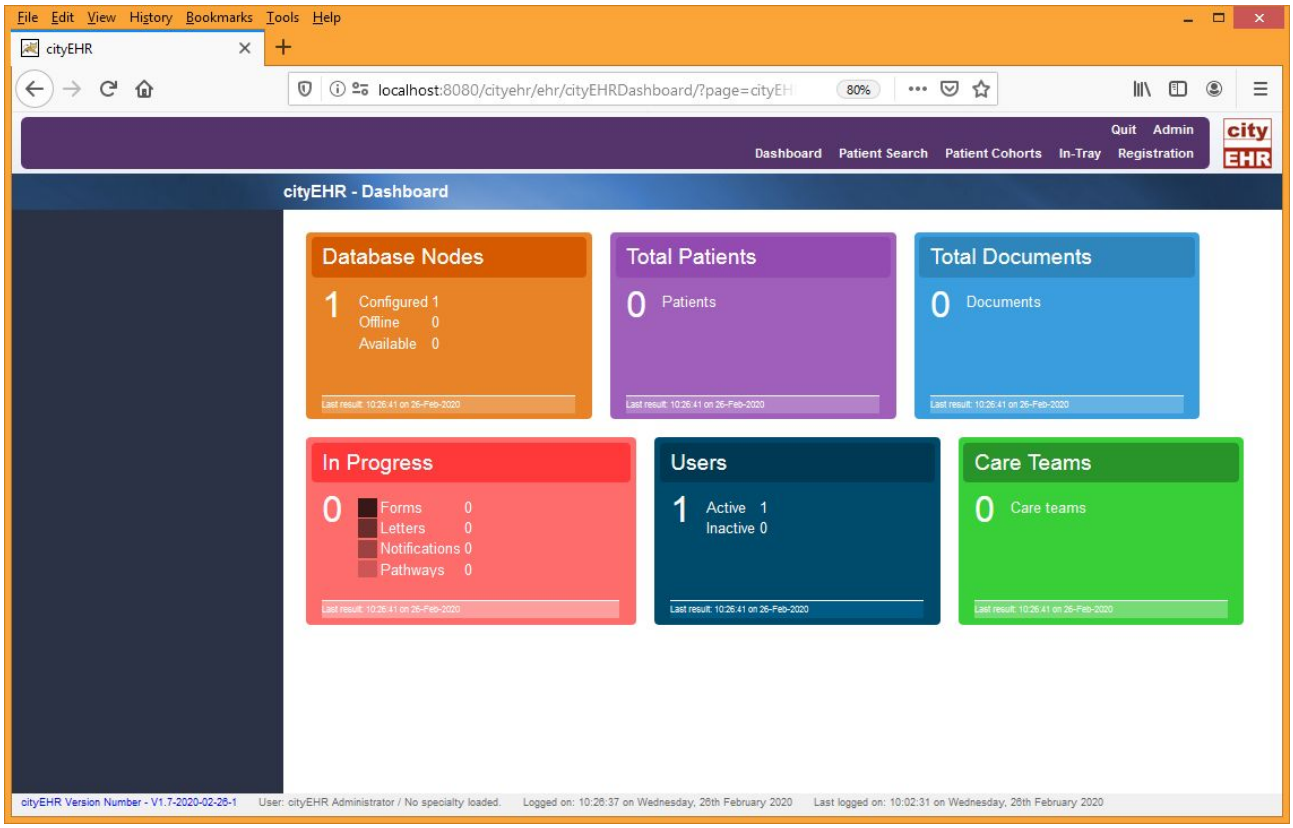


cityEHR will now run through a sequence of steps to build the default application; while this is in progress the screen will look like the one displayed below. It take a minute or so for this process to complete, so you will need to wait while before continuing.

After the default application has been built during your first log-on, and for every other time you log on, the screen will look like this after you have authenticated:



Press the Start button to move to the default home page, which is pre-configured to be the dashboard page, as shown in the figure below.



The Dashboard shows a summary of the overall status of the cityEHR application, which ships by default with the base installation. There is one user registered (the 'admin' user you logged in as) and no patients (so the total patients is zero, there are no clinical documents recorded and no documents in progress).

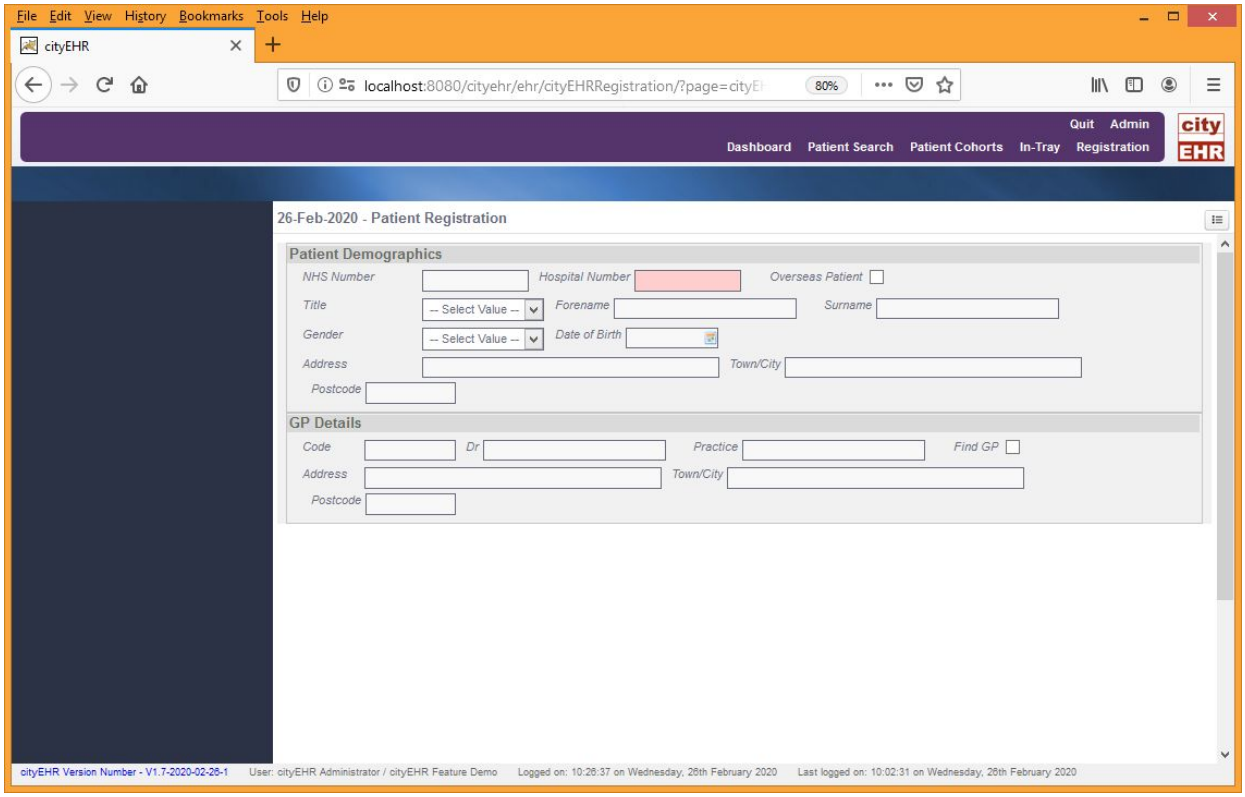
We will now start by exploring the default application.

3. Exploring the Default cityEHR Application

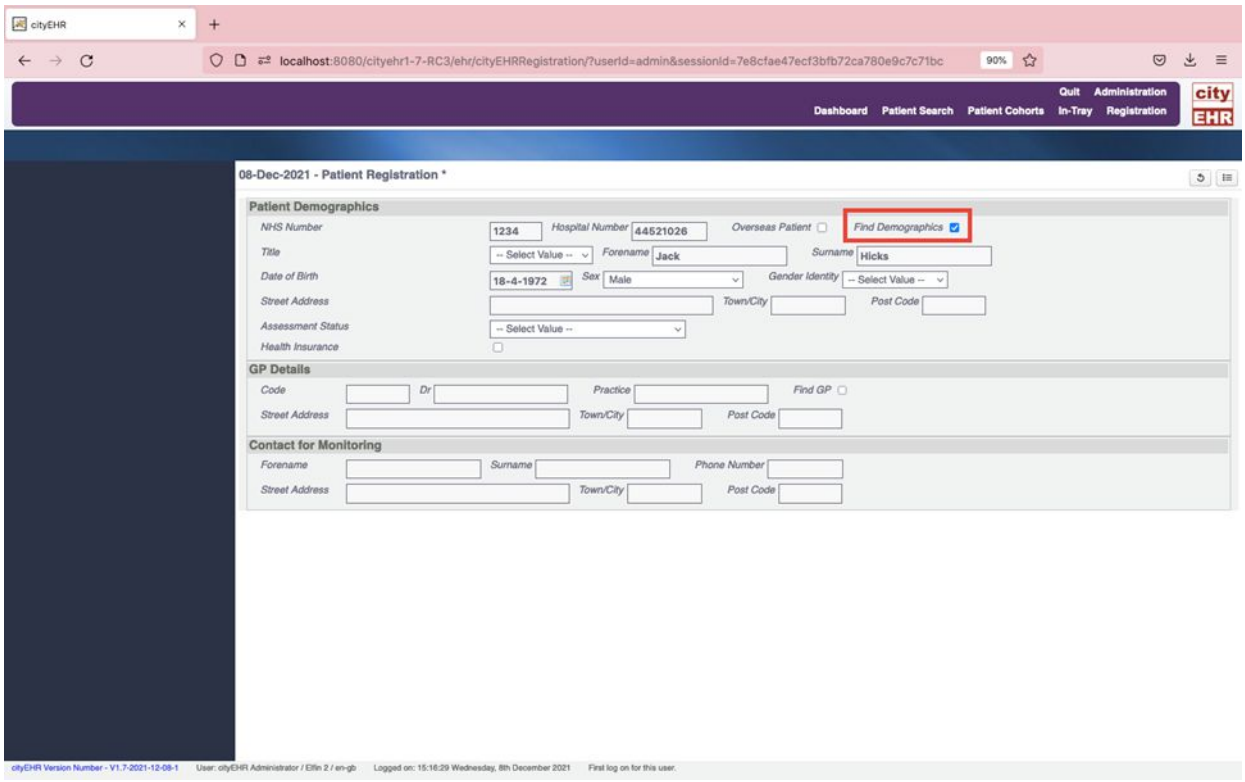
3.1. Registering a New Patient

At the start, the database for the cityEHR application does not contain any patient records, so the first step in using the application is to create some through the patient registration page.

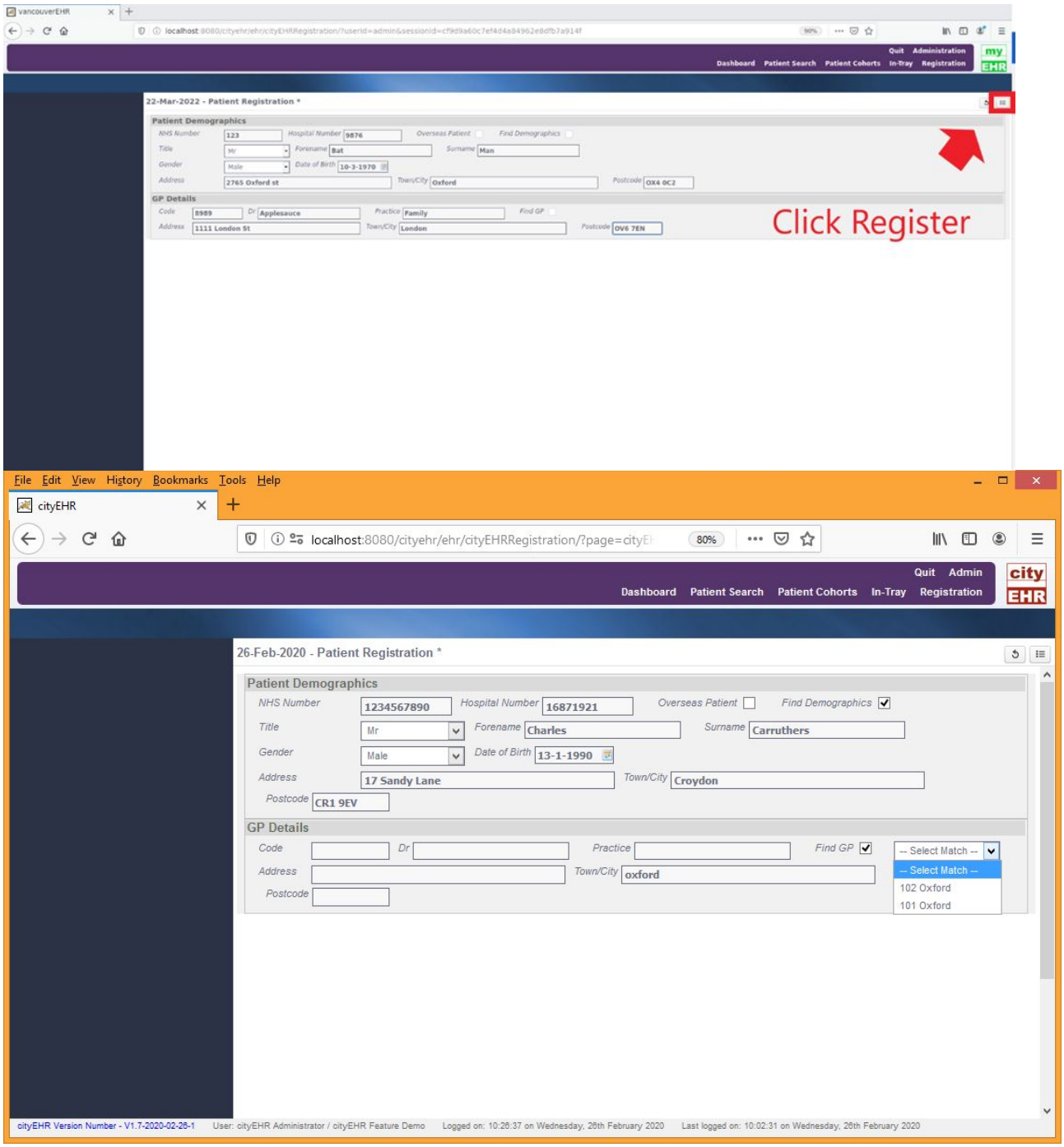
1. First log on as the default user (admin / password) as in the steps above.
2. To register a new patient click on the Registration button in the purple system navigation pane at the top of the page. You should then see the registration form as shown below.



3. The Hospital Number is a required entry (shows with a pink background) and is used as the unique identifier for patients stored in the system. All other fields on the form are optional.
4. You can fill out the patient details by entering data into each of the fields NHS Number, Title, Forename, etc.
5. Alternatively, you can fill out all the patient details using a simulated demographics service, which is configured to generate a set of random patient demographics. In a live installation, such a service may be configured to lookup from a local EPR system or a national demographics service.
6. To use the lookup service, fill out the NHS Number (in the default application this simulates a national patient identifier) and then check the Find Demographics check box that will appear once an NHS number has been filled out.

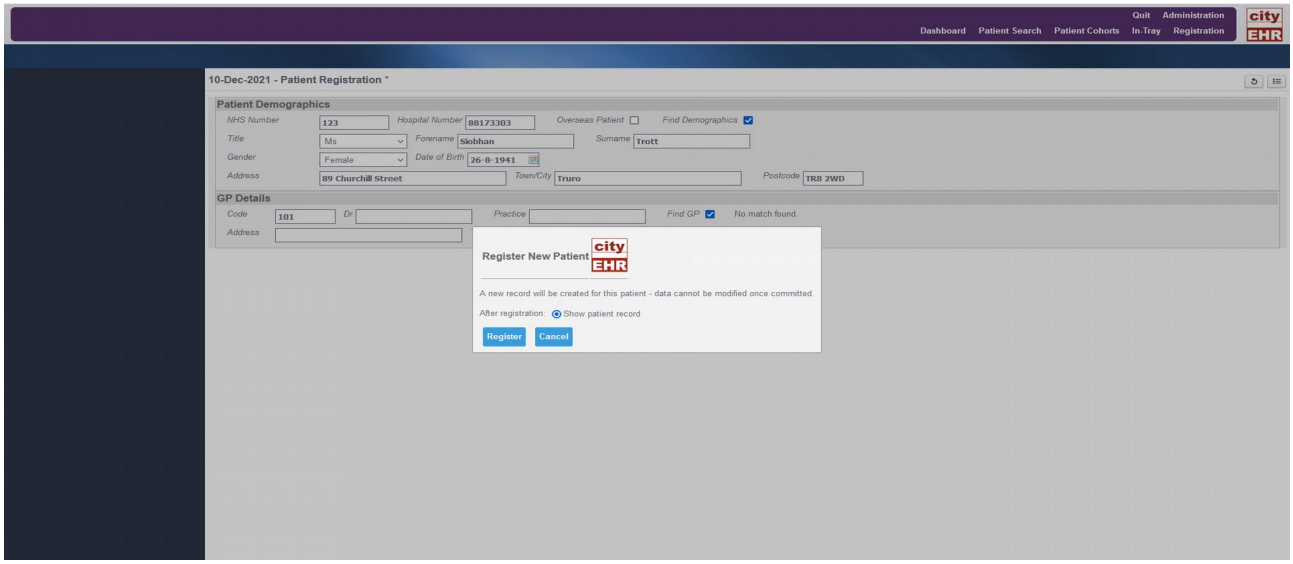


7. The demographics service will now fill out the remaining patient details, using a randomly generated set of demographics.
8. Similarly, you can fill out the GP Details by typing in the fields, or by using the Find GP service. The demonstration service is quite limited – you must type 'Oxford' as the Town/City and then check the Find GP checkbox.
9. This will return a selection of two GPs – select one from the dropdown and the GP details will be filled out for you.



10. Once all the details are entered (either by typing in the fields or by using the lookup services) then press the Register button at the top right of the form (the name of this button will show when you hold your mouse over it)

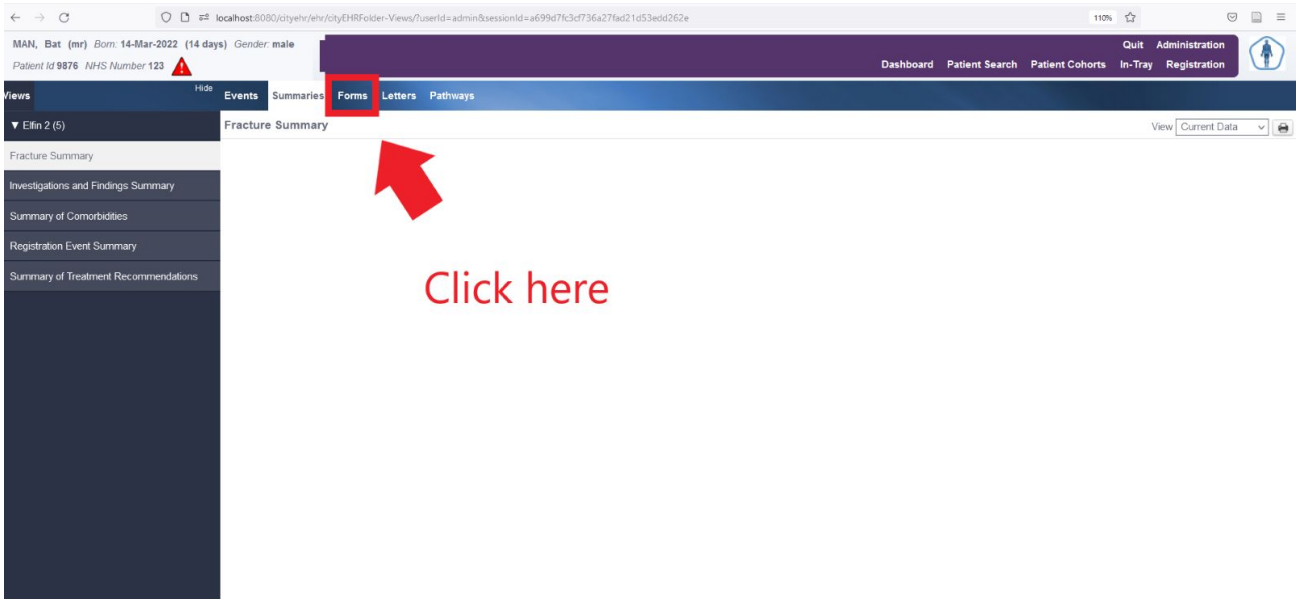
11. Provided that you have entered a Hospital Number and this hasn't already been used for a patient in the application, then you will be asked to confirm that you want to create a new re cord (see the figure below). This dialogue also allows you to select where to navigate to next in the record of the new patient – you should leave this as the default (Go to Hospital Anxiety and Depression Scale form) so that you can continue to enter data for the patient.
12. If the Hospital Number is not entered or a patient already exists for that number then you will be shown an error message which must be dismissed (press the Cancel button) before



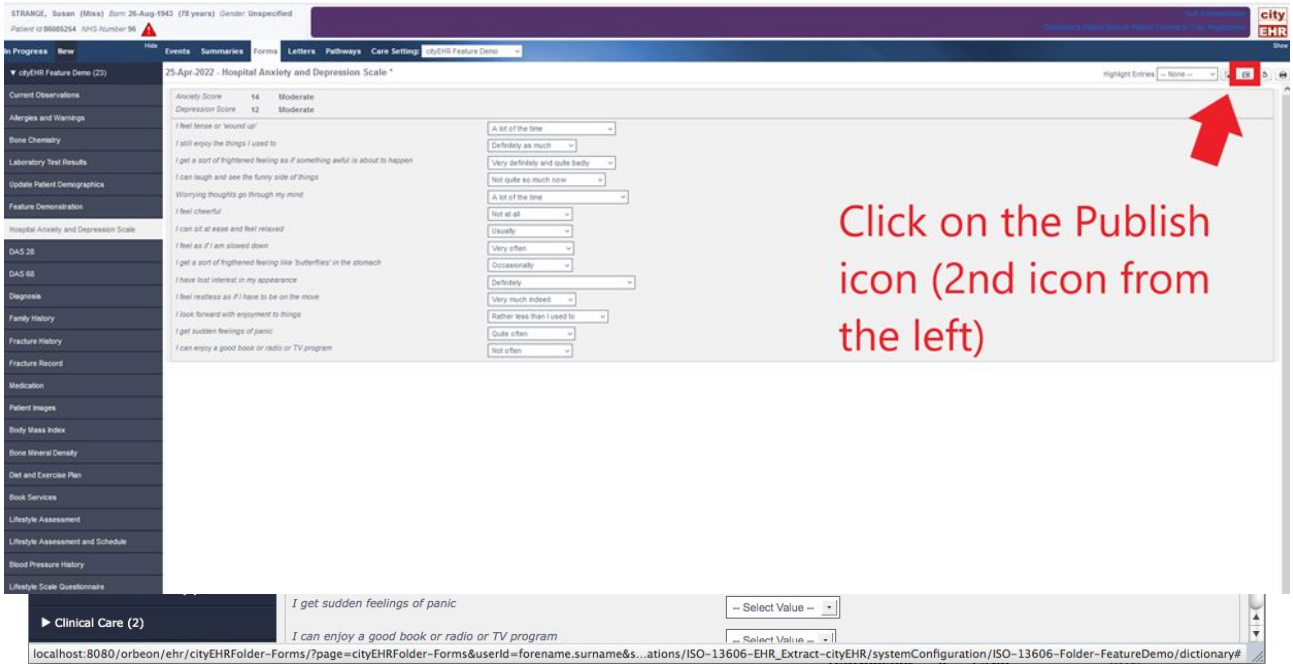
you can continue. In this case, fill out or change the Hospital Number and try again to register the patient.

13. Click the Register button and your patient should be registered!

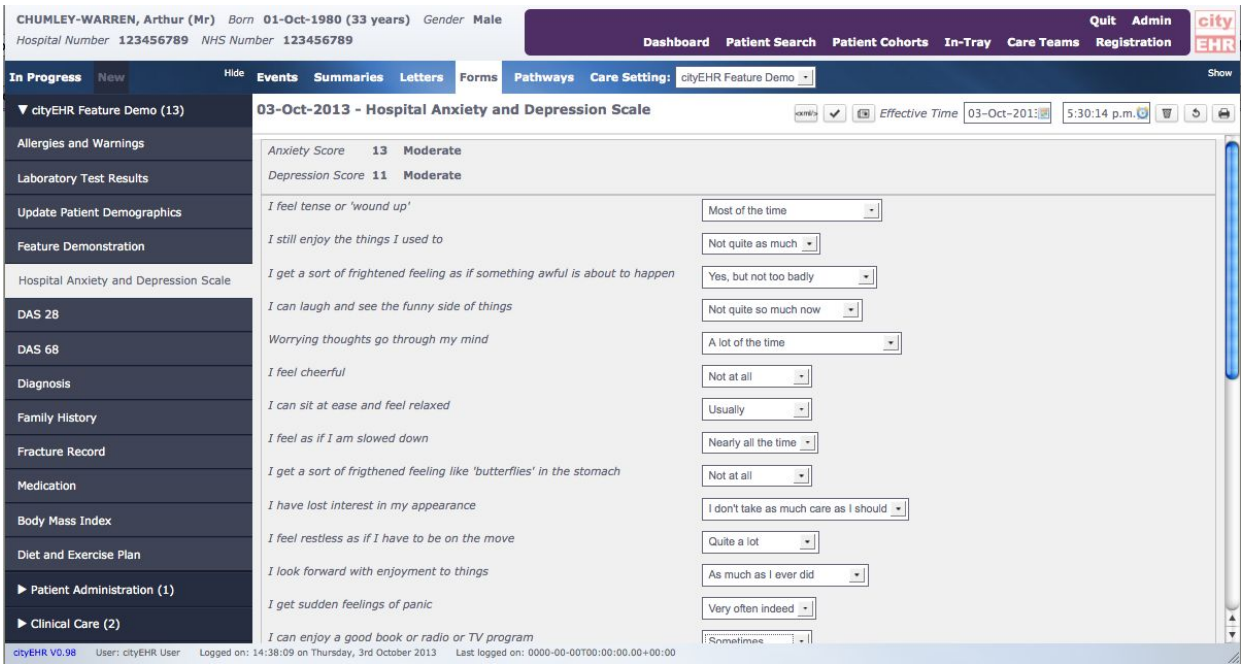
3.2. Entering Patient Data

1. After registering the new patient you should be taken to the page for entering patient data through web forms. This page is on the 'Forms' tab – if for some reason this page is not loaded for you directly, then press the Forms tab and wait for the page to load.
2. 

3. You will be presented with a list of new forms that can be entered for this patient. The forms are listed in various 'contexts of care' with the top category 'ctyEHR Feature Demo' containing all the forms available and the others containing smaller sets of forms for Administration and for Clinical Care.
4. You can now select a form to enter new data for the patient. We will start using the form for HADS - Hospital Anxiety and Depression Scale, so just press on this tab in the list on the left hand side of the page.

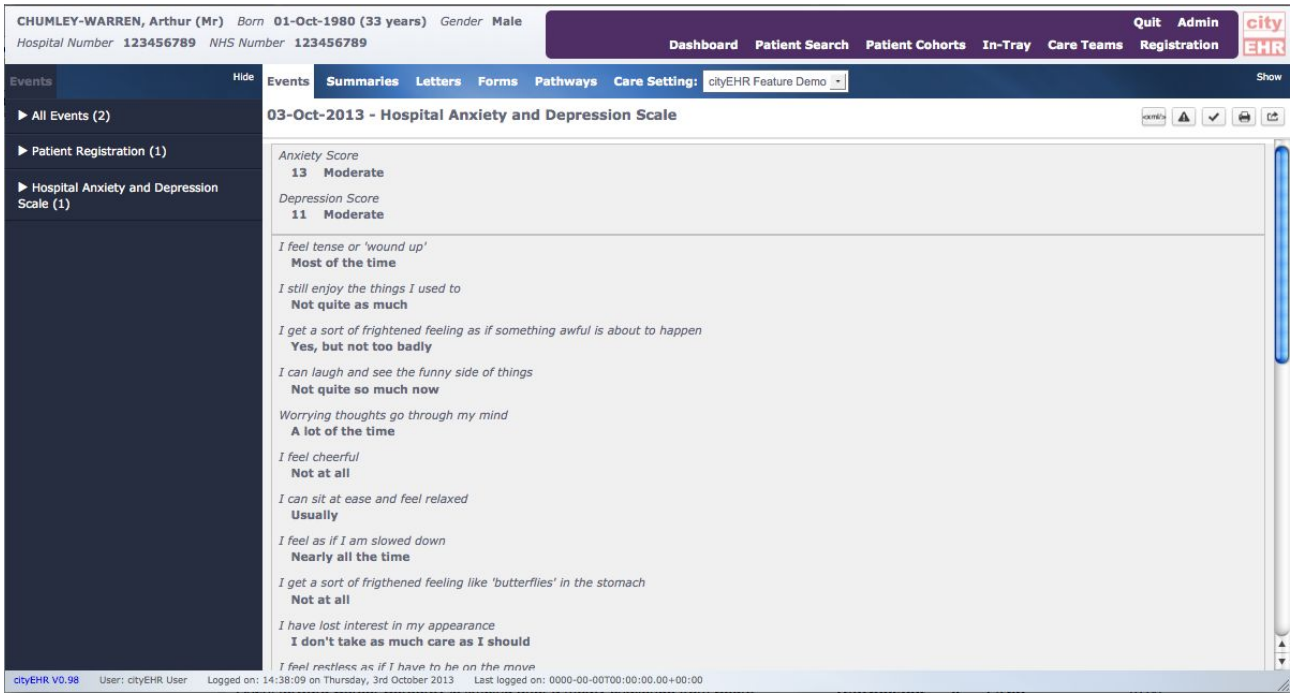


5. The form will load and you can now enter data into the fields by answering each question using the drop down menu selections. For this test, it doesn't really matter how you answer the questions – just make sure you continue to the bottom of the page and select an answer for every question.
6. At the top of the HADS form are two calculated entries for Anxiety Score and Depression Score. These will be calculated as soon as you have entered the answers to all the questions.

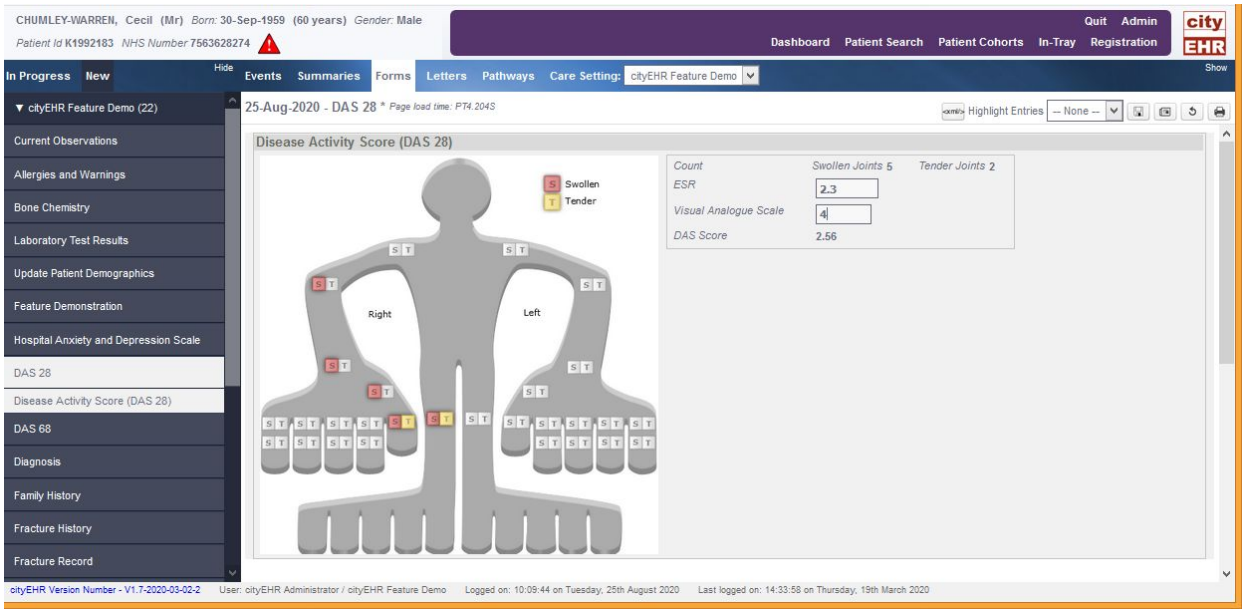


7. Once you have finished entering data you can 'publish' the form to the patient record by clicking the Publish button at the top right of the form (the name of this button will show when you hold your mouse over it)

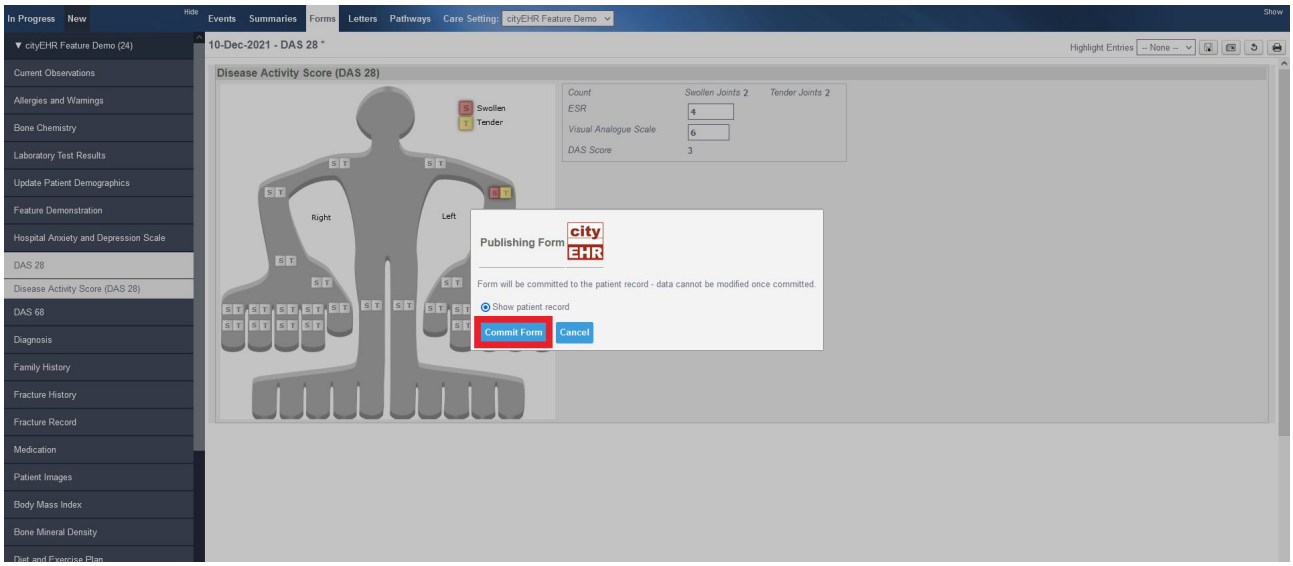
8. Press the “Commit Form” button with the radio button “Show patient record” selected.
9. Once the data have been committed to the patient record you will be moved back to the patient record folder which shows a list of all data in the record for your patient, including the HADS data that you just entered.



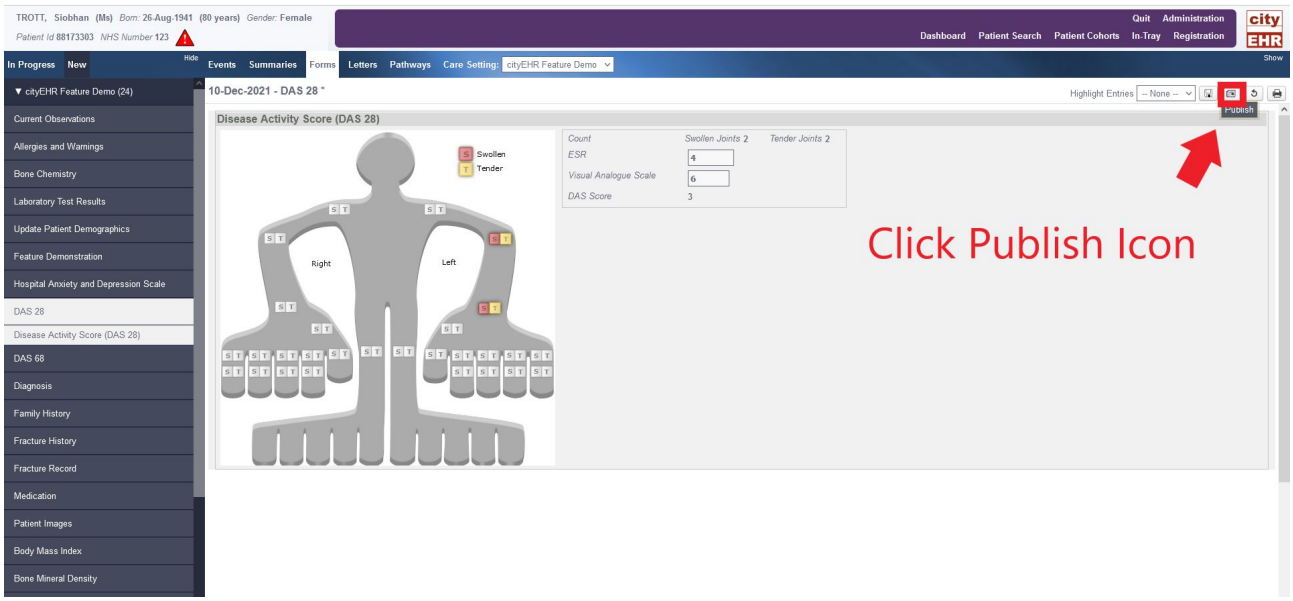
10. Return to the Forms tab and this time select the form for DAS 28. This form records the Disease Activity Score for the patient, by selecting joints that are either tender or swollen. The input of tender or swollen joints is made by clicking on the appropriate area in the image (called a homunculus).



11. As you click to select the tender and swollen joints you will see the counts changing. Enter values for ESR (e.g. 2.3) and Visual Analogue Score (e.g. 4) and you will see the DAS Score calculated.
12. The DAS Score will be recalculated each time you select a tender or swollen joint or change either the ESR or Visual Analogue Score.

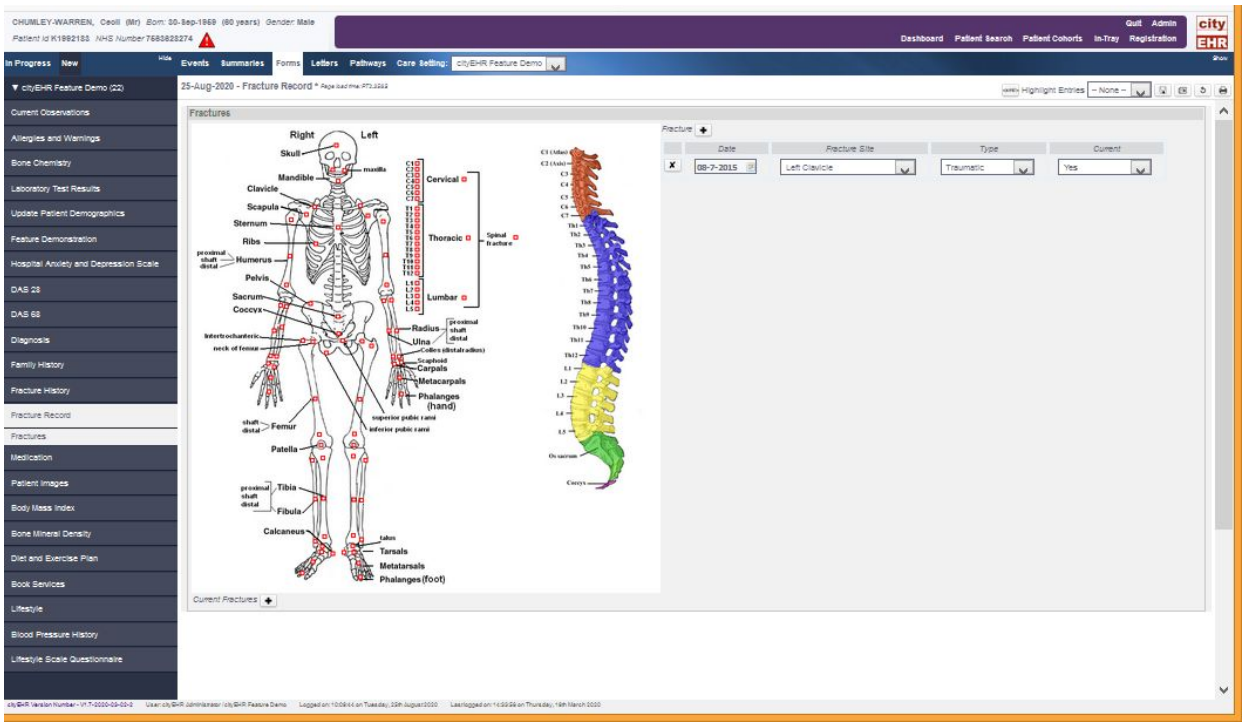


13. Once you have finished entering data you can 'publish' the form to the patient record by clicking the Publish button as before. Confirm the action and you will see the DAS 28 data stored in the patient record.

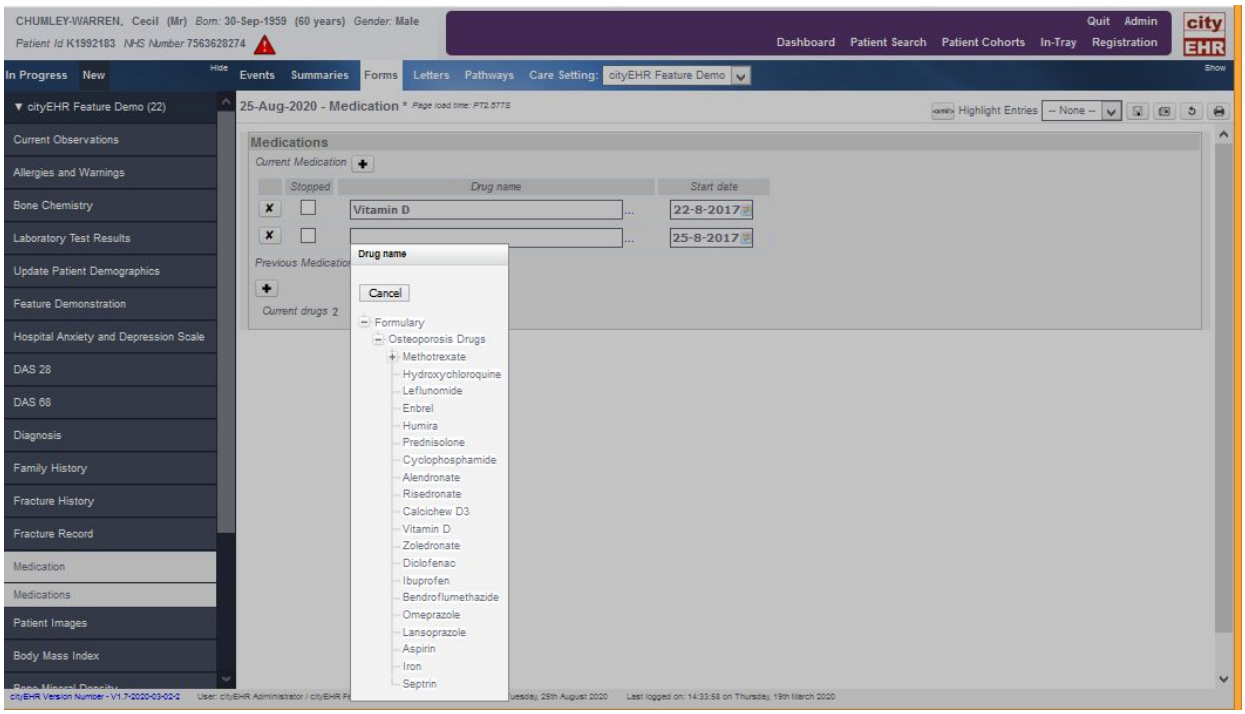


14. Press Commit Form on the Dialogue Box that appears after clicking Publish.

15. Return to the Forms page (press the Forms tab on the menu) and this time select the Fracture Record form.
16. You may need to reduce the resolution of the page to fit the display of the form shown below, or you can press the small Hide button to collapse the left hand navigation pane and give more room for the form.

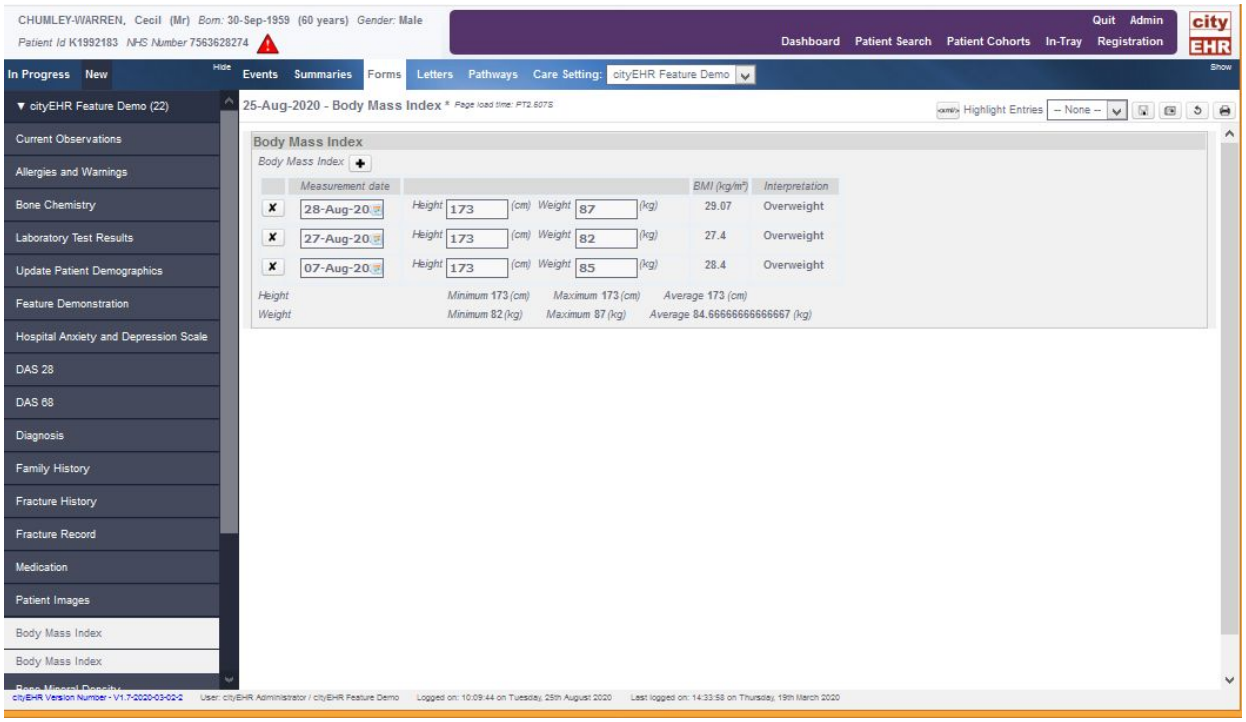


17. This form has an image of a skeleton that can be used to select fracture sites. Click on the red squares in the image to select a site – this will then add a new line to the list of fractures where you can fill out the date and other details of the fracture.
18. You can also add fractures by pressing the small '+' button at the top of the fracture list, or remove a fracture by pressing the 'x' button to its left in the list.
19. Once again, publish the form to the patient record when you are done.
20. Return to the Forms tab and select the Medications form.

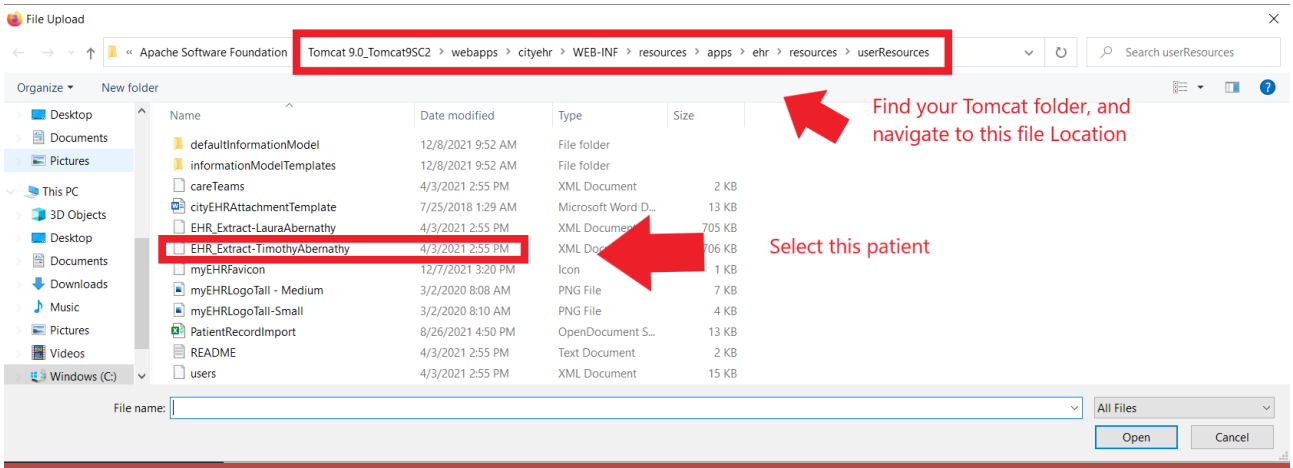


21. You can enter data for either Current Medications or Previous Medications by pressing the appropriate '+' button.

22. To enter the name of the medication you can either start typing in the input box, or press the very small '…' button to its right, which will bring up an expandable list of medications from which you can select. Its probably best to use this navigation list for you first few entries and then try typing names after you have seen what medications are available.
23. When typing the name of the medication you will either get a single medication filled out automatically as soon as your input matches it uniquely, or a small drop down selection of matching medications.
24. Once you've added a collection of medications, try checking or unchecking the 'Stopped' button. When you do this, the medication will be moved between the lists for Current or Previous Medications.
25. Once again, publish the form to the patient record when you are done.
26. Return to the Forms tab and select the Body Mass Index form.
27. On this form you can enter a set of measurements for height and weight of the patient on various dates – the Body Mass Index (BMI) will be calculated, along with the average height and weight for the patient.



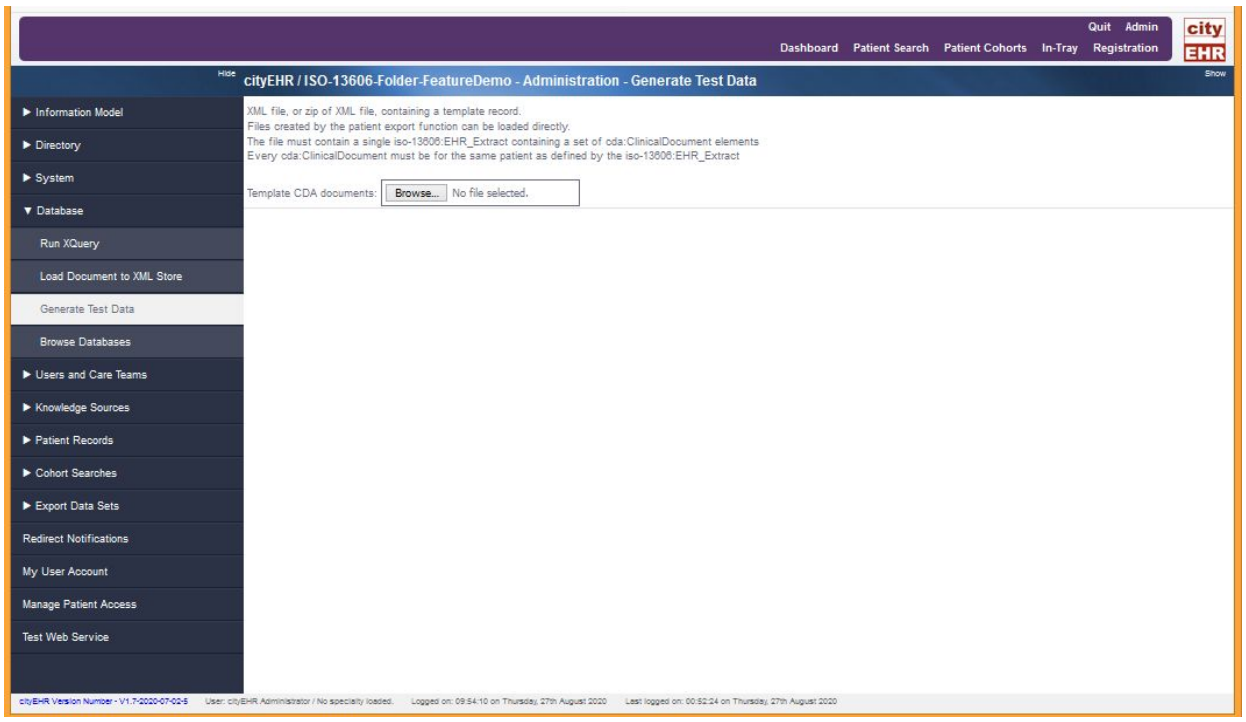
28. Publish the form.



4. Creating Test Patients

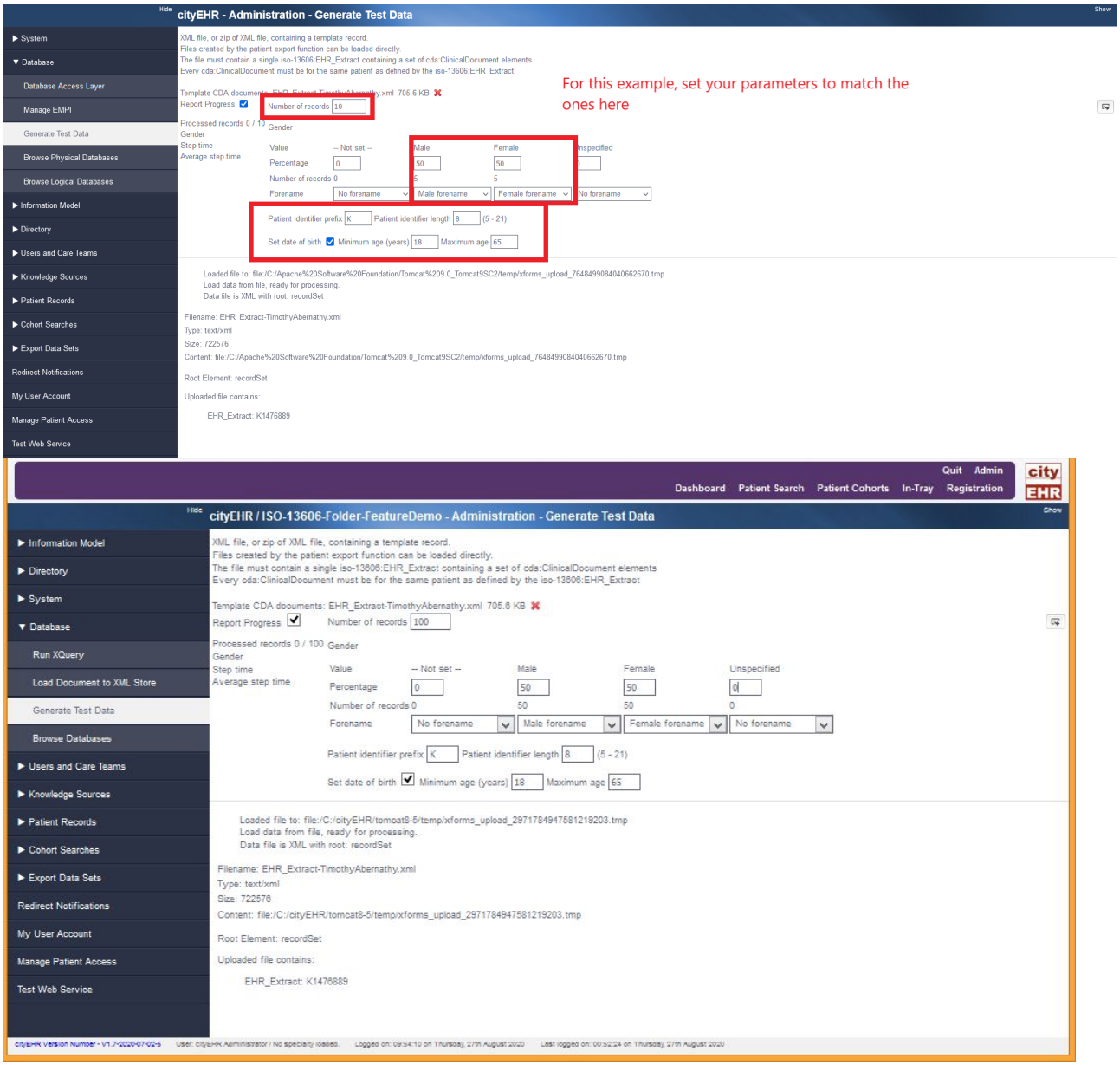
To continue exploring cityEHR you will need a larger sample of test patients – these can be generated using functions available on the Administration page, which is accessed by pressing the Admin button on the main system menu (top left of the page).

1. On the Admin page, in the menu in the left hand pane, select the menu option “Database” and then the sub-task for Generate Test Data.
2. Press the Browse button to load a file containing a sample patient record.



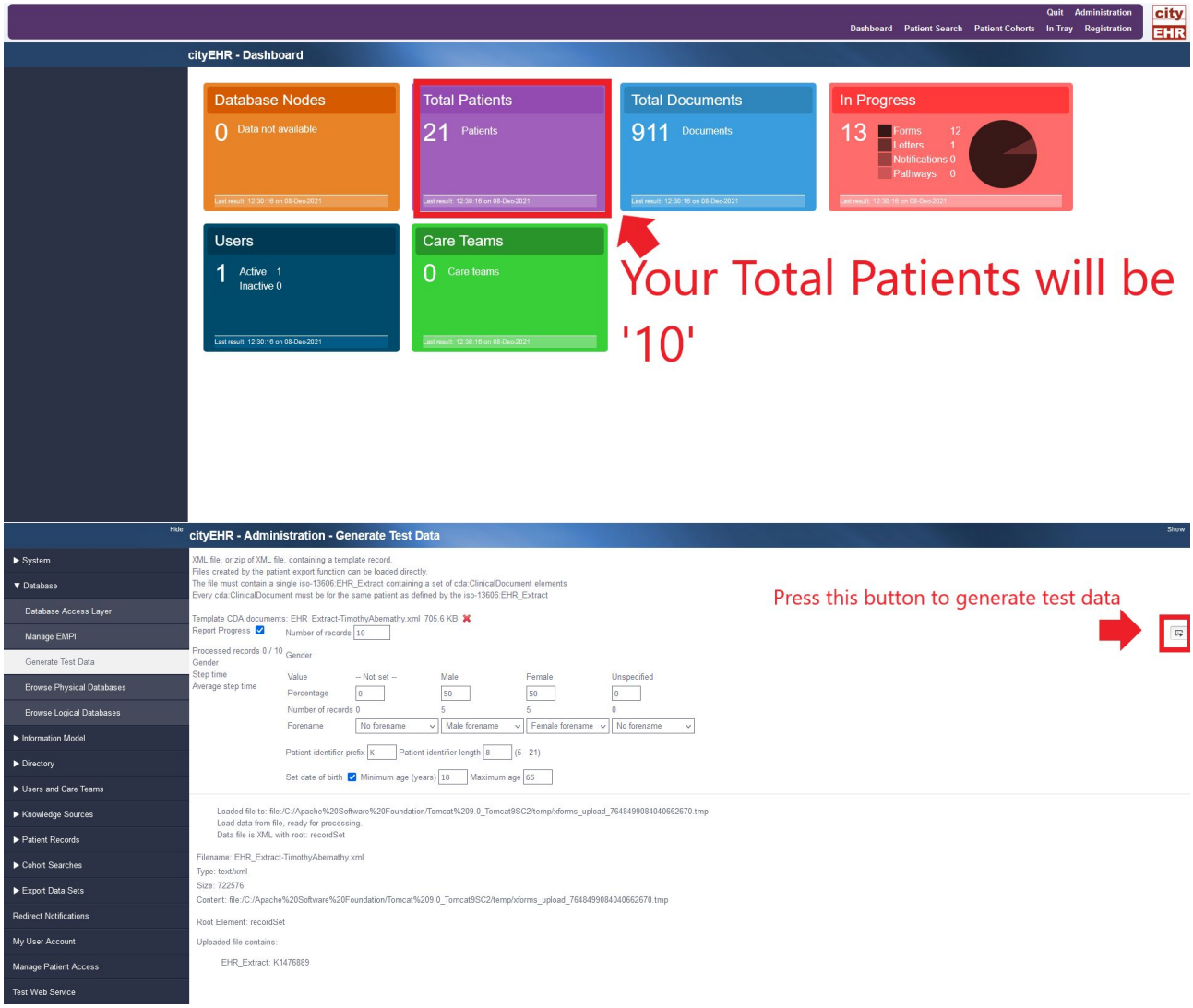
3. Press the Browse button. Navigate to your TomCat folder and follow the path: webapps/cityEHR/WEB-INF/resources/apps/ehr/resources/userResources. Select the file called: EHR_Extract-TimothyAbernathy.xml (If you want to see what this file looks like, then you can open it separately using a progammers file editor or plain text editor).

4. Once you have selected the file, it should load to cityEHR and you will see the page as shown below.



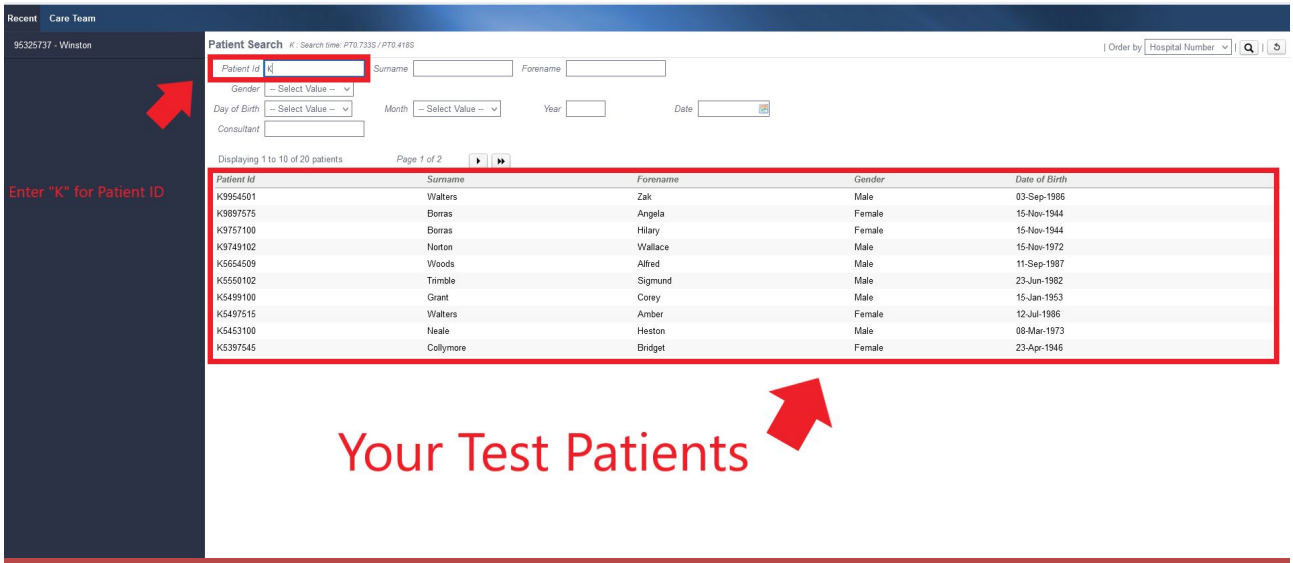
5. By default, the parameters are set to generate 100 test records, split evenly between male, female and unknown gender, aged between 18 and 65.
6. Change the number of records to Male: 5 and Female: 5. If you would like, you can keep the default of generating 100 records, but be aware that it can take up to 5 seconds to generate each record, so 100 records may take over 5 minutes to complete. You will probably just want to generate records for Male and Female patients, so you can change the percentages to 50 in each of these columns and the Unknown percentage to 0. The actual number of records to be generated will change as you change the percentages (and an error message will appear whenever the percentages don't add up to 100).
7. In the columns for Male and Female patients, change the Forename selection to Male Forename and Female Forename as appropriate.

8. Once you are happy with the parameters, press the small button on the right hand side of the page to generate the test records. You will need to wait a while until this process is finished.



9. Once the test data is generated, your screen will look like this:

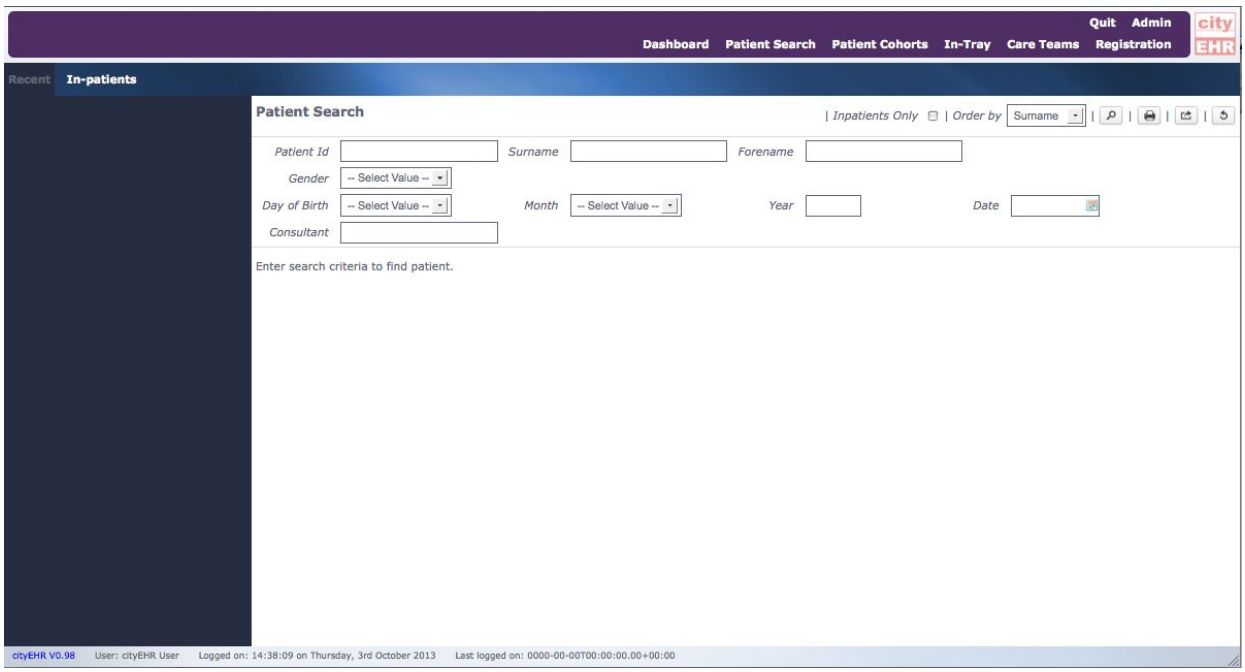
10. Now you can press the Dashboard button in the main System Menu (top of the page) to leave the Admin page and view the Dashboard, which should now show that you have the new records loaded.



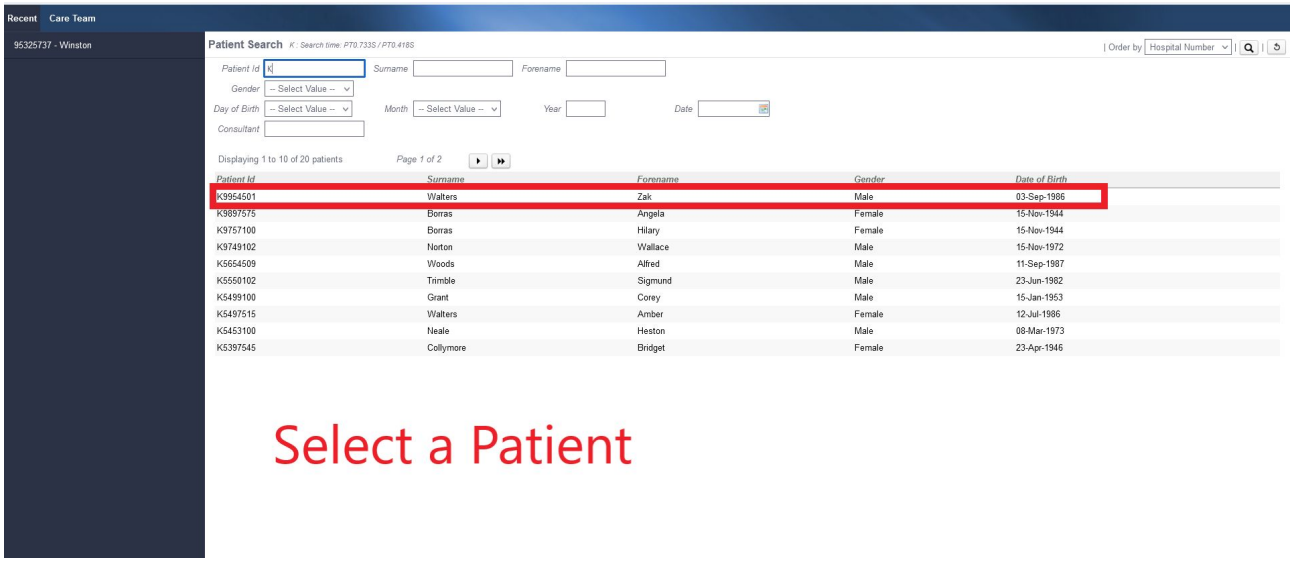
5. Finding Patients

Once you have some patients recorded in your database you can search for them and select the patient whose record you want to view or input data for.

1. To find a patient, press the Patient Search button in the purple system navigation pane at the top of the page. You should then see the search form as shown below.

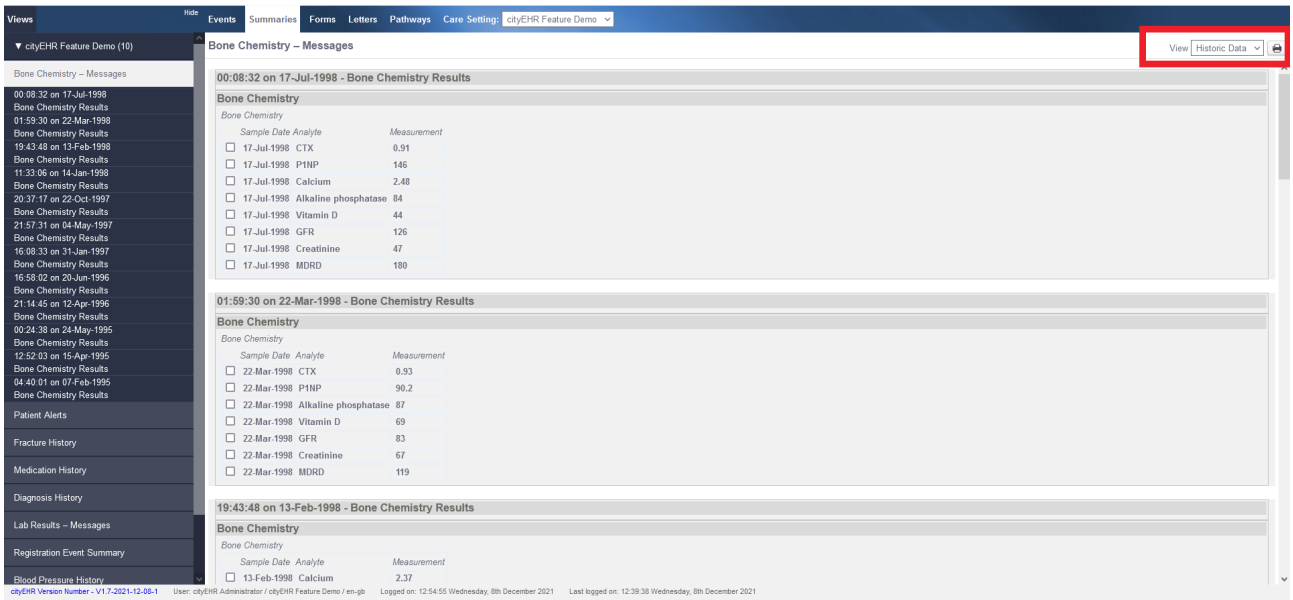


2. Enter some search criteria and press the Search button at the top of the form (the name of this button will show when you hold your mouse over it). Alternatively, just press the Enter key when you have typed into any of the text input fields.
3. Since the test patient data is randomly generated, you can be fairly sure that at least one patient exists with a surname starting with any commonly occurring letter, or try searching for patient identifiers like “K” (assuming you kept the default format for patient identifiers when you generated the test data).



4. The results from your patient search are listed with basic demographics details. If there are no results then you will be informed of this. If too many patients match your search (for example, this may happen if you just search for Male patients) then you will be informed that too many patients were found and you need to enter more specific search criteria.
5. Once some patients have been found in the search, the list of patients will be displayed and you can now select one to enter their record. Note that this list appears even if there is only a single patient found – this allows you to verify that the correct patient was found, before you move to view their record.

6. When you click to select a patient from the list, you will be taken to the default summary view for that patient's record, which will include features for viewing, charting and annotating the record. The next exercise will walk you through this process.

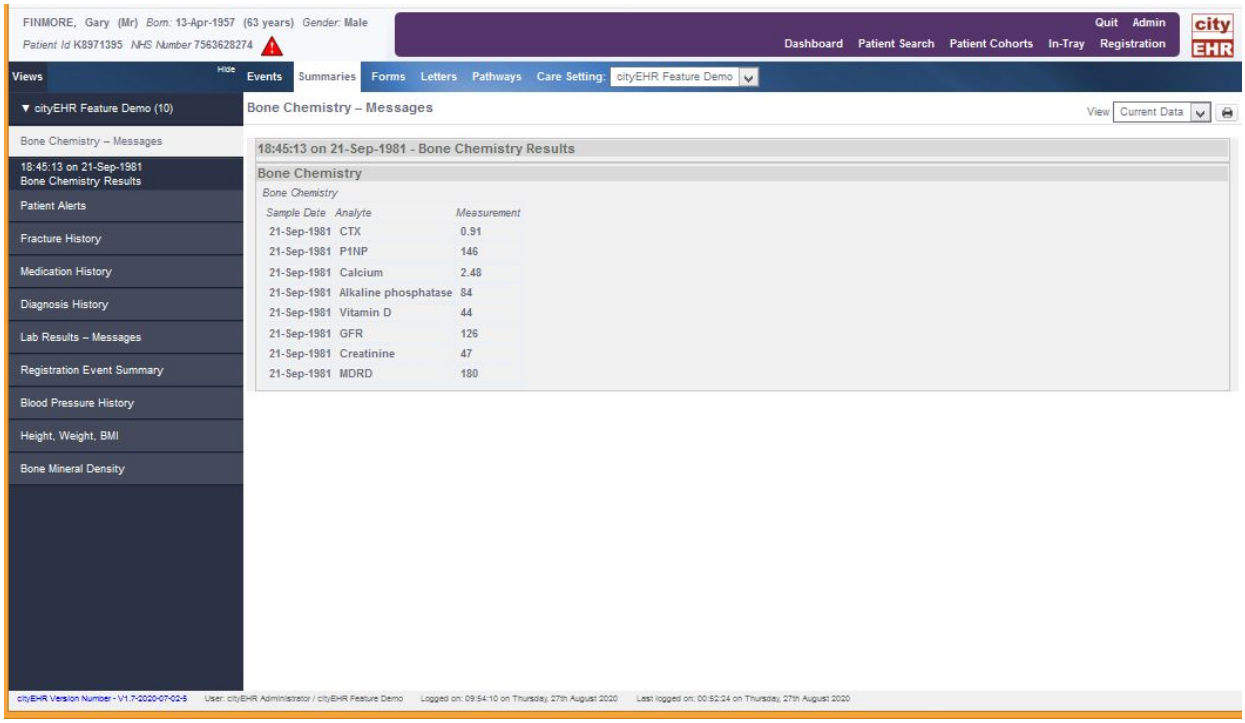


6. Viewing the Patient Record

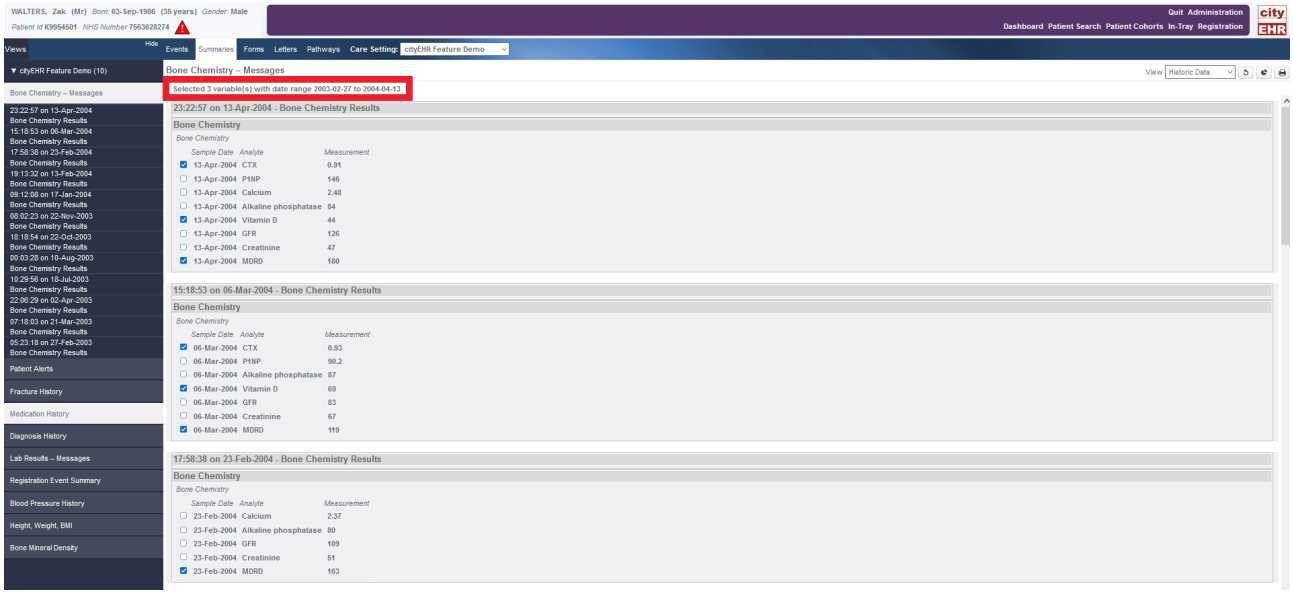
6.1. Summary View and Charting

When you first access a patient's record, you will be shown the Summary page, which includes a selection of various summary views.

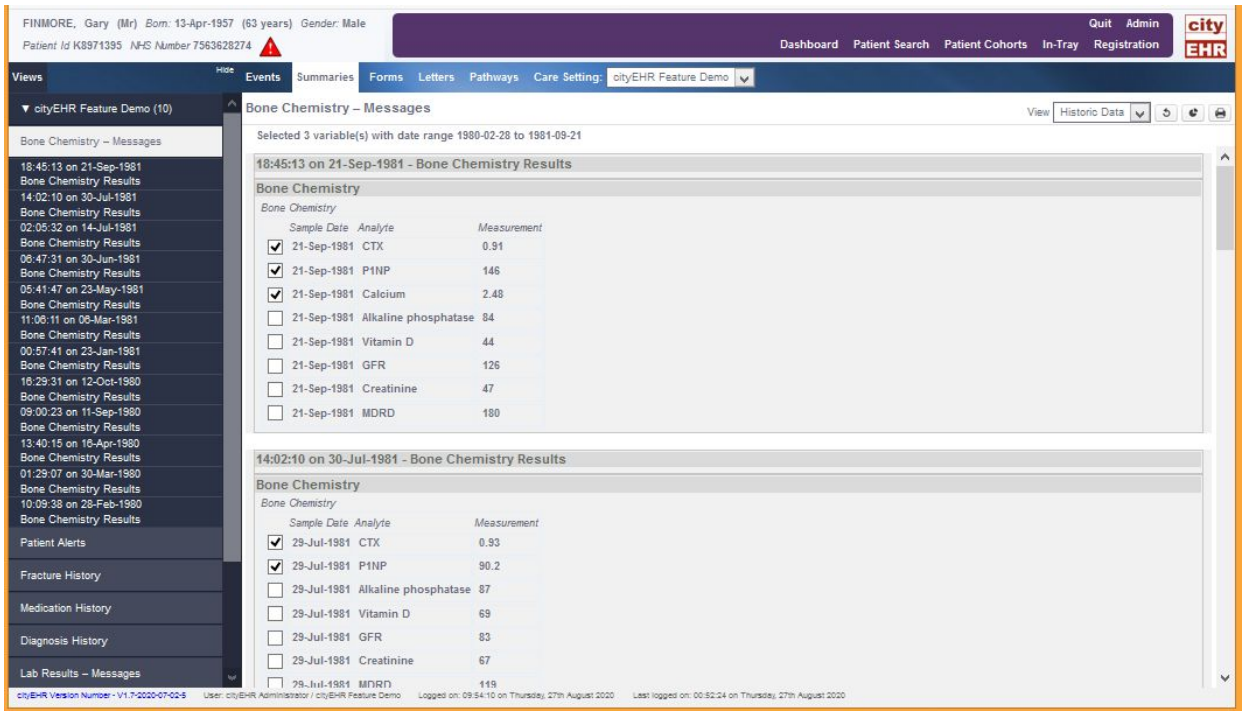
1. Initially, you should see the summary view for Bone Chemistry – Messages. These are bone chemistry results that have been sent to the cityEHR as messages from the laboratory which performed the tests. (At least we are pretending this in the test data, although the results used were originally generated in this way)



2. Initially, this summary just shows the most recent set of Bone Chemistry results. Now change the drop down at the top right of the pane to Historic Data and you should see the complete list of historic results for the patient.



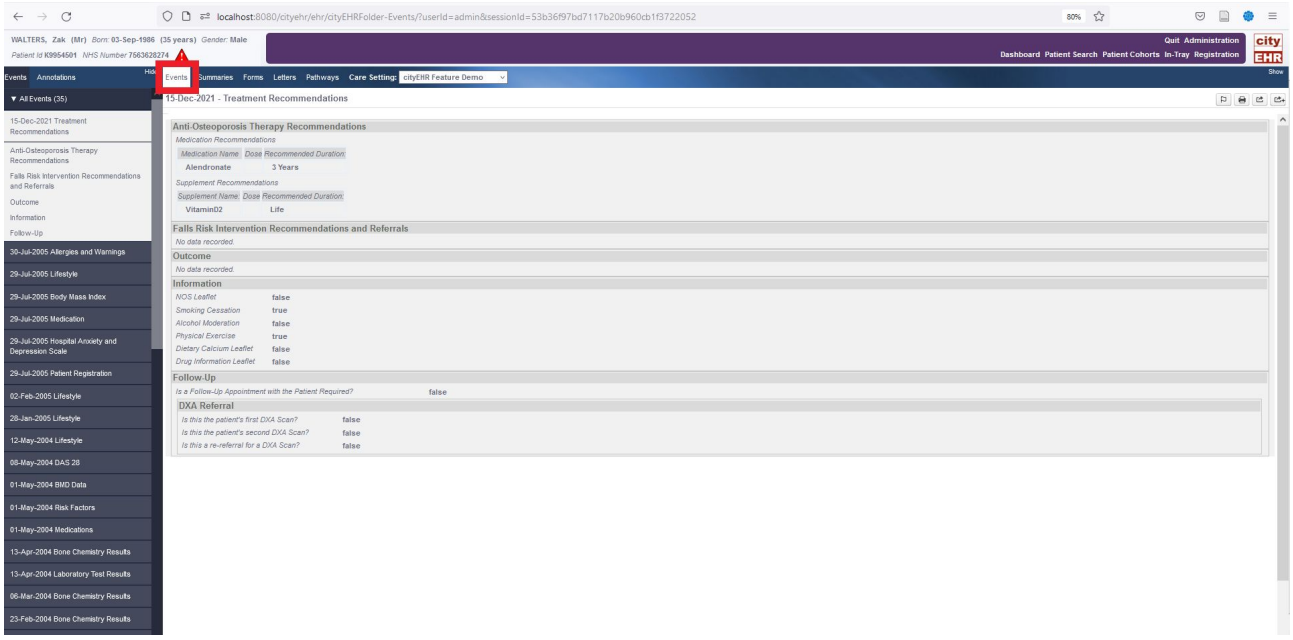
3. Select two or three of the analytes (CTX, P1NP, Calcium, etc) that you want to view on a chart, by selecting the check boxes to the left of each line. Note that you only need to check the box in one set of results; all boxes for the same analyte in other results sets will also be selected.



4. As you select the analytes, a summary of the number selected and the overall data range covered by the selected results will be updated at the top of the pane.

5. Once you have selected two or three analytes, press the Chart button that should now be visible at the top right of the pane. See screenshot below.

6. On pressing the Chart button you should see a new dialogue window with charts of the analytes you selected, There are various parameters at the top of this dialogue that you can use to adjust the charts that are displayed.

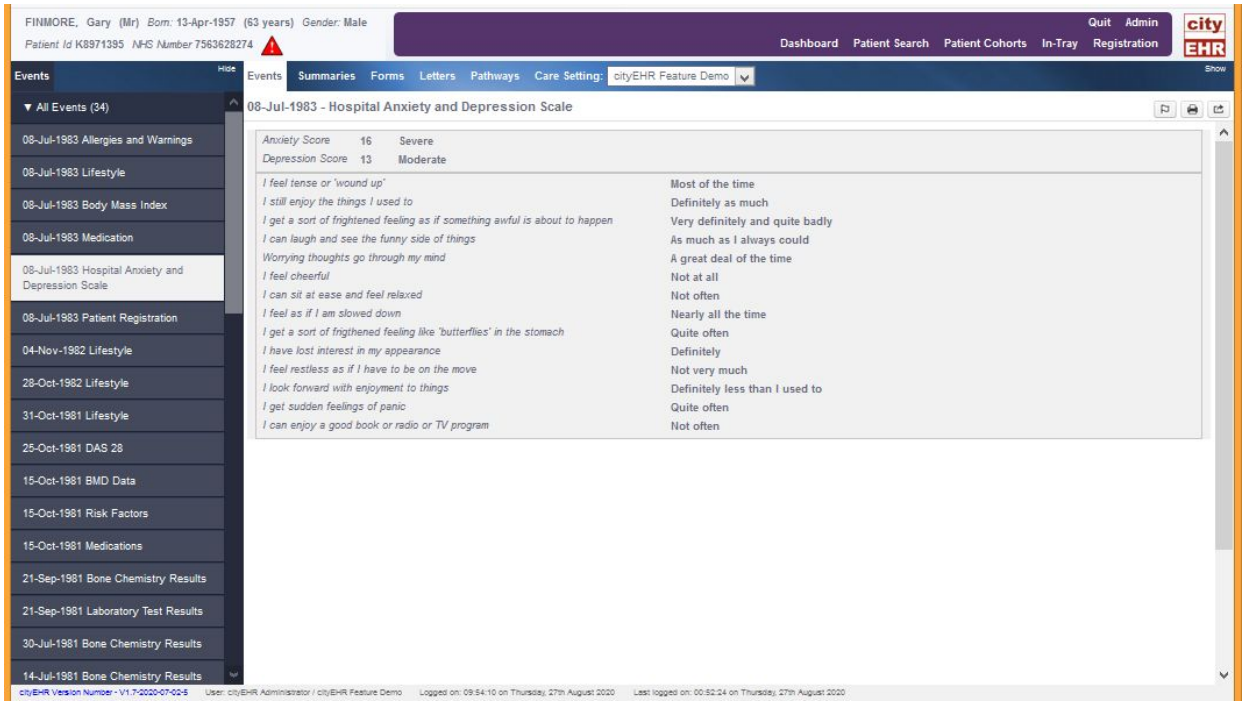


7. Once you have seen enough, press the Close button at the top of the dialogue to dismiss it. See screenshot below.

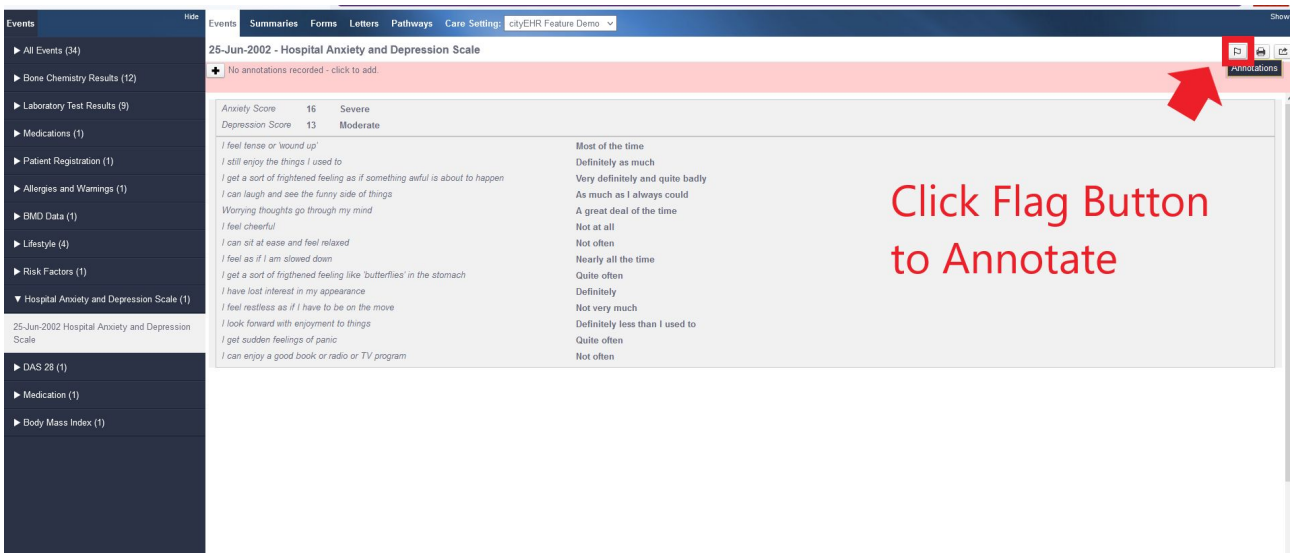
6.2. Viewing the Longitudinal Record

To view all the events in the patient record, press the Events tab at the top of the viewing pane.

1. You will see a list on the left hand side, of all the events recorded in the patient's record and details of the most recent of these will be displayed in the main viewing pane.



2. Select any historic event from the list to view the recorded information in the main viewing



pane.

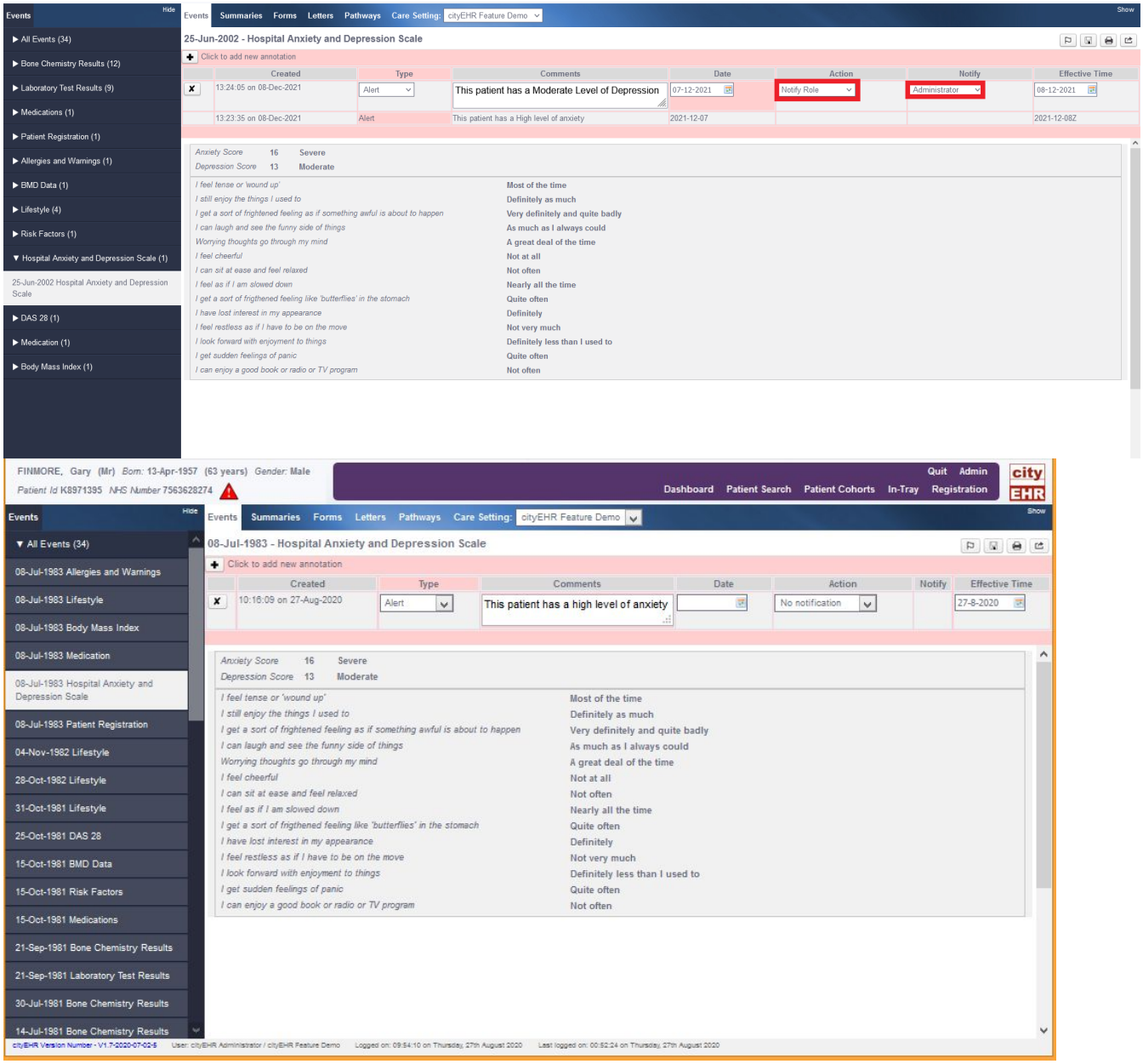
6.3. Annotations and Notifications

The Events page is used to access the full longitudinal record of events recorded for the patient. Since cityEHR must preserve a proper history of the patient's information, it is not possible to change any of the recorded events that have been committed (published); but it is possible to add annotations.

1. In the Events page, select the historic event that you wish to annotate – for example the HADs assessment.

2. To annotate the event, click the small Flag button to the top right of the record view. This will display the annotations for this event.

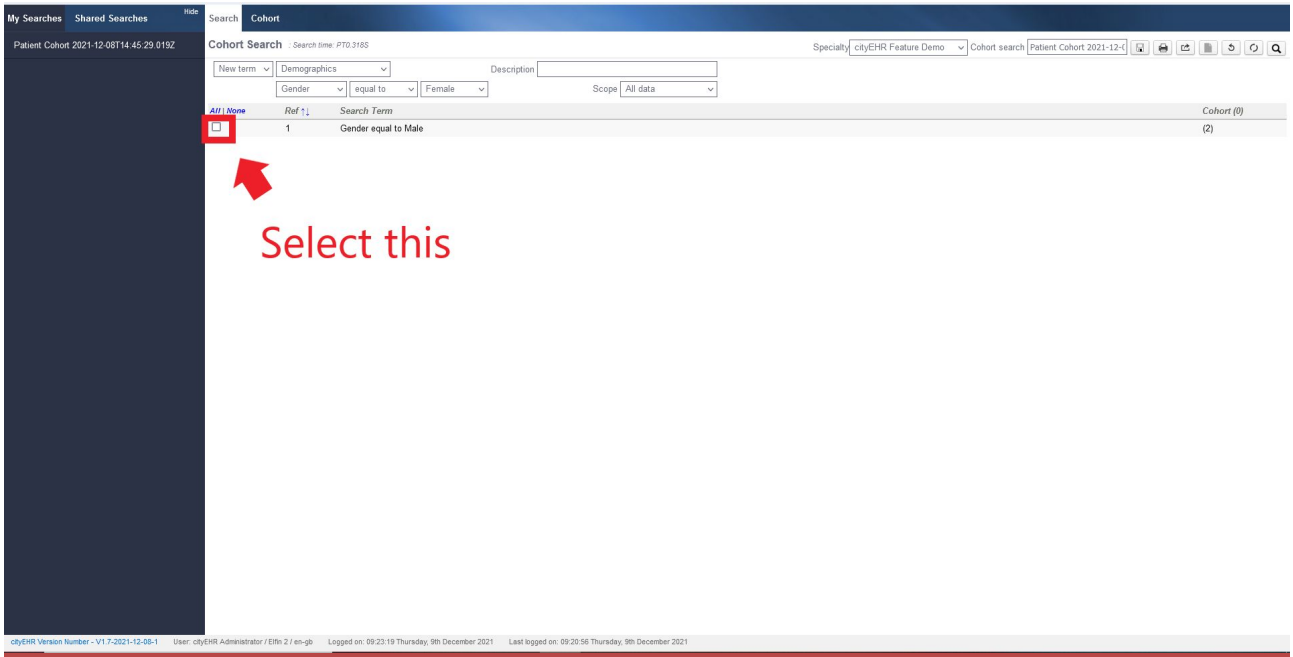
3. Click the '+' button at the top left to add a new annotation.



4. You can now enter the Type and Comments for the annotation – then press the Save button that appears in the top right menu to commit your annotation to the record.
5. Once saved, your annotation is stored as its own event in the historic record for the patient, associated with the event it annotates.
6. Annotations can also be made as ways to notify other clinical users about events in the patient record.
7. To do this, add a new annotation but this time use the Action dropdown menu to select the users you wish to notify.
8. Note that for a fresh installation of cityEHR, with only the single admin user, you should only be able to notify roles of user, so select Notify Role as the action and then Administrator as the role in the dropdown.

9. When the details of your notification are completed, press the Save button to commit to the annotation to the patient record.

10. Once saved, the annotation is stored with details of the users you have chosen to notify and they will be altered through a message in their InTray (as we will see later on in this Quick Guide



7. Cohort Search

To run cohort searches, press the Patient Cohorts button in the main cityEHR navigation panel (available at the top of every page). We will work in here.

The cohort search facility allows you to:

- Make cross-patient searches on any entry/element in the information model
- Combine cohorts returned from individual searches
- Save searches and patient cohorts
- Reload searches and cohorts that have been saved previously
- View and print cohort lists
- Export patient data for a cohort

The sections below show cohort search features, used with a small database of test patients (such as the data generated in the Section above, Generate Test Data).

7.1. Demographics

1. Navigate back to cityEHR Feature Demo

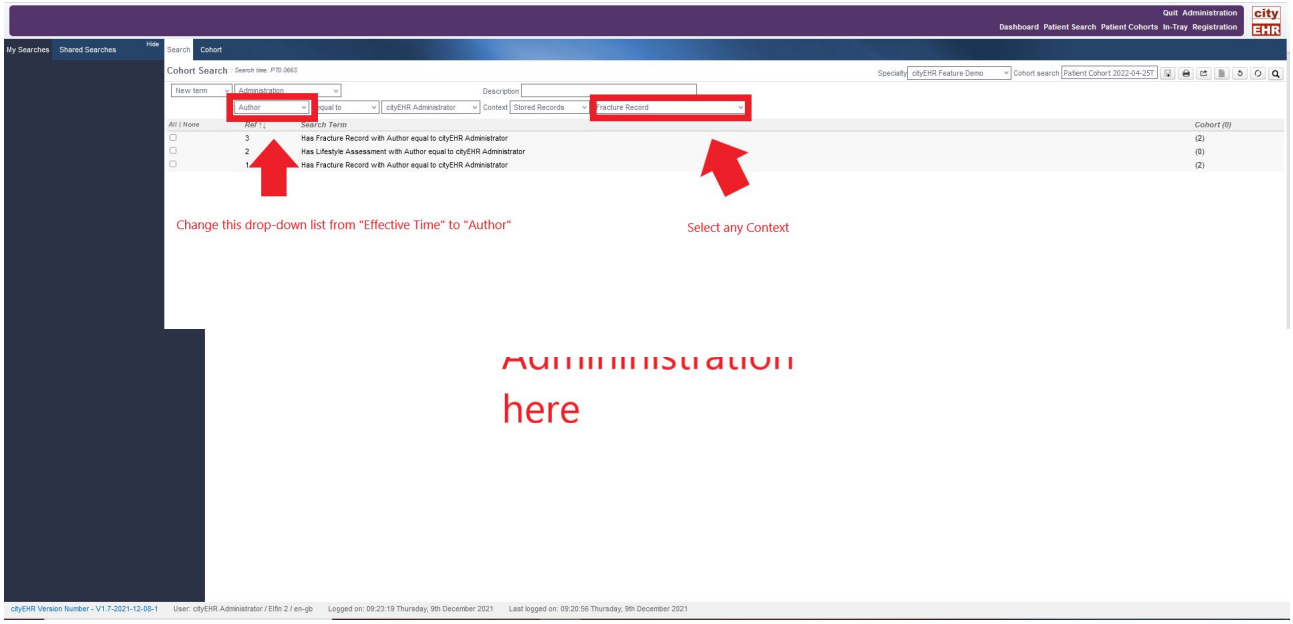
2. Navigate to Patient Cohorts in the purple dashboard

3. To search for cohorts based on patient demographics, select Demographics (the default when the page loads) from the left hand search type selection.

2. You can then select to search on Gender, Data of Birth or Age. Enter the criteria for the search in the fields provided and then press the Search button to perform the search and display a summary of the cohort found.

3. View the Cohort Results in the display window.

4. Now select the box next to the Cohort Search Results.



5. Now Navigate to the “Cohort” tab (located next to the “Search” tab). You should be able to view the patients in this cohort. See screenshot below.

6. You can now print or export this list. Please Navigate to section 8.5 for instructions on how to print and section 9.2 for instructions on how to export data for a cohort

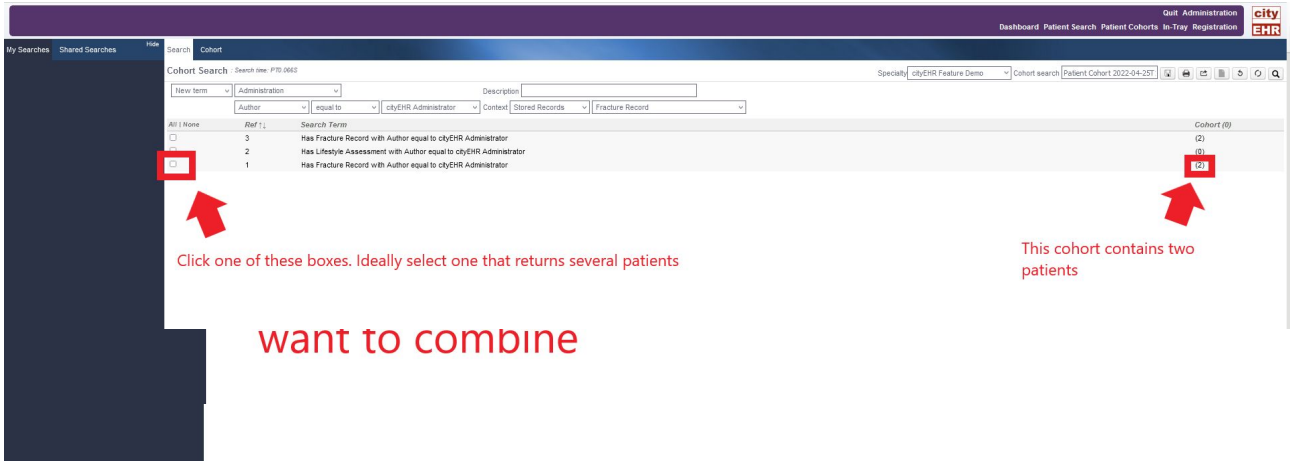
7.2. Administrative Data

1. Select Administration form the left hand search selection menu to search for cohorts based on the effective time or author of specific compositions. The Context selection allows you to specify the composition (i.e. document type) to search for – or you can leave this as 'Any Context' for a general search.

2. The cohort is formed as patients who have any compositions of the specified type with the author or effective time as constrained by the search criteria. If no context is chosen then the cohort is formed based on any composition e.g. find all patients with any compositions committed by a specific author (user). Select the search criteria to be “author” and select any option from the context drop-down. See screenshots below.

3. Click the Search button (Magnifying Glass) to return search results.

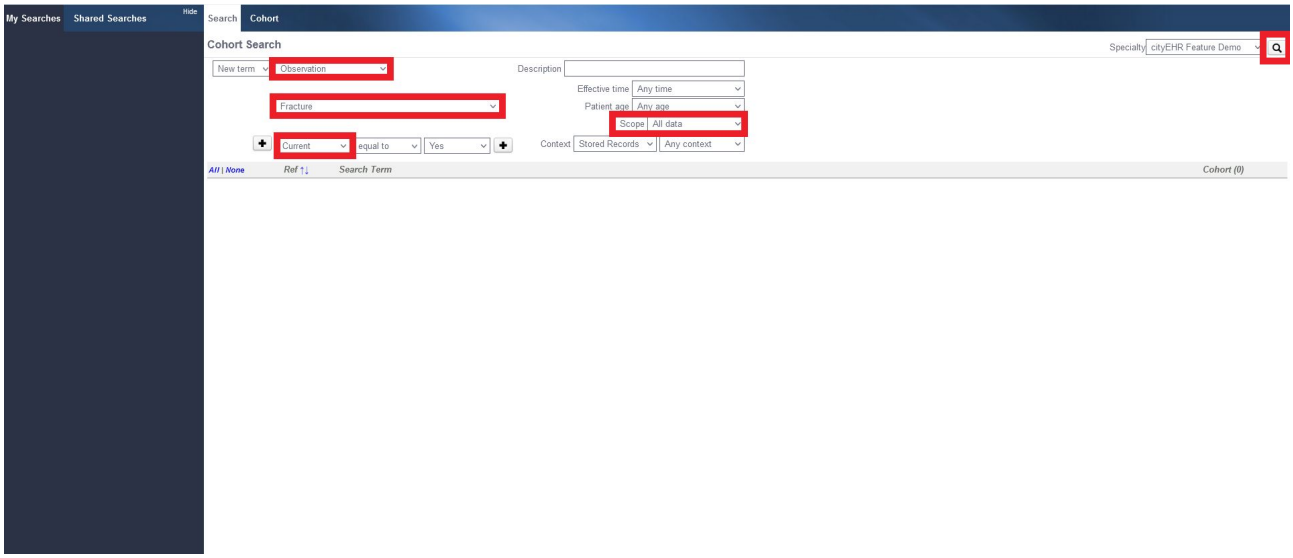
4. Click on the empty box next to your new patient list.



5. Navigate to the Cohort tab to view a patient list of your search results.

7.3. Observations

1. Change the search term to Observation. You can change the parameters to run more specific cohort searches for these observations. See image below for an example. Make sure to click “Search” to retrieve your search results!



2. For this example, we have set the “Observation” as Fracture, time = Current, Scope = All Data. We can view our results below:

3. For this observation, we have returned zero results. You can change and modify the cohort search data to see what you retrieve!

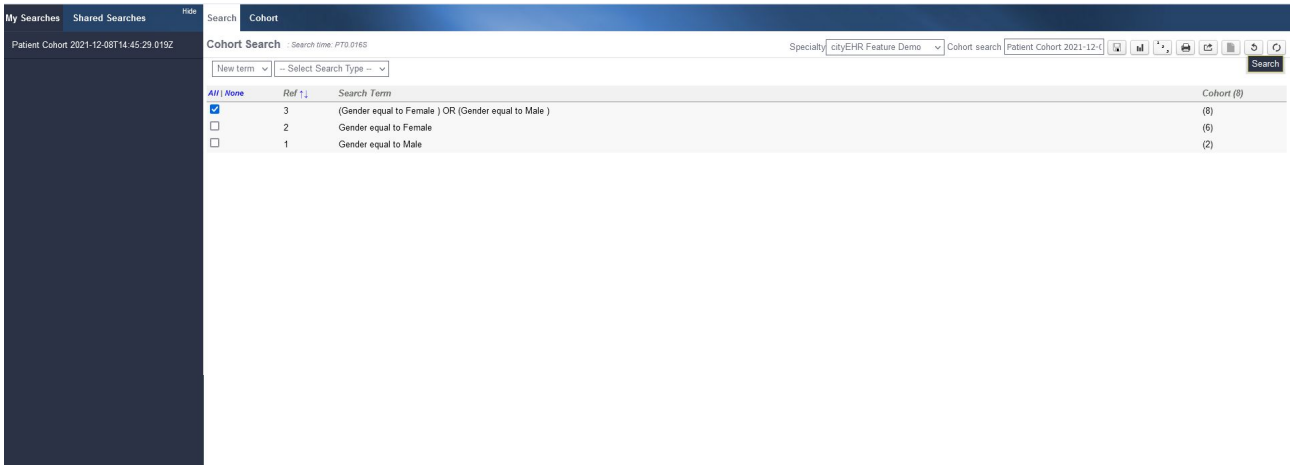
7.4. Combining Cohorts

Cohort searches can also be combined. This section will show you what that means and how to do that.

1. Search for the Cohorts you wish to combine. Please see example below. We have created two cohort searches under “Demographics” for “Gender equal to Female” and “Gender equal to Male”.

2. Now Select the Cohorts you wish to combine.

3. Navigate to “Select Search Type” and select “Combine Selected Cohorts”, pick an Operator, and



then click the Search Button. You can also select “Combine Cohorts”. The options for the operators will be different. When selecting “Combine Cohorts”, your operator options are:

a. AND

b. OR

c. A PERCENTAGE OF: This operator will find the members of cohort A that are in cohort B and calculate a percentage.

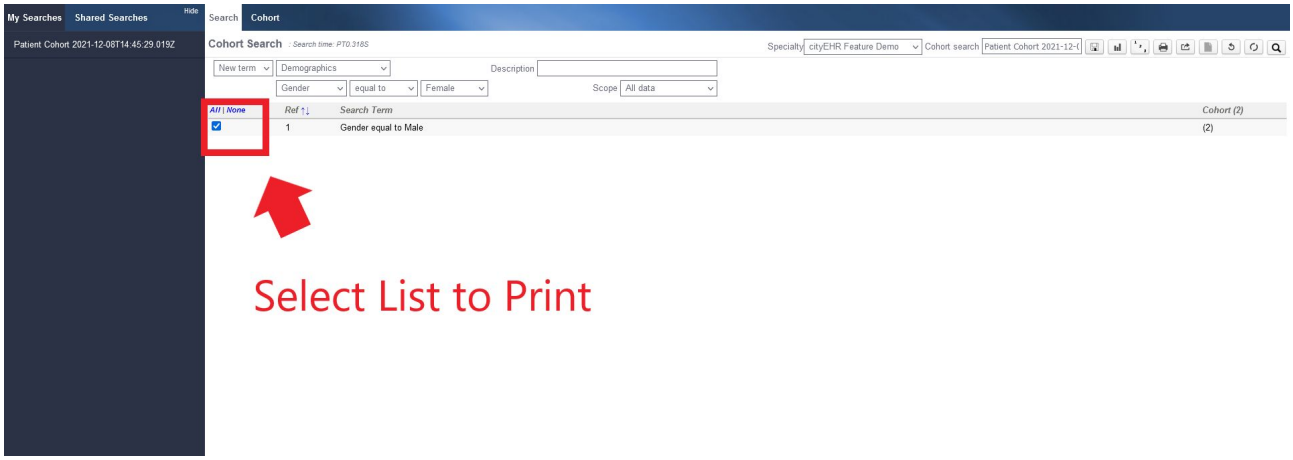
4. See results of your search in the display window and select them by clicking the check box. Please see the image below. Save this cohort search.

5. Navigate to the Cohort Tab. You have an option to print this list by clicking the icon on the right with the printer.

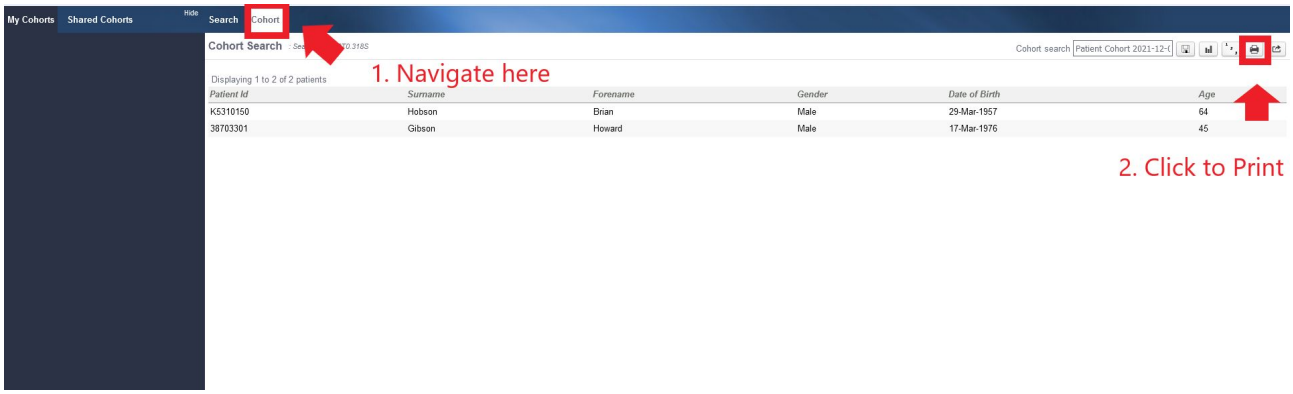
7.5. Printing Cohort Lists

Cohort lists can also be printed. This section will show you how to do that.

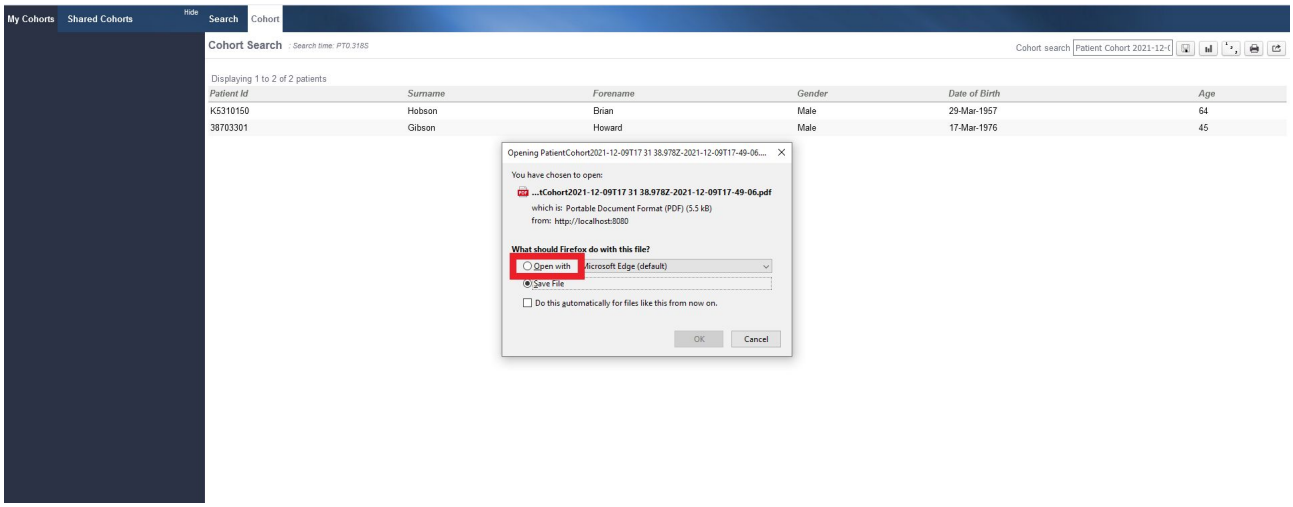
1. Select the Cohort List(s) you would like to print (the Cohort Search Results). See image below.



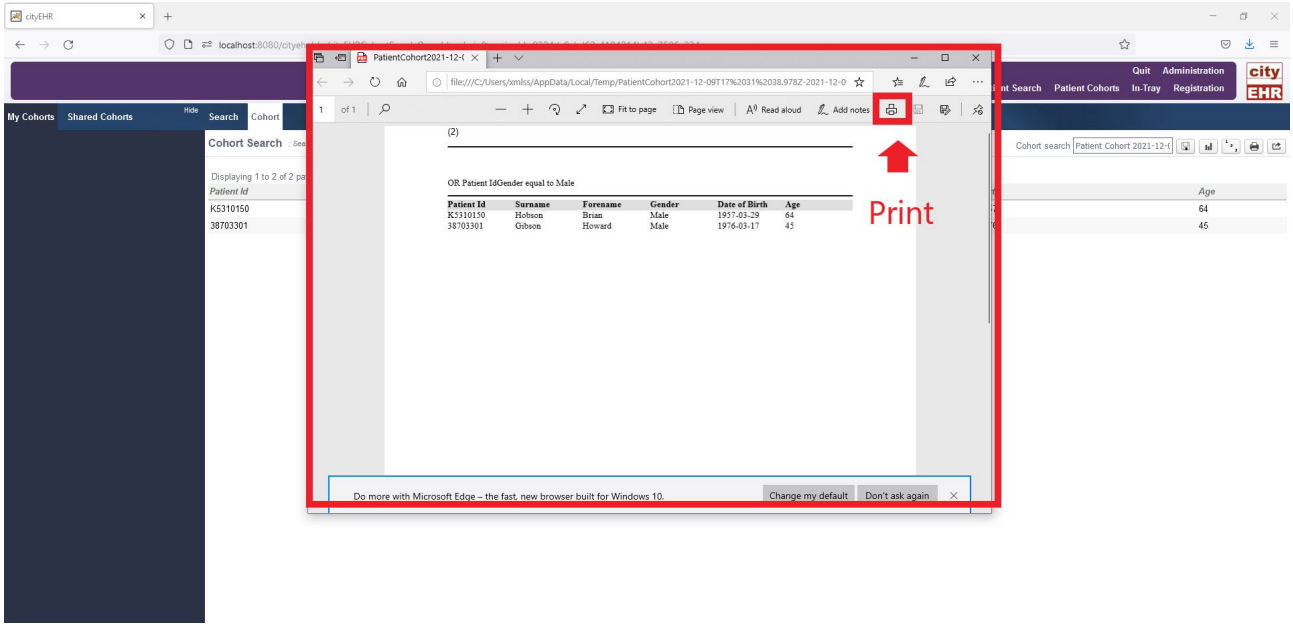
2. Navigate to the Cohort Tab and click the Print Icon to print cohort lists.

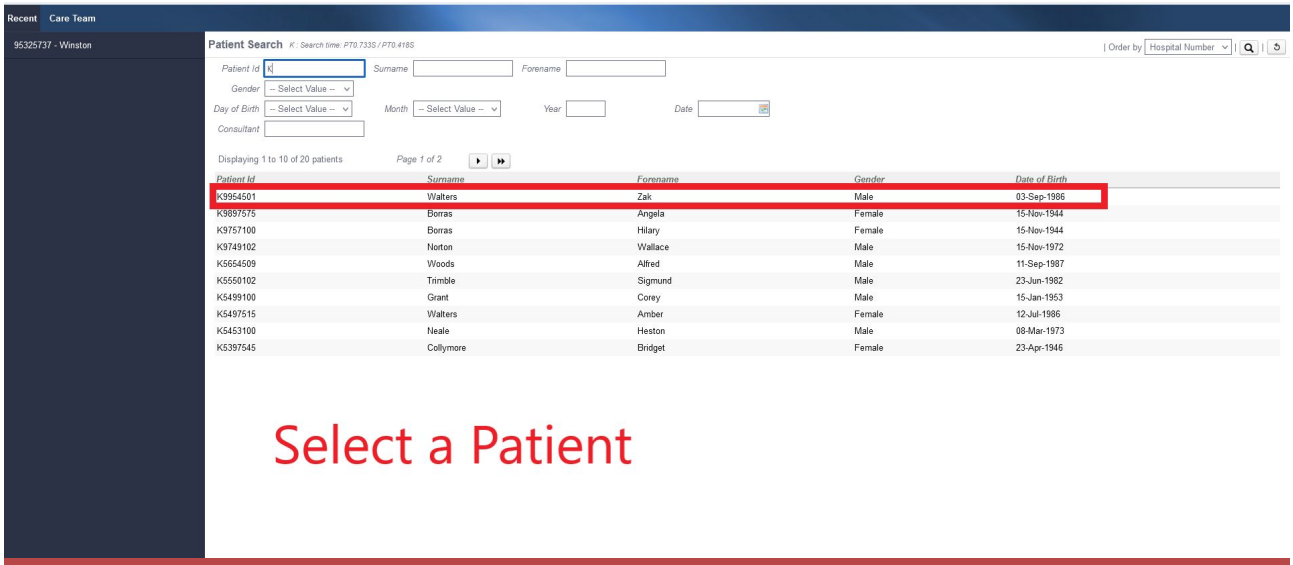


3. Click Open File and open with whichever application you would like.



4. Click Print.


Print
(2)
OR Patient IdGender equal to Male
Patient Id Surname Forename Gender Date of Birth Age
K5310150 Hobson Brian Male 1957-03-29 64
38703301 Gibson Howard Male 1976-03-17 45
Do more with Microsoft Edge – the fast, new browser built for Windows 10.
Change my default
Don't ask again
My Cohorts
Shared Cohorts
Cohort Search
Quit
Administration
Patient Cohorts
In-Tray
Registration



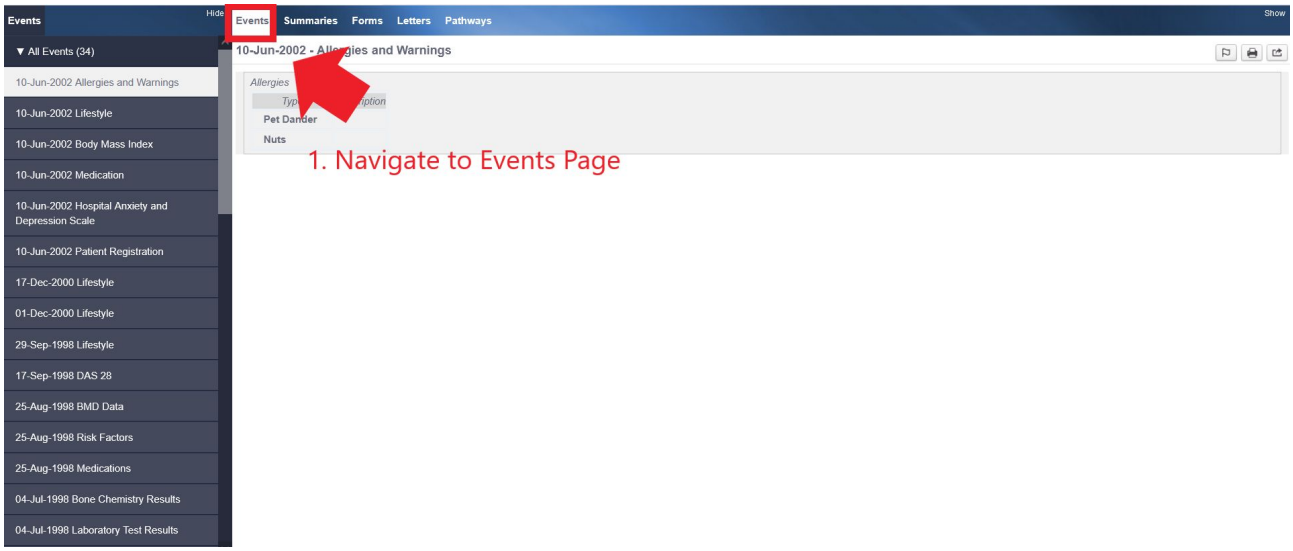
8. Exporting Patient Data from cityEHR

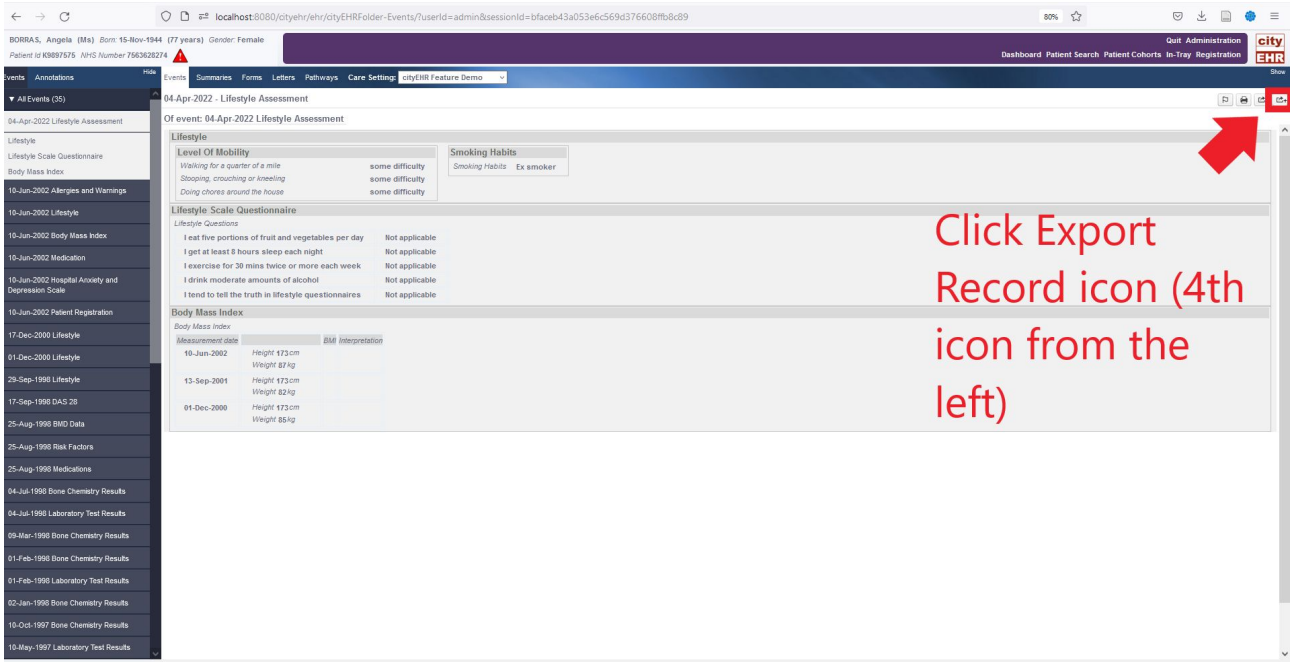
Patient data can be exported in a number of different formats for individual patients or for cohorts of patients found through the cohort search facility.

8.1. Exporting Data for an Individual Patient

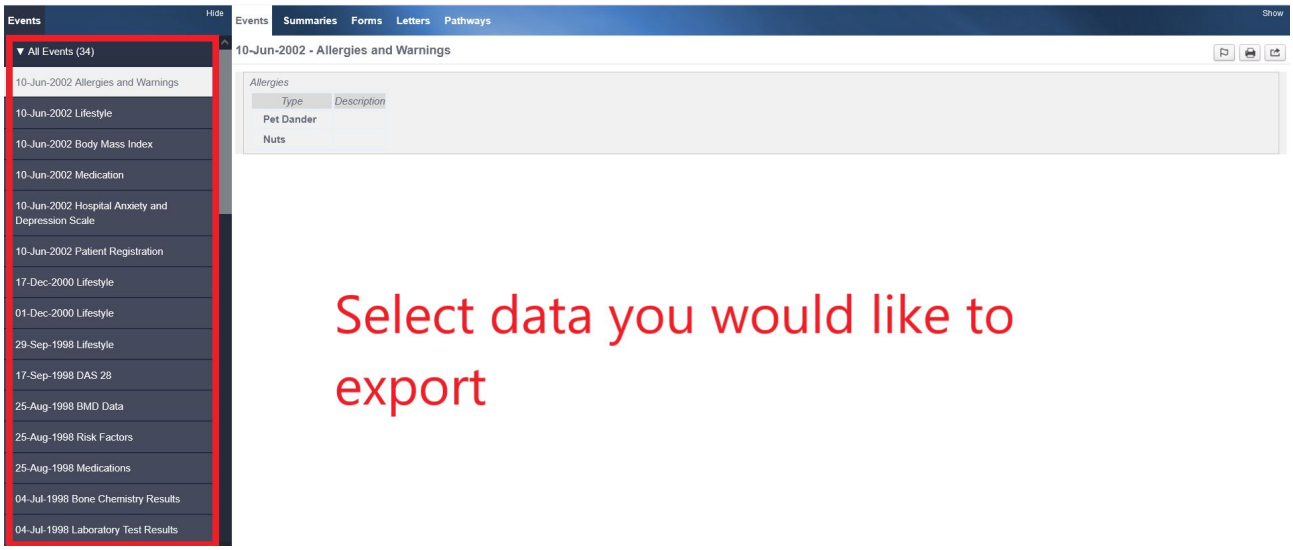
1. The full record for an individual patient can be exported from the patient Events page. Click on a patient in Patient Search for which you would like to export their record.

2. Navigate from the Summaries page to the Events page.





3. Select the Event you would like to export.



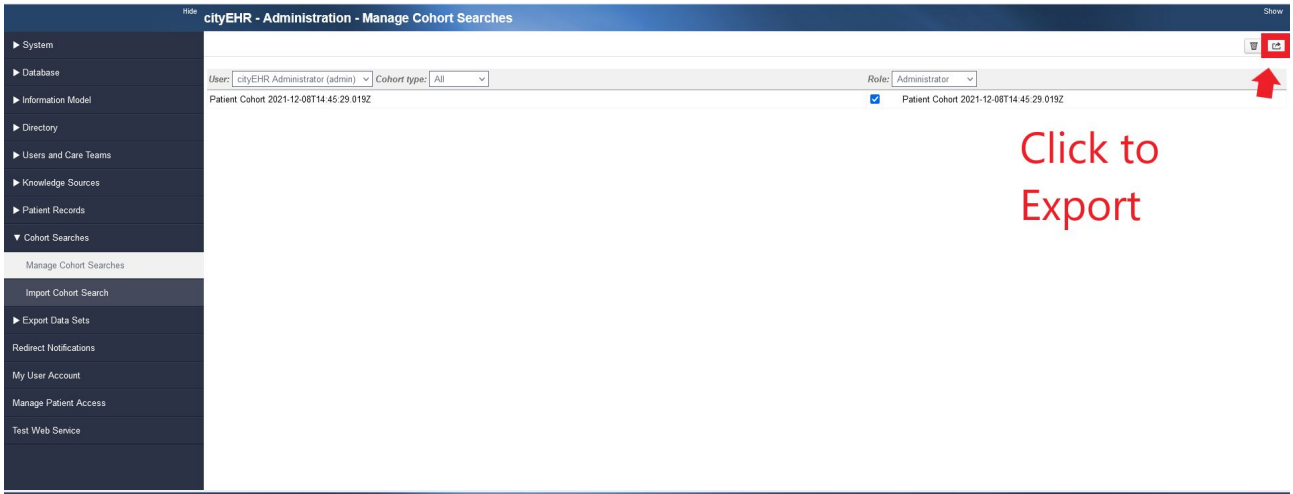
4. Click the Export Record icon to export the Individual Patient Data.

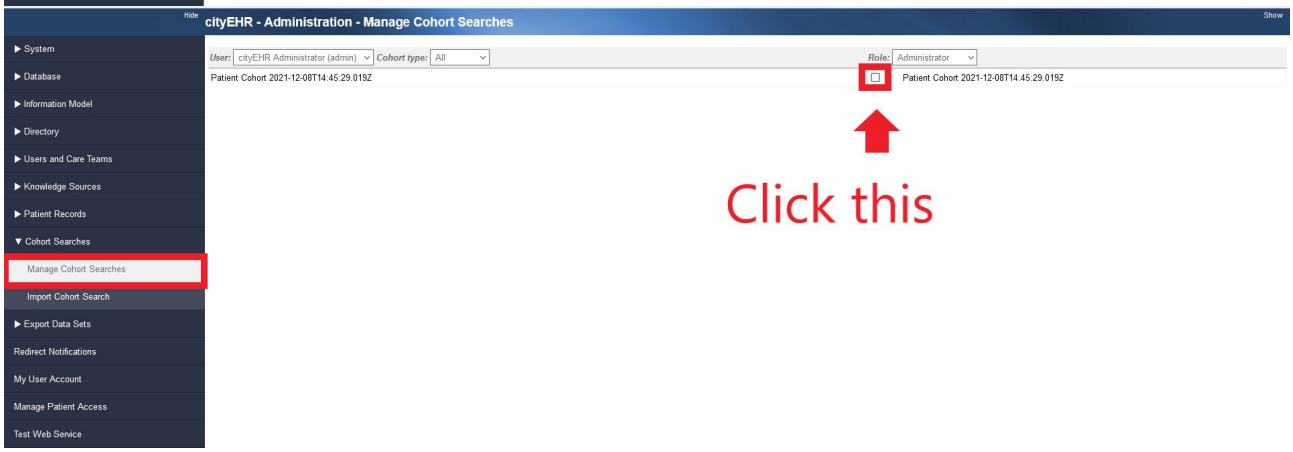
8.2. Exporting Data for a Cohort of Patients

Data can be exported in various formats for patient cohorts that have been formed as a result of cohort searches.

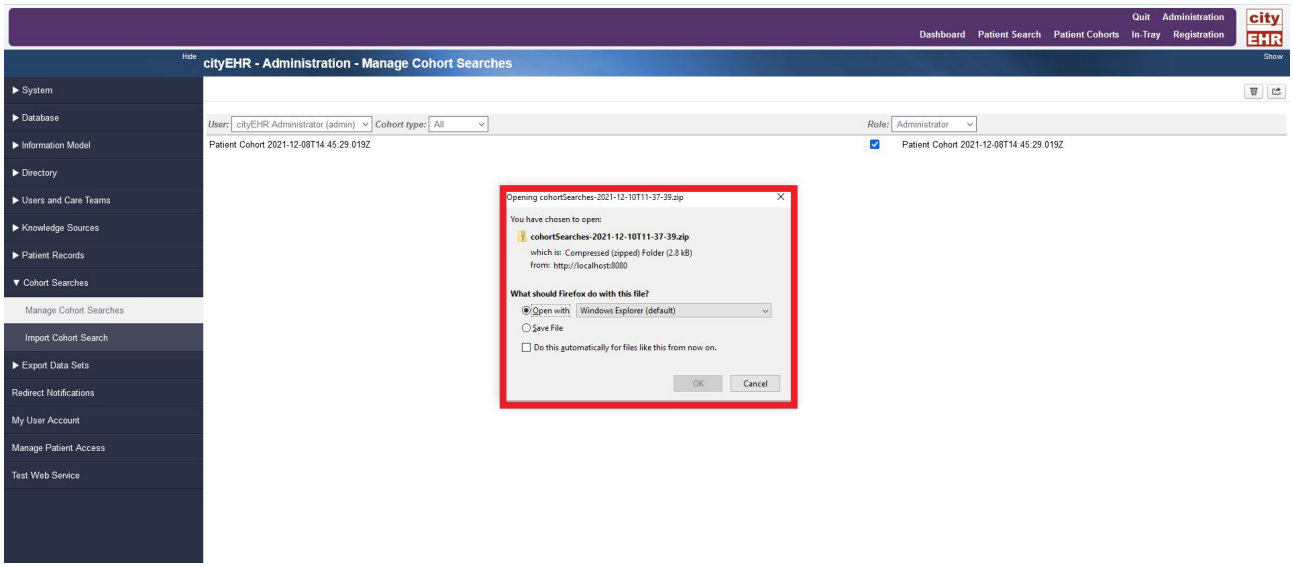
1. Navigate to Administration Screen in the Purple Dashboard.
2. Navigate to Cohort Searches in Menu on the Left of the screen and then click “Manage Cohort Searches”.

3. You will be able to see your saved cohort searches in the main display screen.
4. Click the box next to the Cohort Search you wish to export.

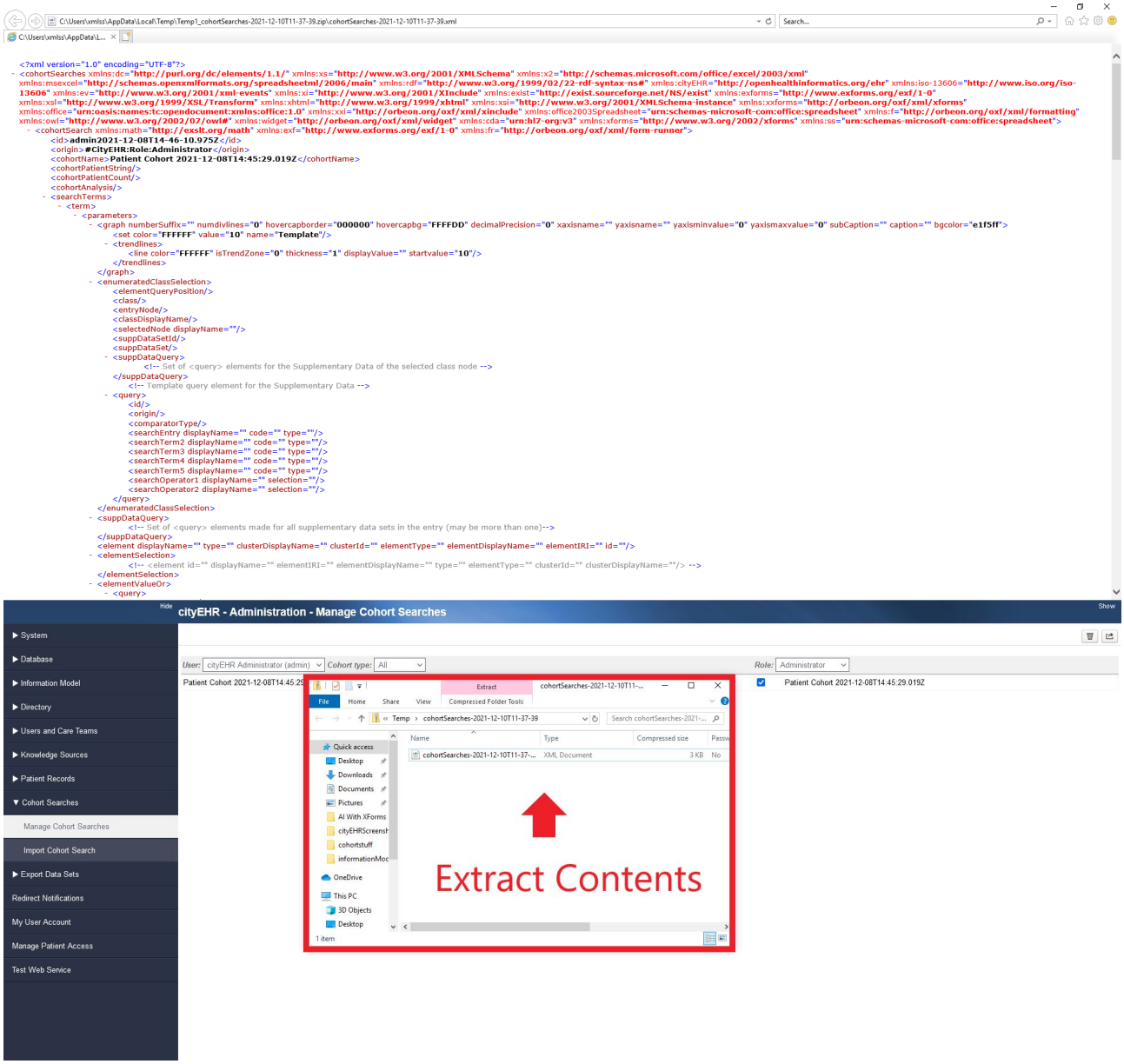




5. Now click the “Export” button that will appear at the top right of your screen.
6. A dialogue box will appear. You can save your Exported File or open with a Default Application



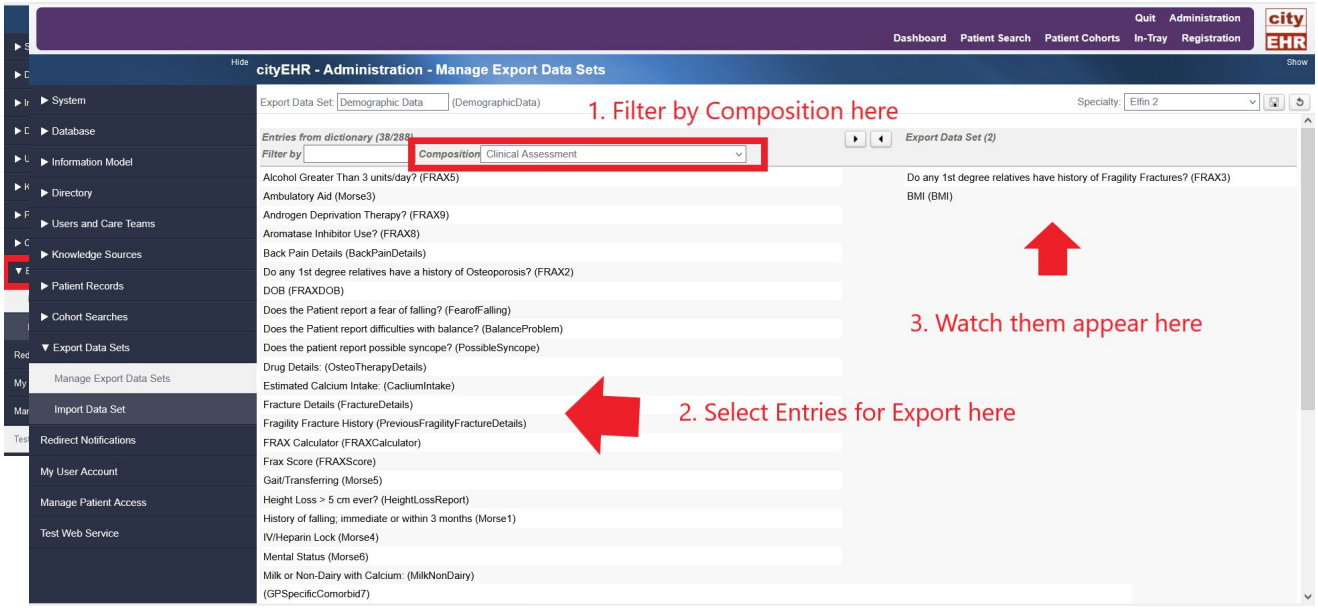
7. For this example, we will open with Microsoft Edge.



8. A dialogue box will appear that allows you to extract the xml contents. Extract the contents.
9. A new window will open with the xml of the exported data.

8.3. Export Data Sets

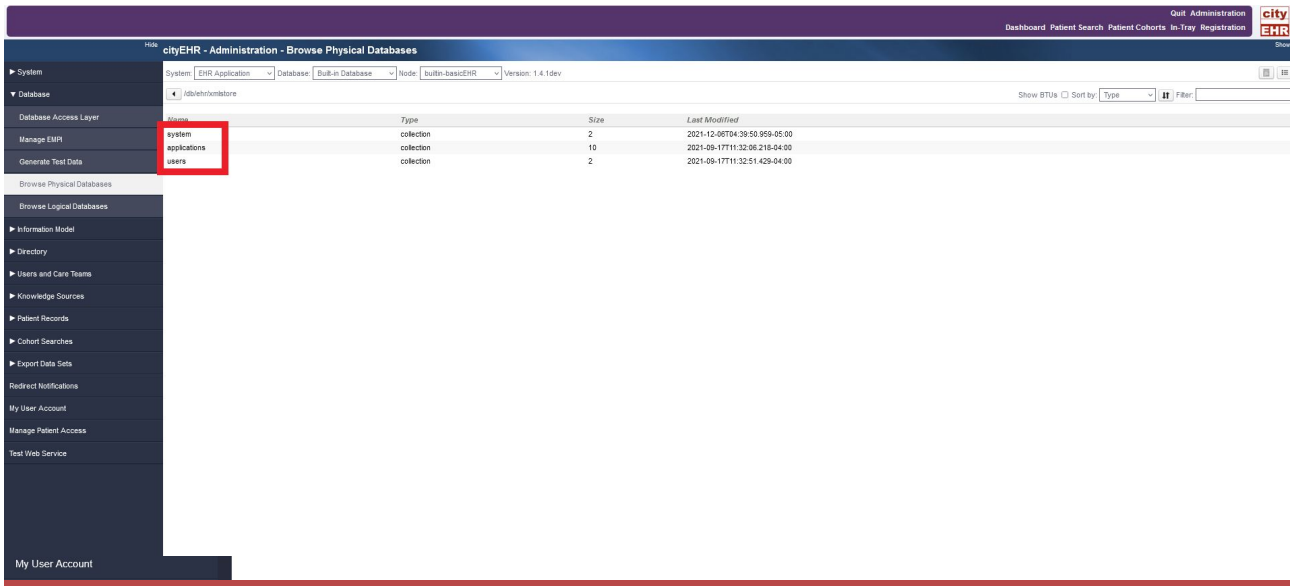
1. Navigate to Administration Screen in the Purple Dashboard.
2. Navigate to Export Data Sets in Menu on the Left of the screen.



3. Name your Data Set. See image below.

4. Select the Entries you want to add to your exported data set. They will appear on the column on the right. You can also filter the Entries by composition if you click the drop-down next to “Composition”.

5. Click the save button at the top right of the display window.



9. Inspecting the XML Store

The native XML database used in cityEHR can be browsed using tools in the Admin page. This can be useful for understanding how data are stored and can be used by administrators to remove information from the database.

The facility to remove data must be used with extreme caution, since it may invalidate the overall structure of the xmlstore and/or compromise patient records.

9.1. Browsing Logical Databases

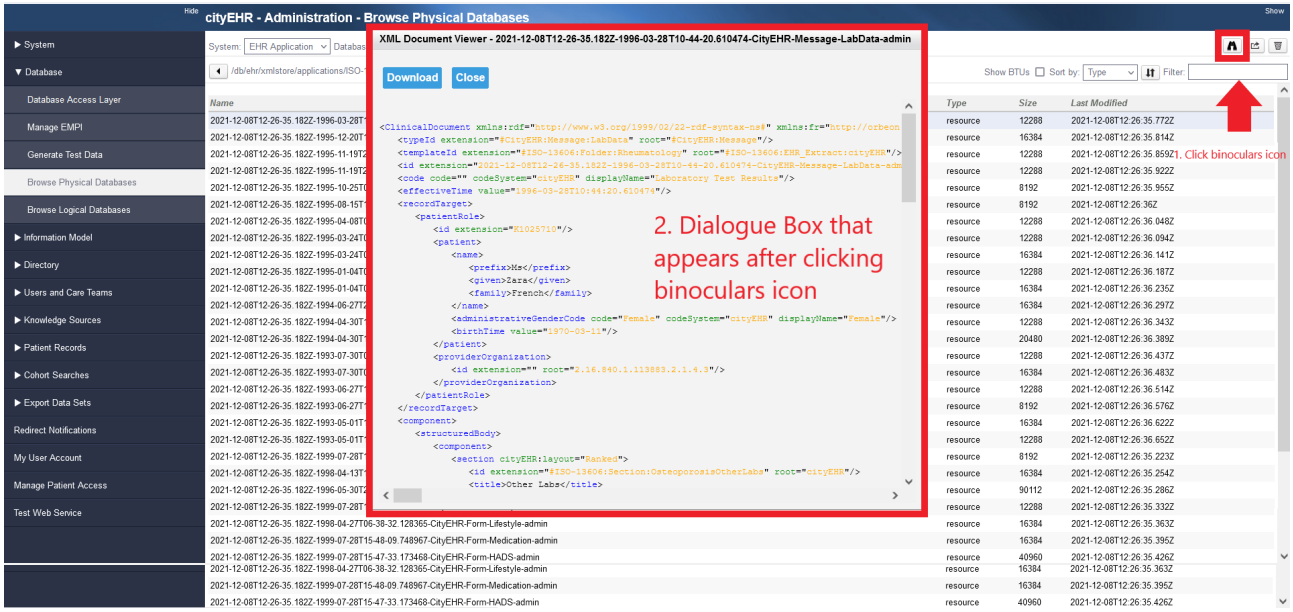
1. Open the Administration page and select Browse Logical Databases from the menu on the left hand side of the display screen. The logical database will show you all the databases as if they are part of one database. The physical database can show you different nodes within that database.

9.2. Browsing Physical Databases

1. Open the Admin page and select Browse Physical Databases from the list on the left hand side of the display screen.
2. There are two separate databases that can be used for the root of the browse:
    1. XML store - holds users and patient records for all installed applications
    2. Audit log - holds audit data for all users
3. Click on the database store you would like to browse. We will select xmlstore for this example.

4. The top level of the xmlstore database has collections for applications, systems, and users. Any cityEHR installation can support multiple applications and a single set of users each of whom has access to one or more of the applications.

5. Click on the *users* link and you will see a list of all users registered with cityEHR. If you are following these instructions for the first time then there will only be the default *admin* user and any that you imported or created in the steps above.
6. Click on the link for *admin* and the link *credentials* should be displayed; click on that. Now



click on the binoculars icon at the top right of the viewing panel.

7. You should now see an XML document in a new dialogue window on your screen. The XML document contains the details for that user.

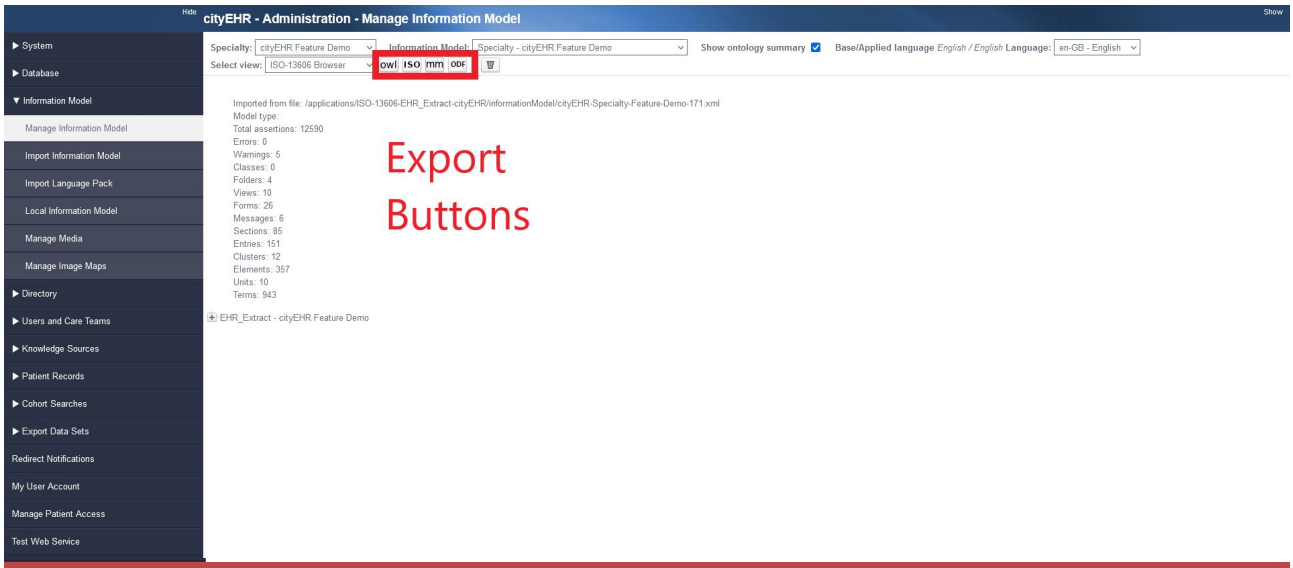
8. You can see the same XML for the user element that was contained in the users.xml file.
9. You can use the download the XML to view it in a notepad format.
10. Now return to the top level of the xmlstore by clicking the back button that is located just to the right of the database selection drop down (don't confuse this with pressing the back button in your web browser). See image below.

11. Click on the applications link, then the link for ISO-13606-EHR_Extract-cityEHR.
12. This should now show the top level collections for the default cityEHR application.

13. Click on the records link and you will now see a list of all patients with a record stored for this application. If you are following these instructions for the first time there will only be one patient with the id (Hospital Number) that you used to register the patient (e.g. 123456789).
14. Click on the link for a patient and you will see the list of timestamped compositions (XML documents in HL7 CDA format) that represent the events stored in that patient's record.

15. Click on one of the timestamps and then click on the binoculars and you should now see an HL7 CDA document for that event in a dialogue box on your screen.

16. You can continue exploring the database from the ISO-13606-EHR_Extract-cityEHR collection, looking at the contents stored for the informationModel (these are the OWL XML files that represent the models you imported) and the systemConfiguration which holds the templates for new forms. letters, etc as well as the full data dictionary for the application.



10. Manipulating the Information Model as an Ontology

Note: Skip all of Section 10 if you do not have access to Protege

10.1. Browse the Ontology in cityEHR

Move to the Administration screen by pressing the button in the top right corner of the screen. Then, move to Information Model in the Menu on the Left of the Screen. You should land on “Manage Information Model”. You will see a summary of the information models loaded for this installation (if not, press the selection to Manage Information Model in the left hand menu).

In the selection for Information Model, find the model for Specialty - cityEHR Feature Demo. This is the model that was driving the interaction with the cityEHR that you have just encountered.

The model is loaded to cityEHR as an ontology which you can browse by selecting “Feature Demo” from the Information Model drop down shown below. You can then expand the ontology by clicking the + sign. See image below.

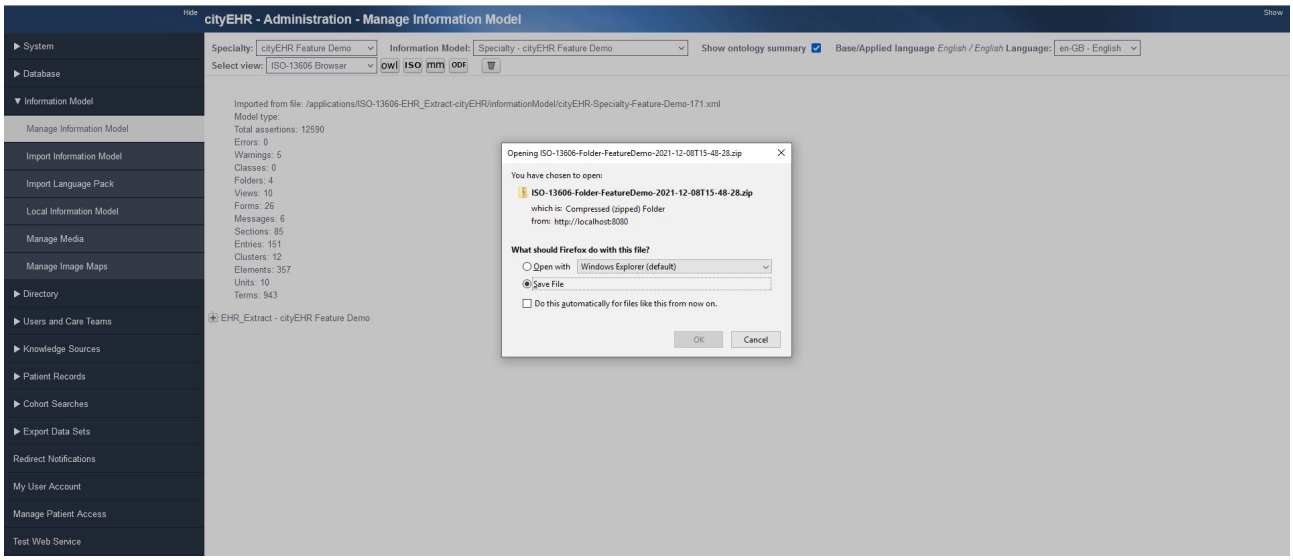
You can browse through the ontology by expanding the tree controls - you should see the Folders, Views, Forms, Sections and Entries for the screens you have already worked with. You can select any of the loaded models and browse either as ISO-13606, data dictionary contents, class hierarchies and class nodes, depending on the type of the model (specialty or class hierarchy).

10.2. Export the Ontology and Open in Protege

1. You can now export the ontology by pressing the Export button in the top right - this will take the ontology from the cityEHR database and return it to the browser as a zip file.

Click on the button that says OWL.

2. Save the file somewhere on your system, rename it to use a .zip extension and unzip to obtain the ontology (OWL/XML) file. If all has worked correctly, this file will be called export.xml. It is indeed an XML file, but it is in the OWL/XML vocabulary, so its useful to rename it to have a .owl extension.



You can now open this ontology with Protege. Start Protege and select to open an existing ontology, navigate to the unzipped ontology from above and it should open. If you have renamed your file with a .owl extension then you should also be able to open it in Protege by double clicking on it.

Select the Classes tab to take a look at the class hierarchy for the cityEHR architecture and then the Individuals tab to see the specific instantiation for the Feature Demo information model.

You will see classes that correspond to items in the ISO-13606 and HL7 CDA models, together with some additional classes that are specific to the cityEHR.

Select the Object Properties tab at the top of the window and expand the Top Object Property to show a list of all the object properties available in the cityEHR architecture. These are split into two sets, with names starting 'has' or 'is' - each named pair being the inverse of each other.

Now select the Data Properties tab at the top of the window and expand the Top Data Property to show a list of all the data properties available in cityEHR

10.3. Edit the Ontology

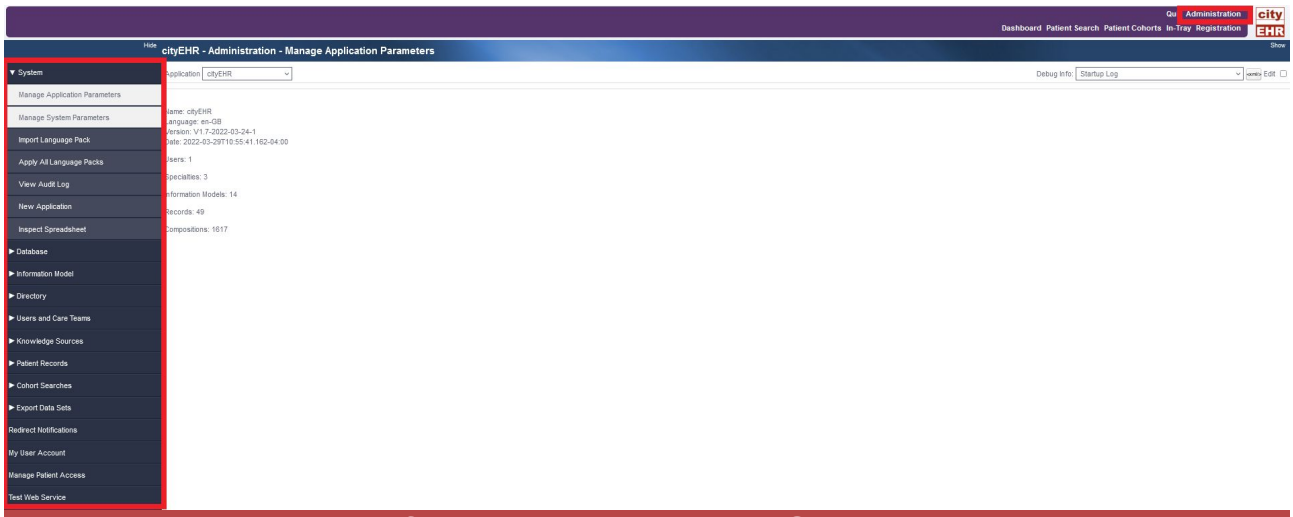
In Protege, try adding a new section to one of the forms and some new entries to the section. Save the file using Save As (in case you have made a mistake).

Your workshop instructor will guide you through these edits.

10.4. Load the Model to cityEHR

Return to the cityEHR Admin page and select Import Information Model form the left hand menu. Browse to you OWL/XML model and press Upload. Once the file has been uploaded you can then press the Import button. This will take a few seconds before displaying a summary of the model it has imported. If there are errors these will be reported and the model will not be loaded.

Once the model has loaded, return to the Patient Search screen, search for and select a patient then visit the form you changed in the model to see the changes.



11. Manipulating the Information Model as a Spreadsheet

Note: Skip this section if you do not have administrative access to cityEHR

If you have administrative access, your Administration Page will look like the one below:

Manipulating the information model as an ontology is quite difficult and it is easy to make a mistake. There are several underlying reasons for this:

- the atomic assertions in an ontology mean that two or three related assertions need to be made to specify fairly simple associations (for example, to create a section which has a title and two subsections will take at least six separate assertions)
- ontologies are used to classify and reason, but are not good for constraining users in the models they can create - we can easily find that a model is inconsistent, but its not so easy to prevent users from creating an inconsistent model in the first place.

To get around these issues, and to create tooling that clinical users are able to work with more easily, the information model for cityEHR can also be created and modified using a standard spreadsheet package.

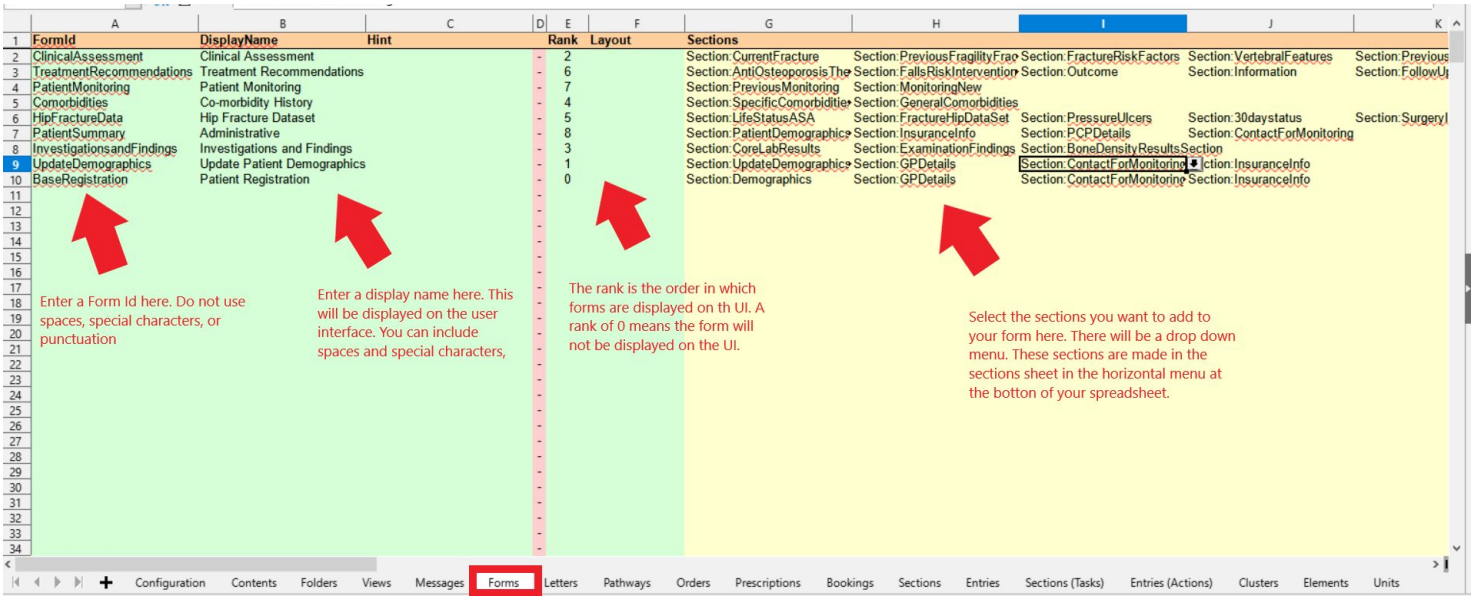
The open source Open Office spreadsheet is used to create a model in a way that is easier to control, in terms of the constraints that can be applied.

When the spreadsheet model is ready it is then saved as an XML file and is transformed from that to an ontology in OWL/XML format as it is loaded to the cityEHR.

1. Using Open Office, open the file cityEHR - Specialty - Feature Demo.ods in the information model directory of the materials
2. This is an open office spreadsheet set up with a cityEHR information model. It has about 20 sheets (see the tabs along the bottom left) and you will see that some of these correspond to components in the ISO-13606 model - Folders, Sections, Entries, Clusters, Elements
3. Other sheets correspond to particular types of Composition - Views, Forms, Letters, etc
4. We are going to use the spreadsheet to add our own new form to the information model.
5. To do this, move to the Forms sheet and enter details of the new form on one of the blank lines (don't insert a new line, just use one of the existing blank lines - the sheet should be protected to prevent you from inserting or deleting lines).
6. In the column called FormId enter an identity for your form - this must use only the characters a-zA-Z0-9 (i.e. no spaces or special characters, including dashes). The form will use the DisplayName you enter in the second column - this is the title of the form and can

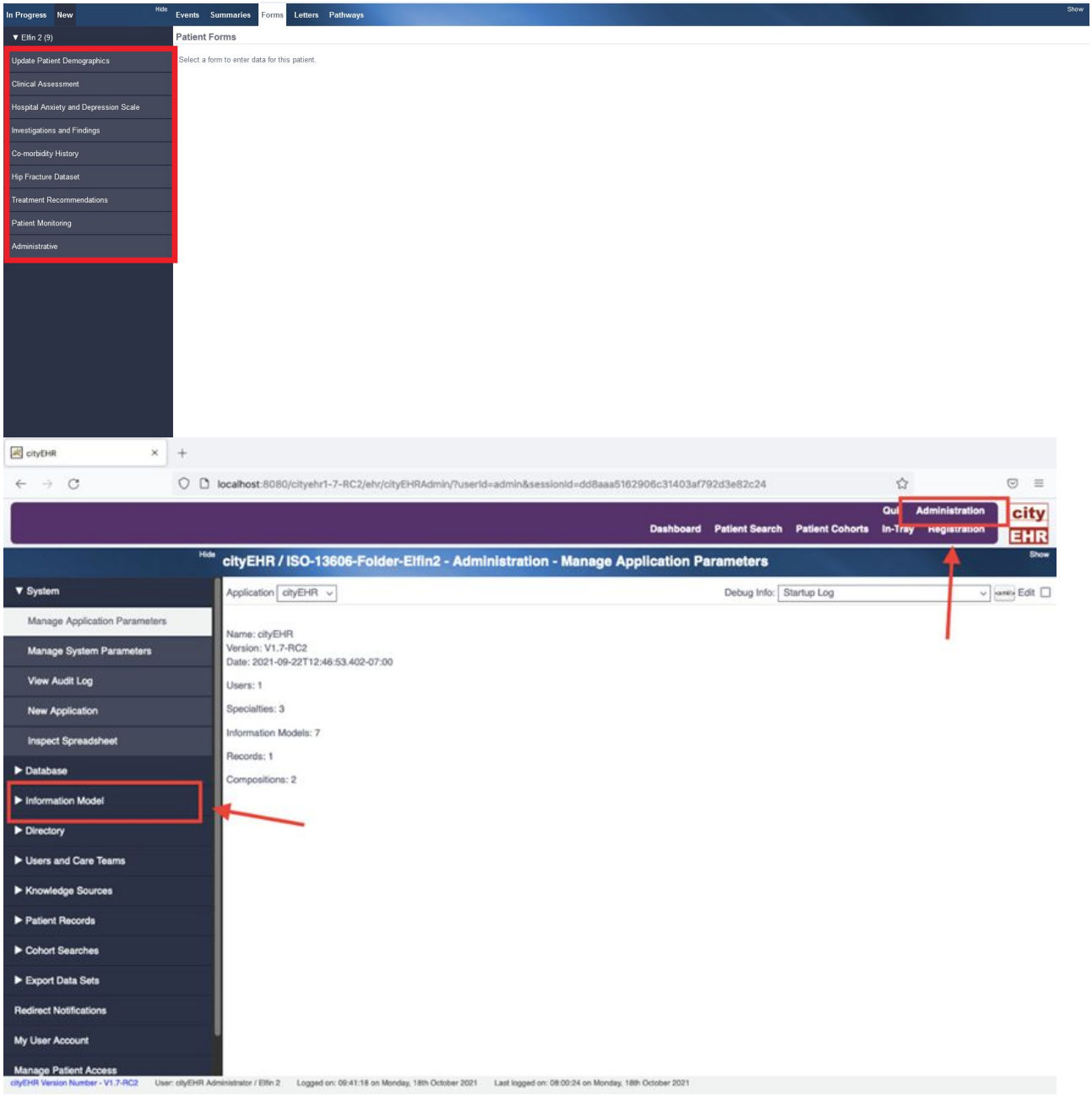
contain any characters, including spaces and special characters. We will set our FormID to TestForm and Display Name to Test Form so that it is easily identifiable in the interface.

7. The Rank column determines the order in which your form will be listed, relative to the other forms already defined - enter a low number to see it near the top of the list or a high

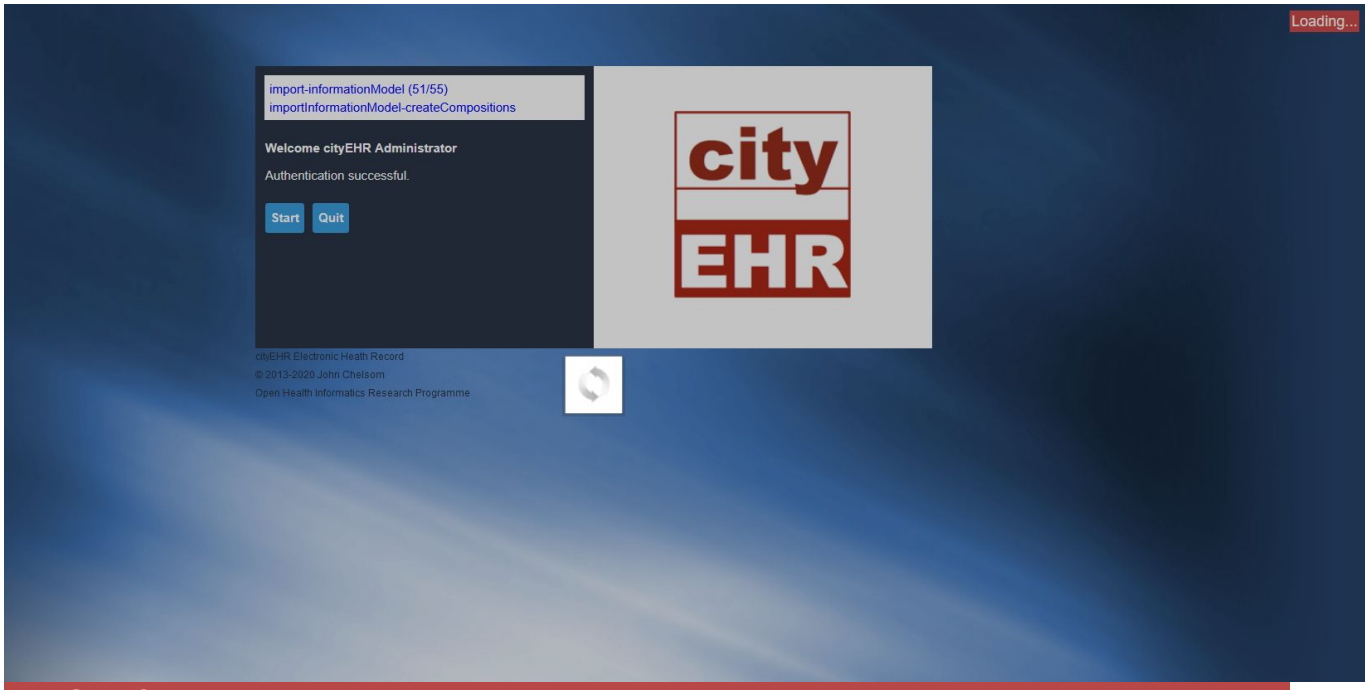


number to see it at the bottom

8. The fields that are buff coloured and headed Sections are where you can select the sections that will appear on your form - you pick these from the drop down lists in each field. Sections will appear on your form in the order in which they are listed here.
9. The sections in those drop down lists come from the Sections sheet. You can move there to see how sections are defined in a similar way to Forms. You can add a new section here and add Entries to it, in the same way that you added sections to a form.
10. In the Entries sheet you can add new entries, each with a list of elements as contents. Finally, you can defined elements on the Elements sheet, with their data types, including lists of enumerated values, if required.
11. Once you are happy with your changes save the spreadsheet under a new name (its important to do this in case you have made a mistake and need to revert to the previous version).
12. Having saved the new spreadsheet you now need to save it again, but this time in XML format. To do that use Save As and select in the File type dialogue at the bottom of the screen for Microsoft Excel 2003 XML (.xml) - note that this option may be scrolled off the bottom of the list of file types when you first select the list.
13. The save as XMl will take about 30 seconds. Once successfully saved, make sure you close the spreadsheet since it is now in XML format and any additional changes you make to it will not be properly recorded in the spreadsheet. (to make further edits, reopen the .ods file and re-save as XML when you are done).
14. Back in the cityEHR interface, navigate to the Admin page and select Import Information Model from the list of selections on the left.



15. Browse to the XML model you have just created and press to open it. The file will now be 'uploaded' to the cityEHR server. Once that has completed, an Import button will appear on the right of the display screen.
16. Press the import button and wait for the model to import to the database. This may take between 20 seconds and a couple of minutes, depending on the power of your machine.
17. Once completed, you will see a summary of all the processing that has been made, including lists of an errors found in your model.
18. If the model loaded successfully you can now navigate to the Patient Search page, find a patient, select Forms and you should see your new form available in the list of forms to create.



12. Configuring a Runtime Application

There are two types of applications you can create. You can either create a new one from scratch, or one that is shipped with cityEHR (like Elfin, Elfin2, or Ponseti). Instructions for making a New Application can be found in Section 13.1, and instructions for making an application that is shipped can be found in Section 13.2

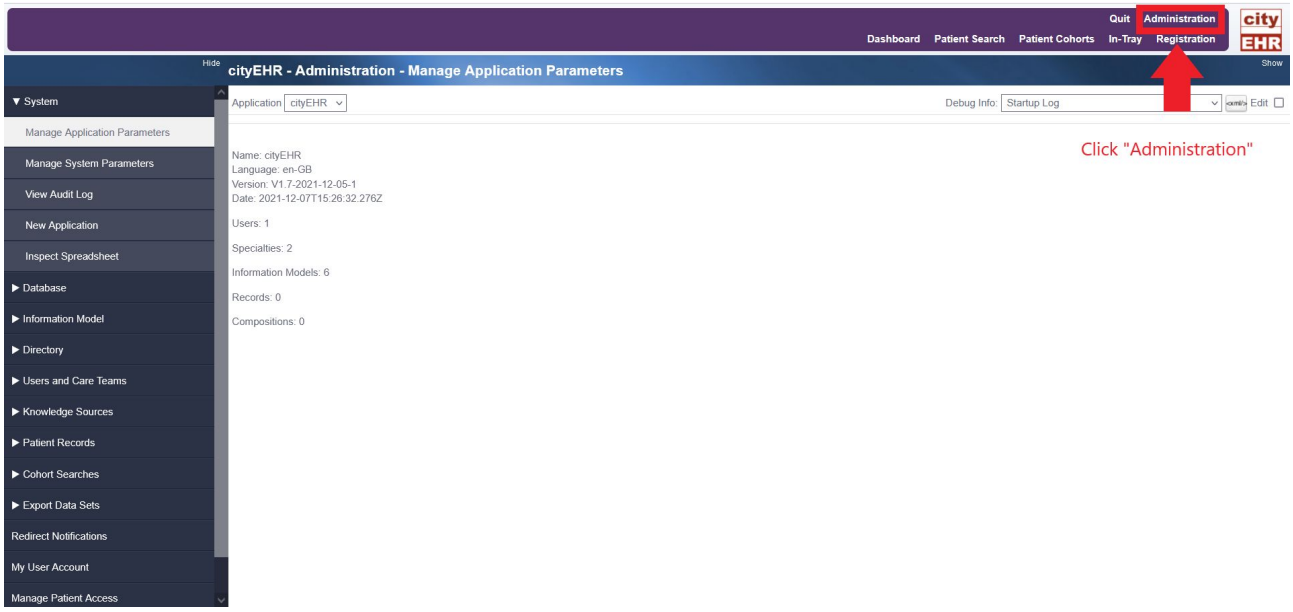
12.1. Creating Your Own cityEHR Application – New Application

These instructions assume you are making an application with the identifier myEHR. Note that this identifier can contain upper/lower case characters and digits but no spaces.

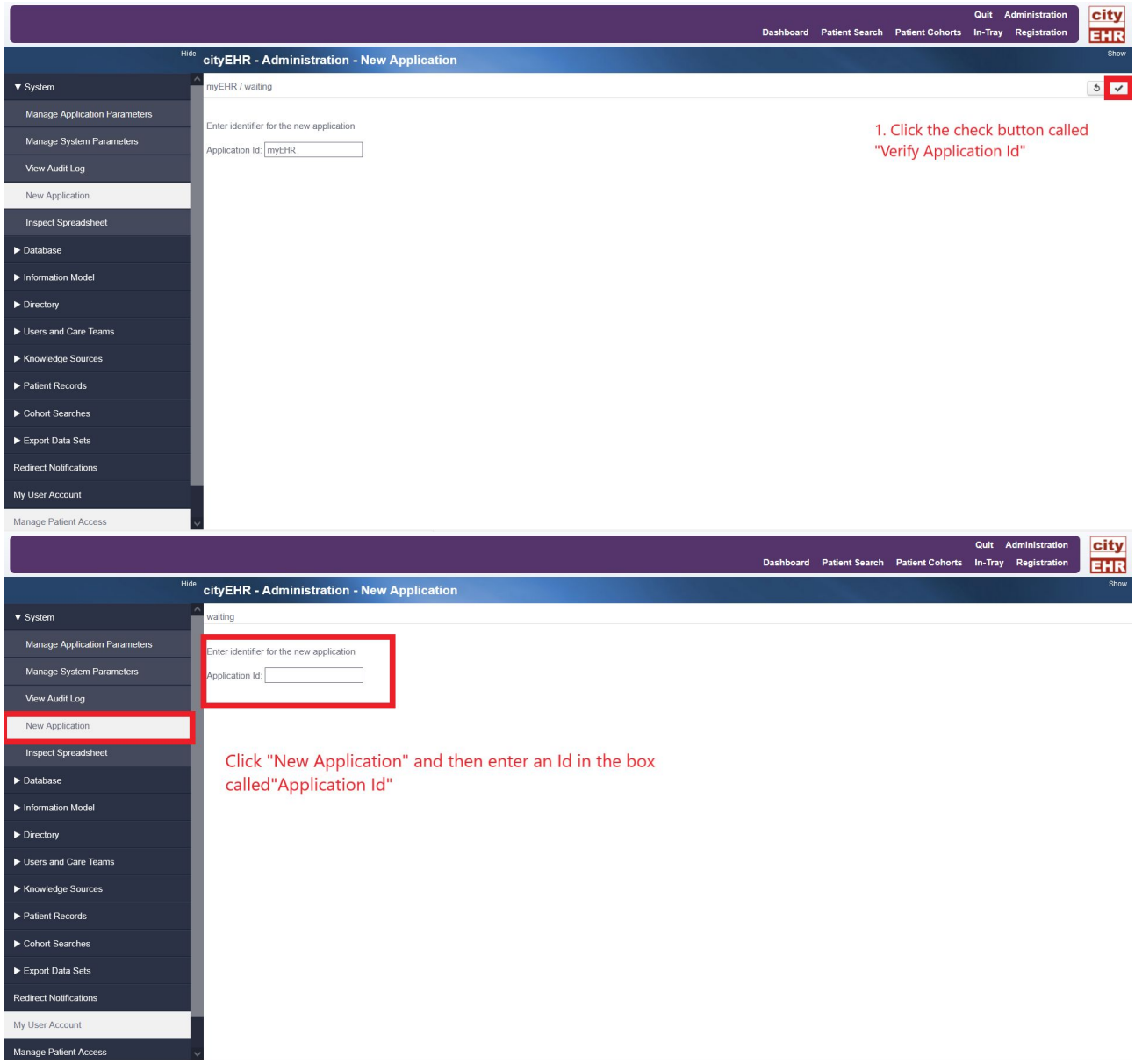
1. Navigate to cityEHR Log-in Page
2. Enter user credentials. If you are starting from a blank database, the admin page will take a while to load. For this initial log-on, you will have to authenticate with username: user and password: password. This log-on may take some time as the system builds the application. Your screen may look like this:

3. Click "Start"

5. Navigate to the Administration Page at the top right of the screen next to “Quit”. Click “Administration”.



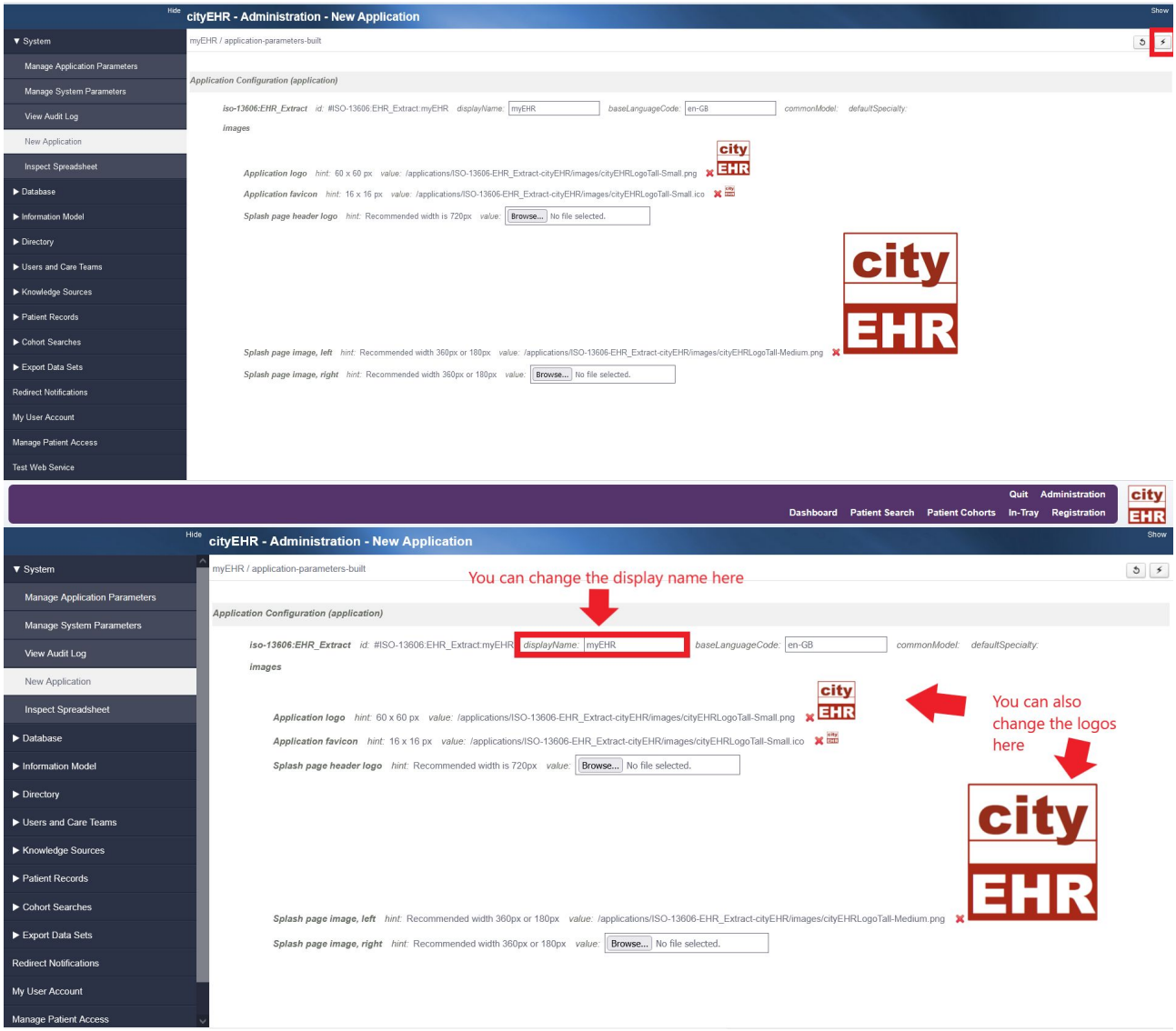
6. Now navigate to and click on “New Application” in the menu left of the screen underneath “Manage Application Parameters”. See below.



7. Now enter an Application Id. For this exercise, we will name the Application Id “myEHR”. Ids can be made up of upper and lower case characters a-z, digits 0 to 9, and dashes (-) or underscores (_). There cannot be spaces in the Id. Some installation Ids have configurations shipped with the cityEHR installation and if you pick one of those Ids it will install that configuration for you. if you pick a new Id, then it starts from scratch. myEHR will be our new Id for this exercise.

8. Now click the button that has a lightning bolt on it at the top right of the screen. See image below. This button creates your application.

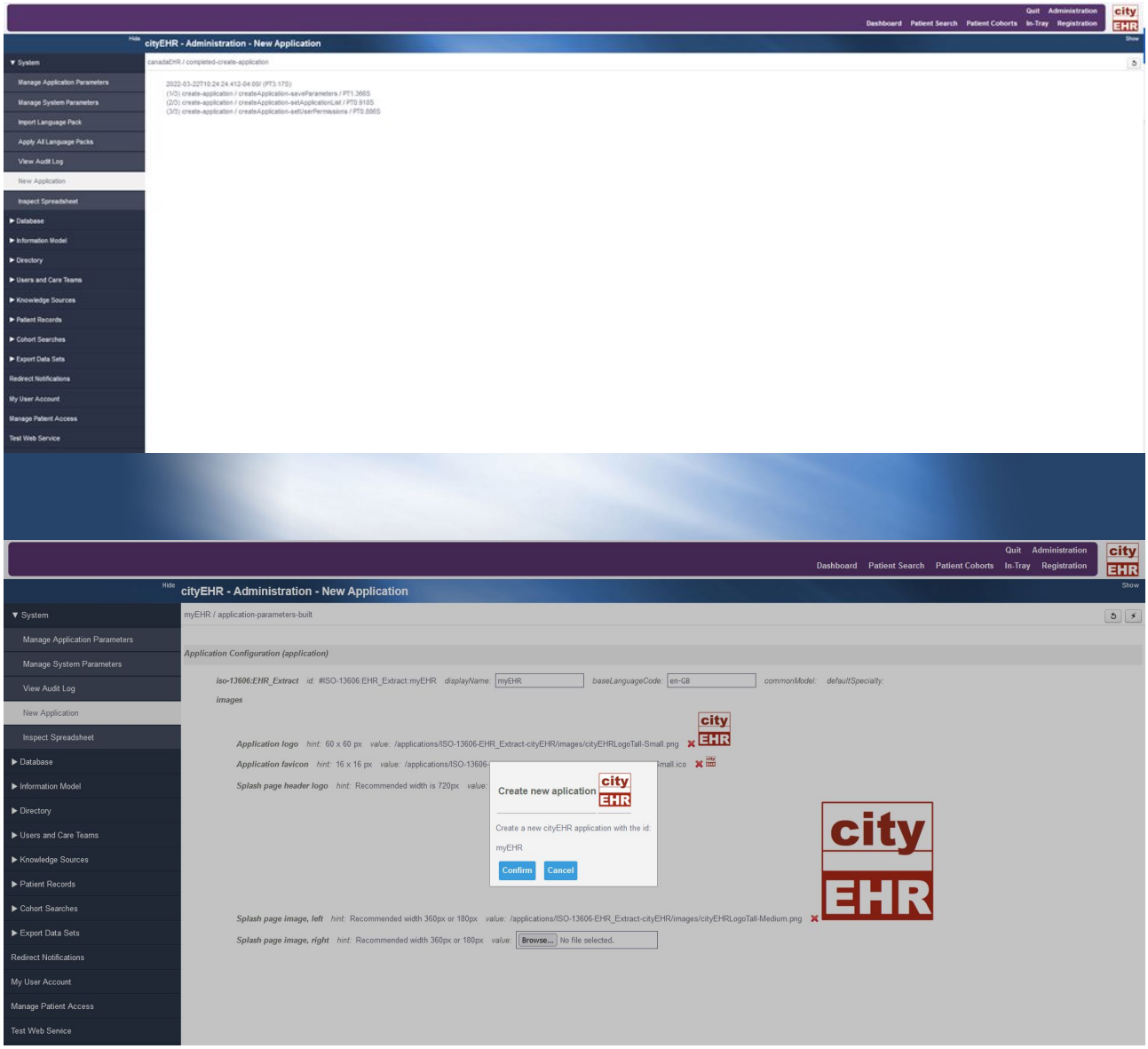
9. If this ID has never been used before, your screen will look like this:



10. You can change the display name of your new application and change the logos.

11. Once you are finished changing the display name and logos (if you want), you can now click on “Create New Application ID”. See image below.

12. A Dialogue Box will appear. Click Confirm.



13. cityEHR will now create your new application. This may take a few moments. Your screen should now look like this, with three completed steps:

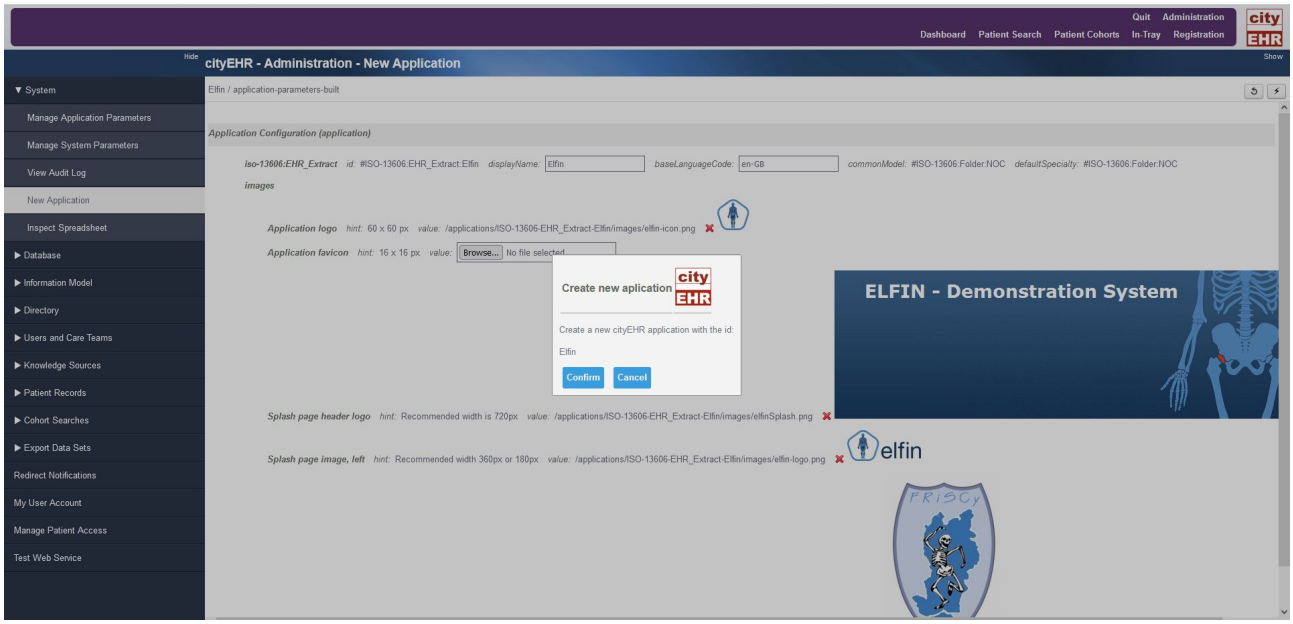
14. Once cityEHR has finished creating your application, navigate to “Quit” in the Purple Dashboard.

15. On the log-in page, you should now be able to select your new application in the drop-down menu.

16. your application will be “empty” until you create, configure, and import an information model for your application. Navigate to section 13 called “Manipulating an Information Model” for instructions on how to do this.

12.2. Creating a Shipped Application

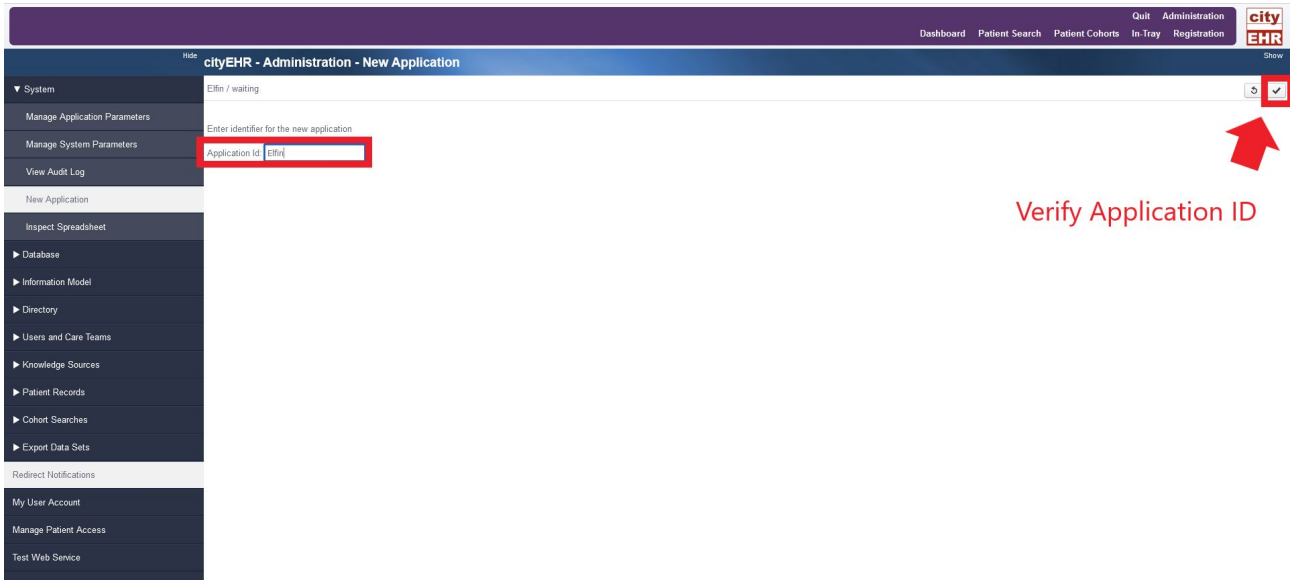
This section will teach you how to create an application that ships with cityEHR, such as Elfin or Elfin2. For this example, we will create an application with the id Elfin.



1. Navigate to Administration page and then to “New Application” under “System” in the menu on the left of the screen.

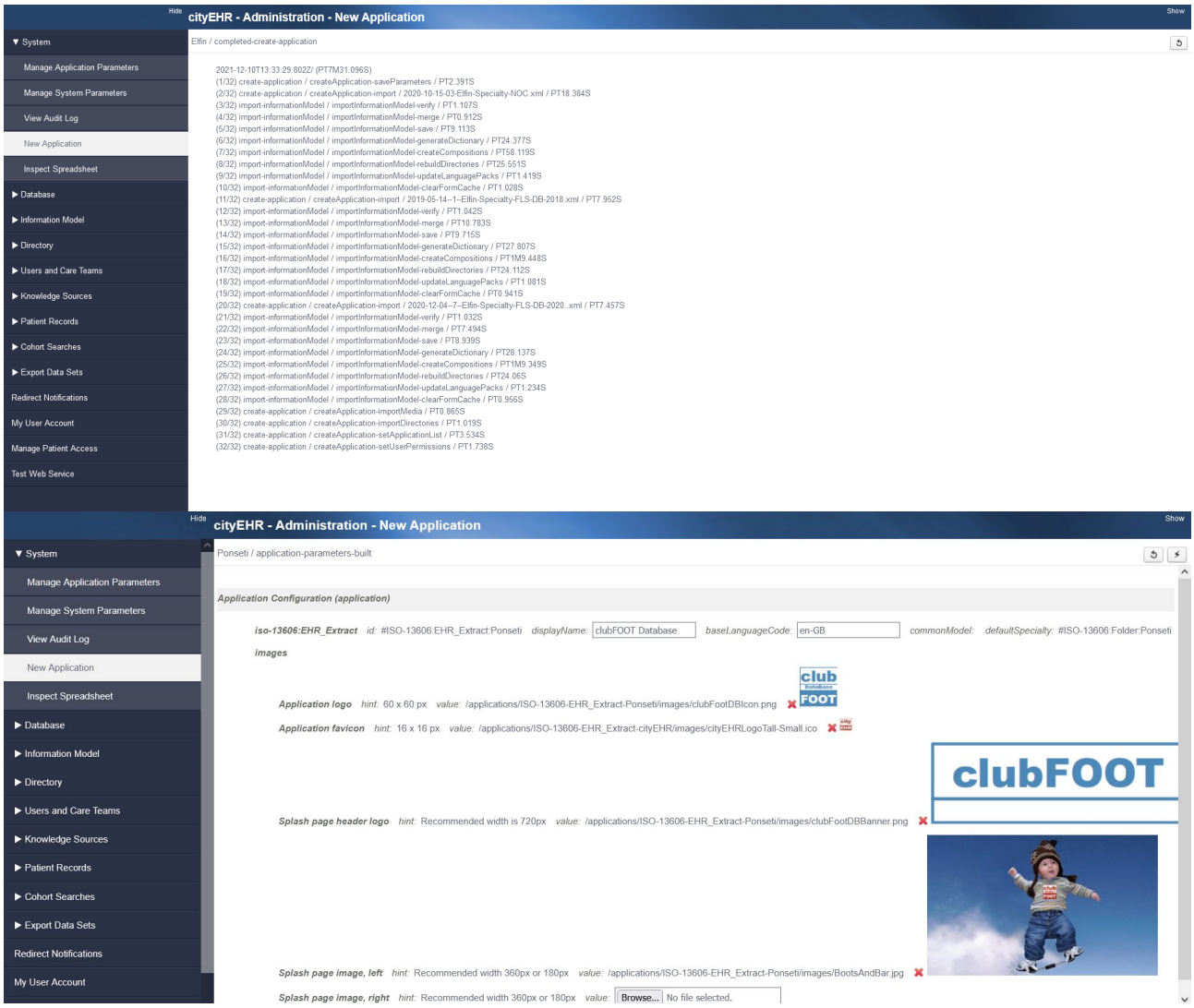
2. Enter the shipped application id “Elfin” or “Elfin2” or “Ponseti”. For this exercise, enter the application ID “Elfin2”.

3. Click “Verify Application Id” (the check mark icon) in the top right of the display screen.



4. Your screen should now look like the one below if you have typed in Elfin2.

5. If you have typed in “Ponseti” as the application ID, your screen will look like the one below.



These are two applications that ship with cityEHR that can be created in your local database.

6. Now click “Create New Application” (lightning bolt icon) and wait for it to load. This may take a few minutes.

7. Once it has finished creating, navigate to Quit in the Purple Dashboard
8. You should now be able to select “Elfin 2” as an application from the log-in page
9. Click Start and you will be navigated to the startup home page for Elfin2.

12.3.

12.4.

12.5.

12.6.

12.7.

12.8.

12.9.

12.10.

12.11.
12.12.
12.13.
12.14.
12.15.
12.16.
12.17.
12.18.
12.19.
12.20.

13. Creating an Information Model

13.1. 13. 1 Creating and Configuring the Information Model

The information model for your EHR application can be created in a spreadsheet by copying the model for the default cityEHR application that is found in the files:

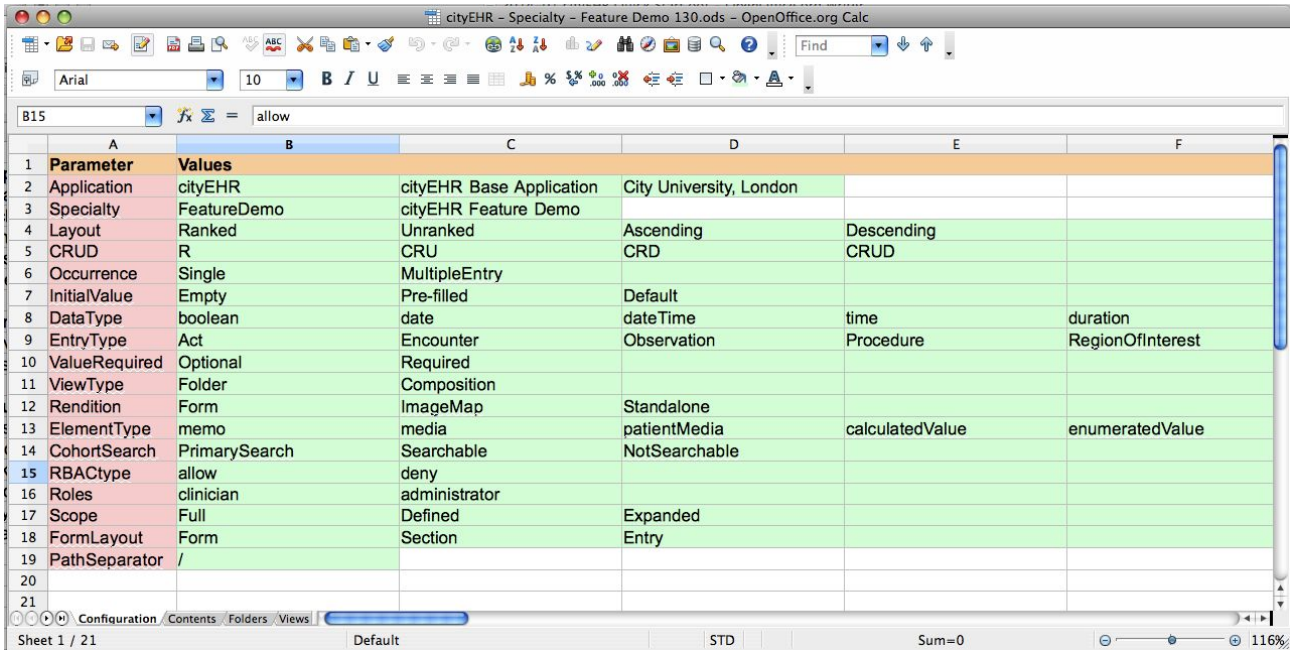
cityEHR - Specialty - Feature Demo

cityEHR - Class - Diagnosis

cityEHR - Class - Drugs

cityEHR - Class - LabTest

All four spreadsheets have a Configuration sheet at the front which looks as follows:

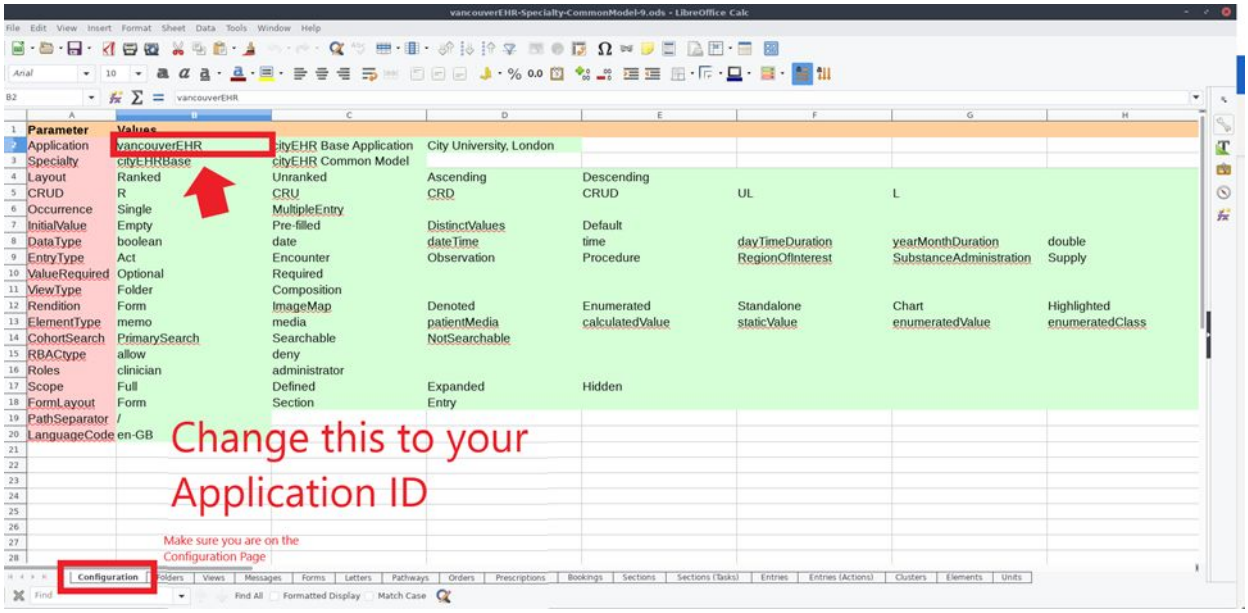


	A	B	C	D	E	F
1	**Parameter**	**Values**				
2	Application	cityEHR	cityEHR Base Application	City University, London		
3	Specialty	FeatureDemo	cityEHR Feature Demo			
4	Layout	Ranked	Unranked	Ascending	Descending	
5	CRUD	R	CRU	CRD	CRUD	
6	Occurrence	Single	MultipleEntry			
7	InitialValue	Empty	Pre-filled	Default		
8	DataType	boolean	date	dateTime	time	duration
9	EntryType	Act	Encounter	Observation	Procedure	RegionOfInterest
10	ValueRequired	Optional	Required			
11	ViewType	Folder	Composition			
12	Rendition	Form	ImageMap	Standalone		
13	ElementType	memo	media	patientMedia	calculatedValue	enumeratedValue
14	CohortSearch	PrimarySearch	Searchable	NotSearchable		
15	RBACtype	allow	deny			
16	Roles	clinician	administrator			
17	Scope	Full	Defined	Expanded		
18	FormLayout	Form	Section	Entry		
19	PathSeparator	/				
20						
21						

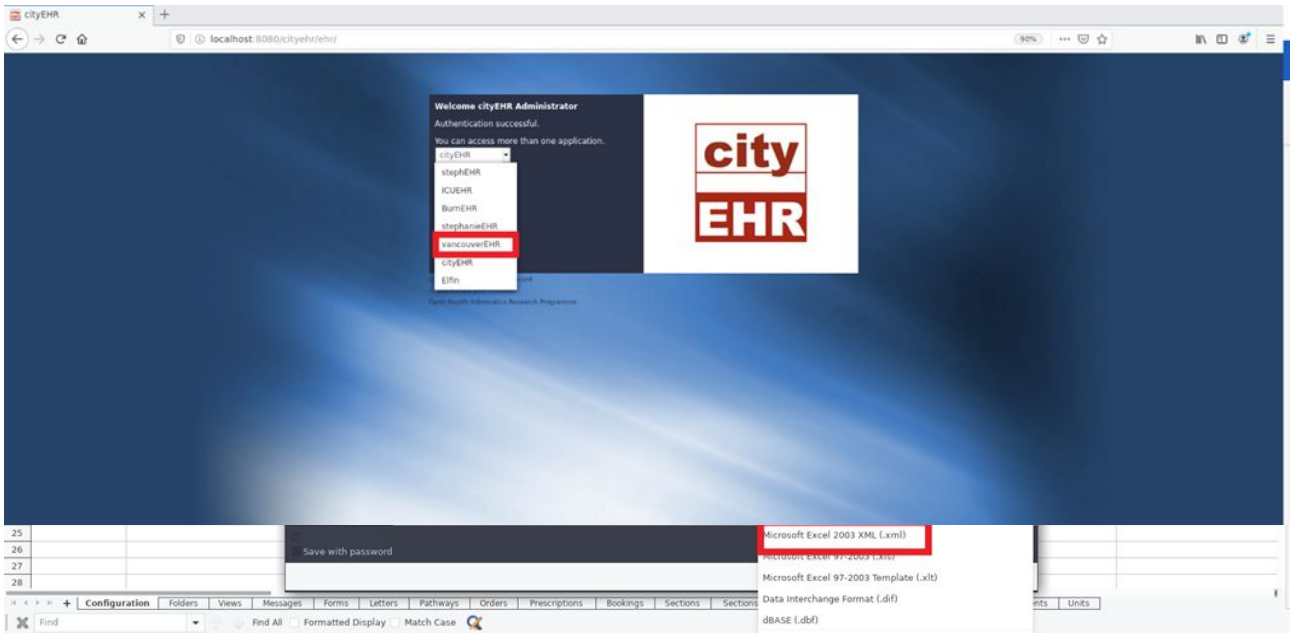
1. To begin doing this, open the cityEHR webapps folder

2. Navigate to the following folder: webapps/cityehr/WEB-inf/resources/apps/ehr/resources/applications/ISO-13606-EHR-Extract-cityEHR/informationModel

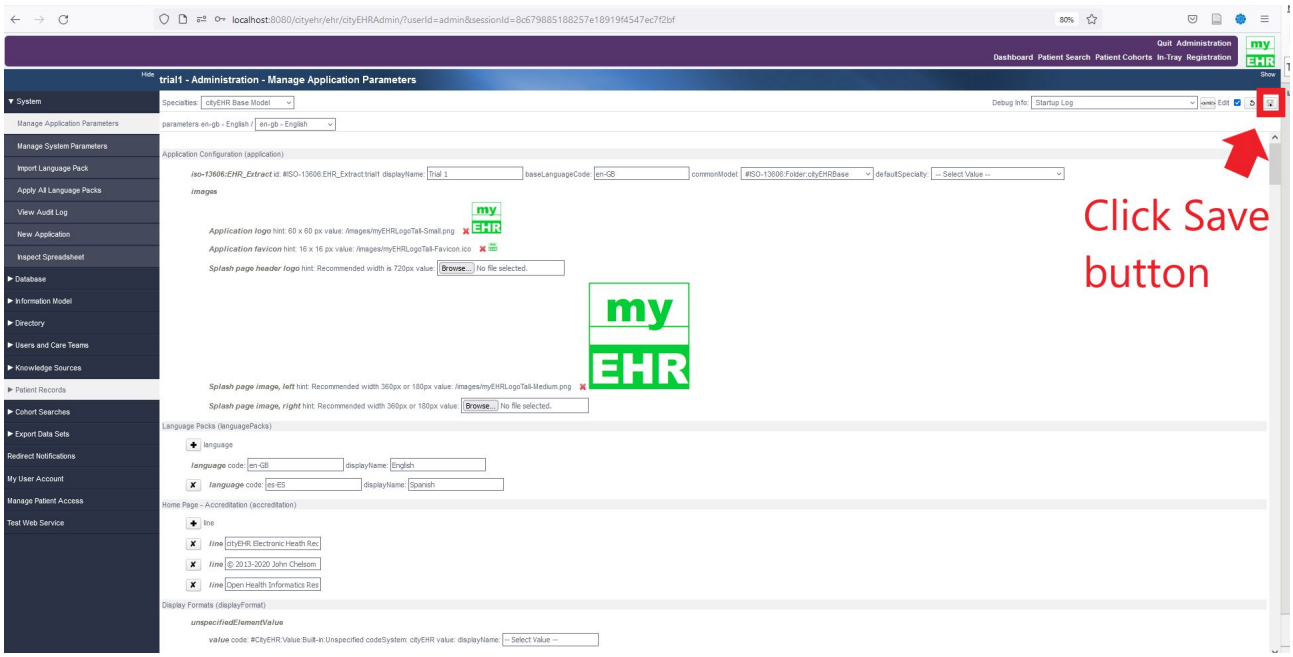
3. You should land on the page above
4. Open the file named: Open the file named cityEHR-Specialty-**CommonModel**.
5. Go to File → Save a Copy → Rename it to your applicationId-CommonModel
6. Save your copy somewhere convenient.
7. **Close the original cityEHR-Specialty-CommonModel**
8. Open the copy you have saved at the location you saved it in.
9. Change the ApplicationId on the Configuration page to exactly match the ApplicationId you assigned your new application. This is found on Line 2, Cell B on the Configuration Sheet (1st sheet).

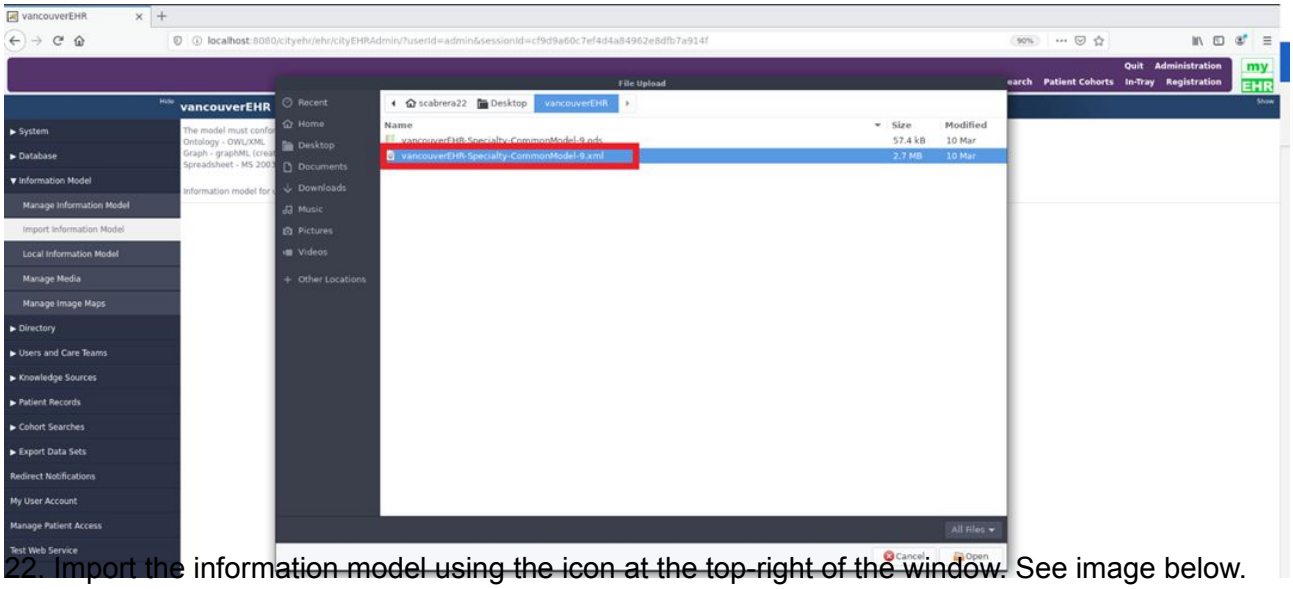


10. Save your changes (File → Save)
11. Now, navigate to File ---> Save As --> keep the name the same --> change the format to .xml under “All Formats” in the bottom right of the pop-up window. See image below.



12. Close your windows
13. Open cityEHR back up.
14. Log-in using the same credentials
15. Now navigate to your EHR. This should be added in the drop-down under “You can access more than one application”
16. Click Start
17. Navigate to Administration
18. Navigate to Information Model --> import information model on the menu on the left-side of the screen
19. Click Browse
20. Find the .xml file you just saved. Note: It will not work if you don’t select the .xml file
21. Select the .xml file



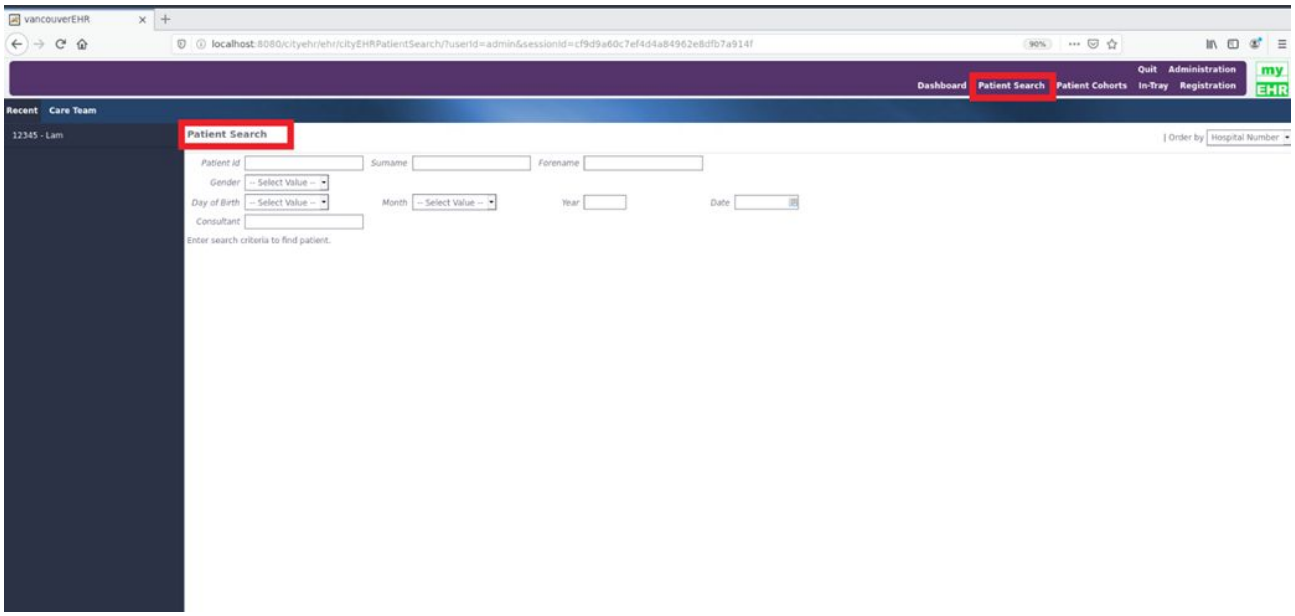


22. Import the information model using the icon at the top-right of the window. See image below.

23. You should now land on a page that shows you the completion of 8 steps.
24. Navigate to Quit.
25. Log back into your application.
26. Navigate to Administration
27. Navigate to Application Parameters found in the menu on the left-hand side of the screen.
28. Click “Edit”
29. Navigate to the “commonModel” option on the screen and ensure that the option #ISO-13606:Folder:cityEHRBase is selected (see screenshot below)
30. Click Save
31. Navigate to Quit
32. Log back into your application
33. Navigate to Patient Search and Registration in the top-right fo the screen on the purple

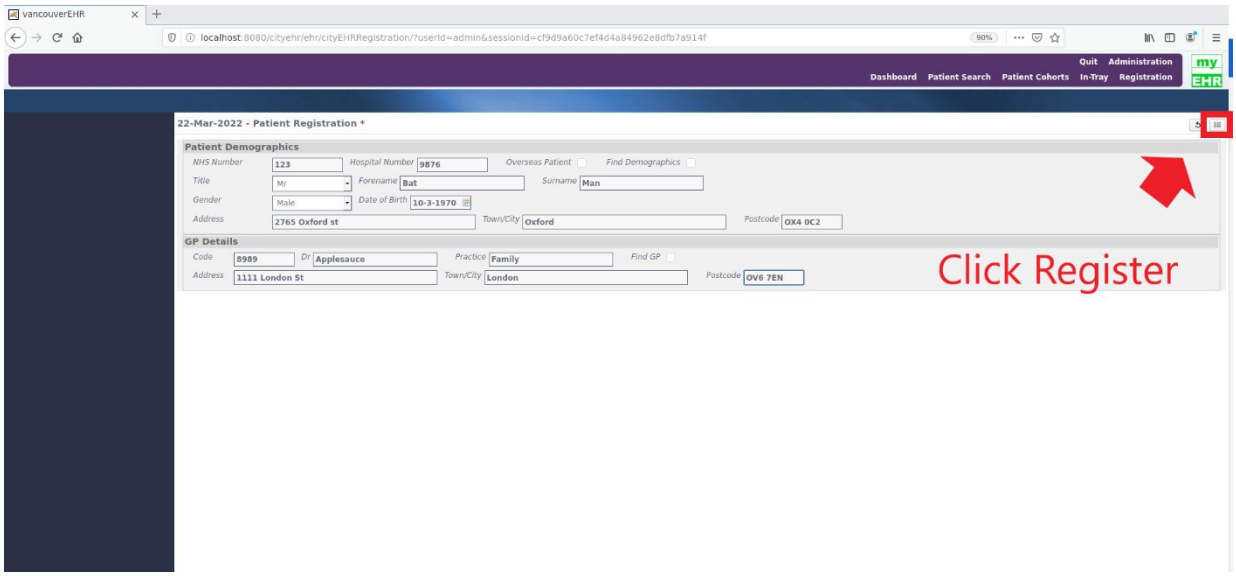
dashboard

34. You should see a fully formed Patient Search Page and a Registration Page. Screenshots of them are below:



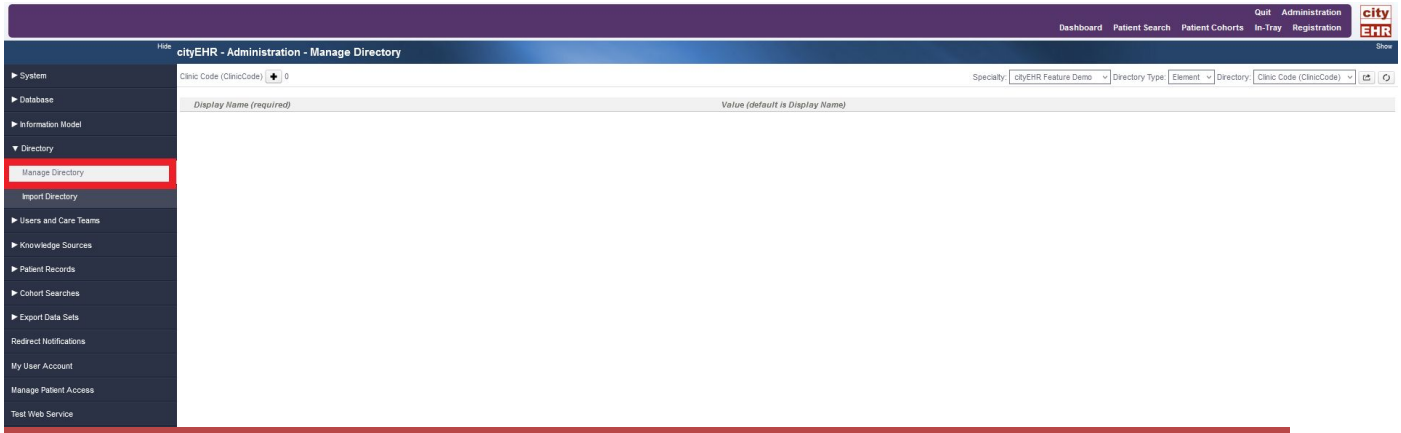
35. Navigate to Registration page

36. On the Registration page, register one patient. Click the menu button at the top right of the screen to finalize the registration.



30. Congratulations! You have registered one patient and made your own base application.

31. Activity complete! Quit cityEHR. If you would like to learn how to make changes to the spreadsheet to add Forms, Sections, Entries, Clusters, and Elements, please refer to the separate Information Modelling Guide.

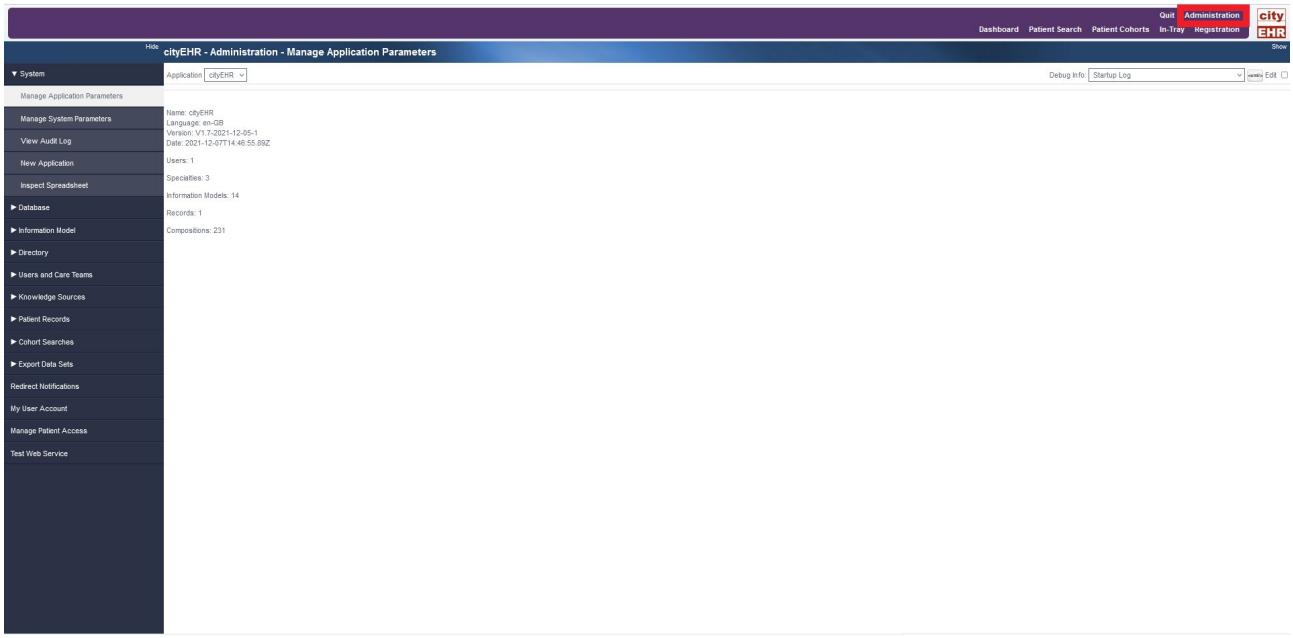


14. Managing Information Directories

14.1. Element Directories

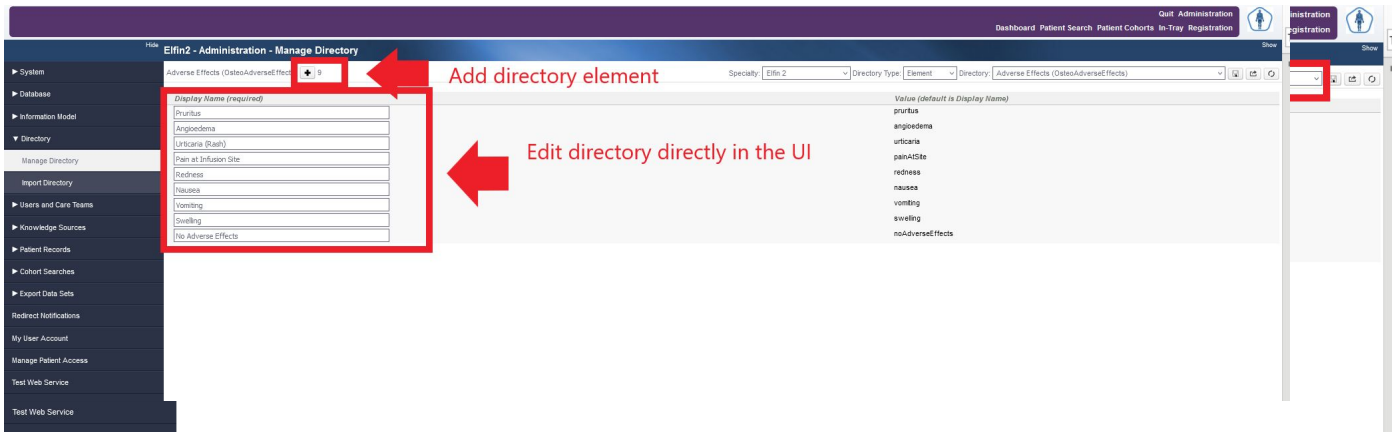
Directories are stored text that the user can edit. This section will show you how to access and edit element directories in cityEHR.

1. Navigate to the Admin screen of your chosen application. For this example, we will use Elfin 2.



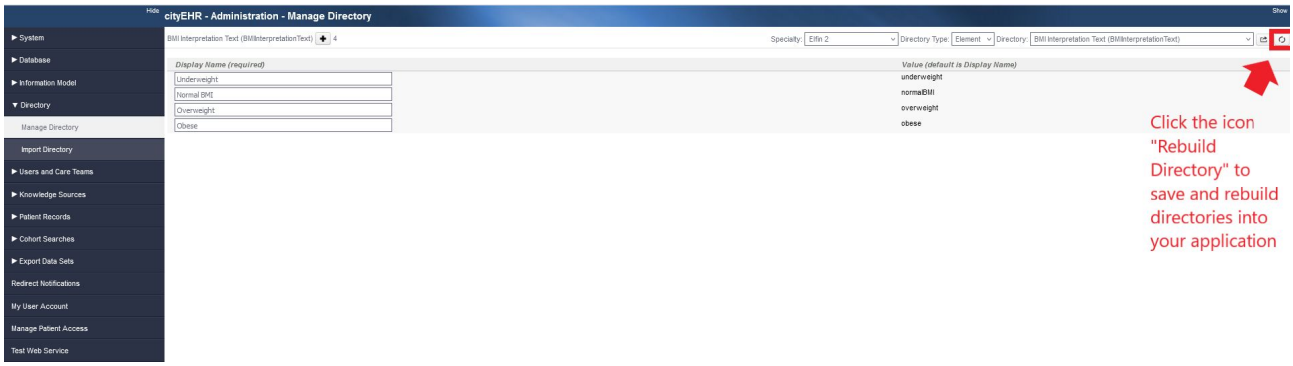
2. Navigate to the “Directory” menu on the left of the screen.
3. Click on “Manage Directory”

4. Ensure that the correct Speciality and Directory Type are selected. For this exercise, it should be set at Elfin2 and Element, respectively.
5. In the “Directory” dropdown list at the top right of the screen, select the directory you wish to edit or add to. For this example, we have selected “Adverse Effects” as our Element Directory.



6. You can add or edit this directory by clicking on the “+” sign at the top left of the directory or by editing the text boxes.

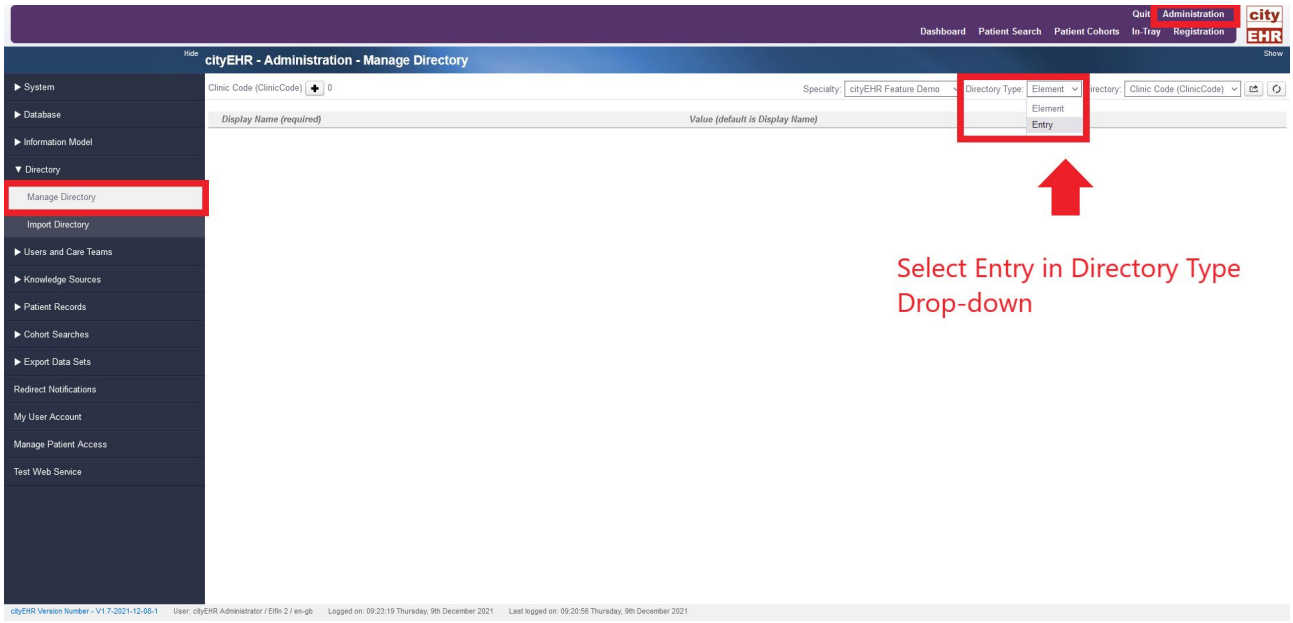
7. Click the icon “Rebuild Directory” at the top left of the Manage Directory form to save and rebuild the directories into your application.



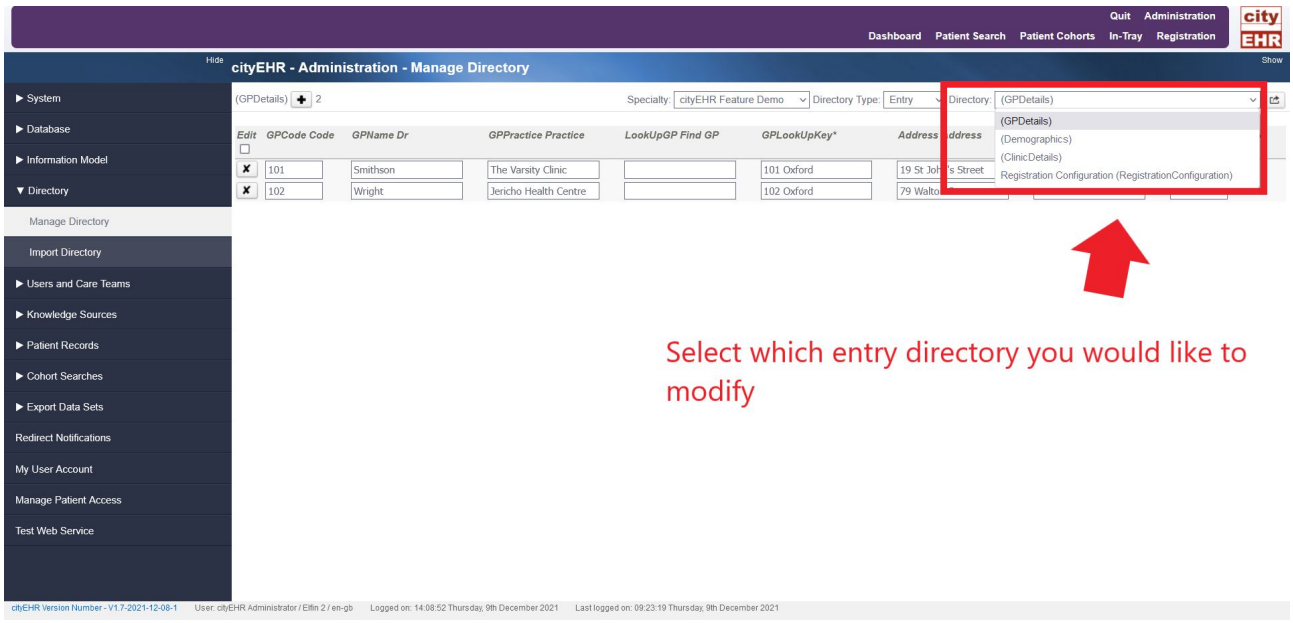
8. Navigate to the screen that contains this directory (form, letter, etc.) and view your changes

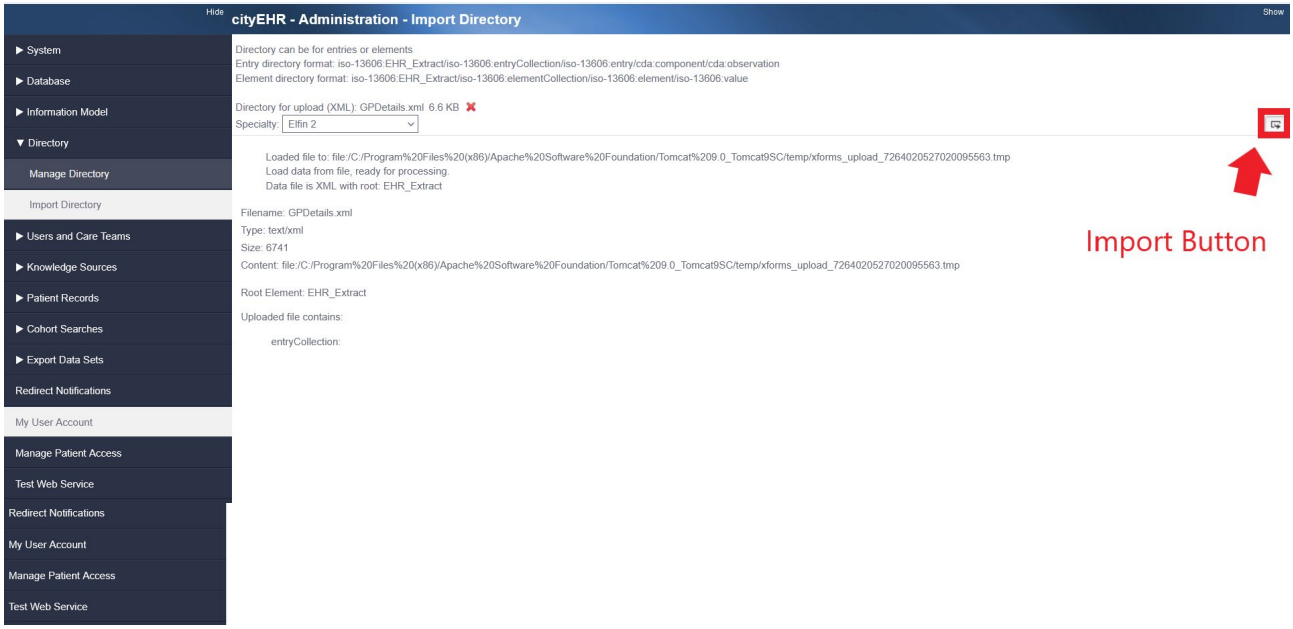
14.2. Entry Directories

1. Entry Directories work like Element Directories, but for Entries. You can edit Entry Directories the same way as Element Directories. To do this, navigate to Manage Directory and then Select “entry” in the Element Type drop down.

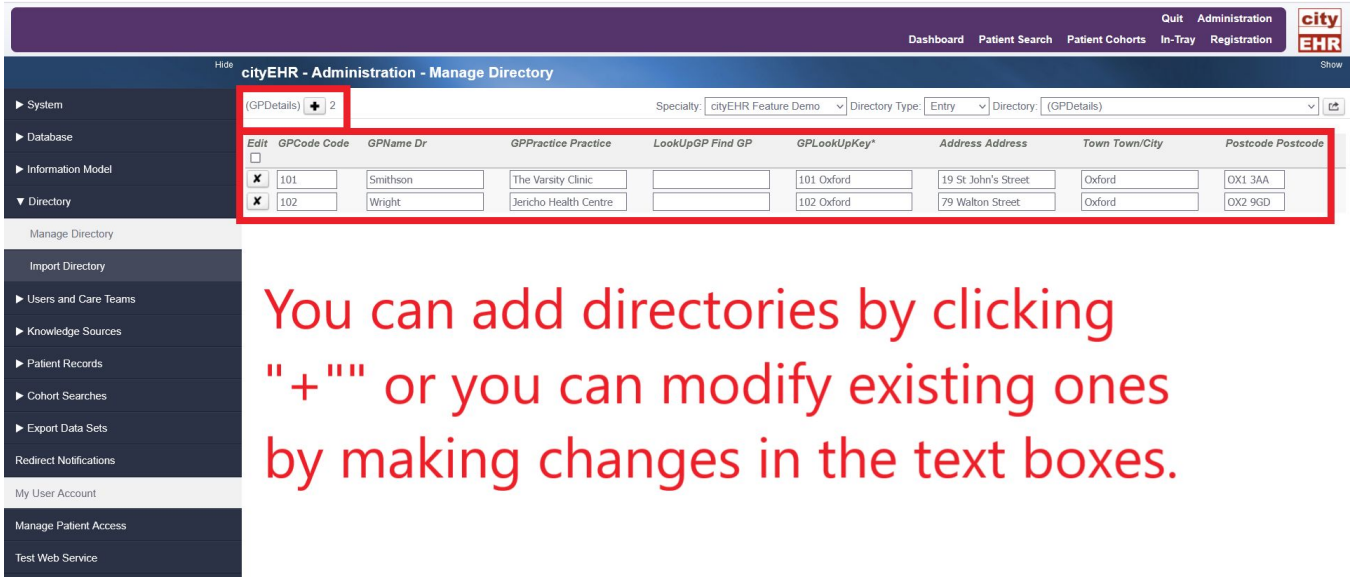


2. Select the Name of the Directory you want to modify.





3. You can make changes in the existing directories or add new ones.



14.3. Importing Directories

1. To import a directory, first navigate to the Administration page, and then to Directory in the menu on the left.
2. Now Navigate to “Import Directories” under “Directory”.
3. Click the “Browse” button in the display window and navigate to the folder shown in the image below.
4. Select the file “GP Details”.
5. Click the import button.
6. Now navigate to “Manage Directory” and navigate to your Entry Directories and you should be able to see “GP Details” as an option to edit!

15. Access Control - documentation coming soon!

cityEHR has a role-based access control system that can be configured to restrict user access to specific functions, based on the role of the user.

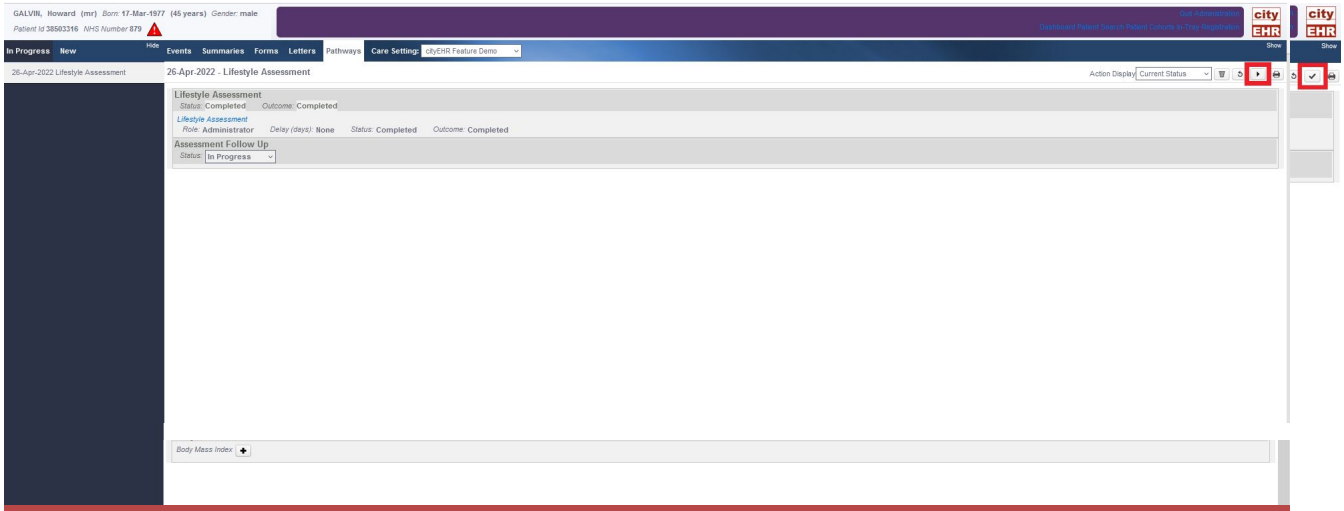
In addition, users can be restricted so that they can access only the data of patients who are assigned to the care team(s) of which that user is a member.

15.1. Setting Up User Roles

15.2. Assigning Roles for a User

15.3. Role-based Access Control to Functions

15.4. Restricting Access to Care Team Patients



16. Care Pathways – documentation coming soon!

16.1. Health Lifestyle Pathway

1. To review the pathways functionality in cityEHR, we will navigate through the Healthy Lifestyle pathway in the cityEHR Feature Demo application.

2. Log-in to the cityEHR Feature Demo application.

3. Navigate to Patient Search and select a patient.

4. Navigate to Pathways in the blue dashboard. See screenshot below.

5. In the menu on the left-hand side, navigate to the pathway called “Lifestyle Assessment”.

6. Click the checkmark icon at the top-right of the screen below the blue and purple dashboards. See screenshot below.

7. Once clicking Start Pathway, you will notice that the italicized “Lifestyle Assessment” turns into a blue hyperlink. Click this.

8. Now click the “Action” button that appears at the top-right of the screen. The icon looks like an open book. See screenshot below.

9. You should be navigated to a Lifestyle Assessment form. Fill out some values in this form.

10. Click the Publish icon at the top-right of the screen and click Commit Form.

11. Your in-progress pathway will appear on the left-hand side of the screen. Click on it.

12. You should now see that the Lifestyle assessment section of your pathway has been completed. You can now click the icon called “Progress” to continue documenting in the section Assessment Follow Up. See screenshot below.

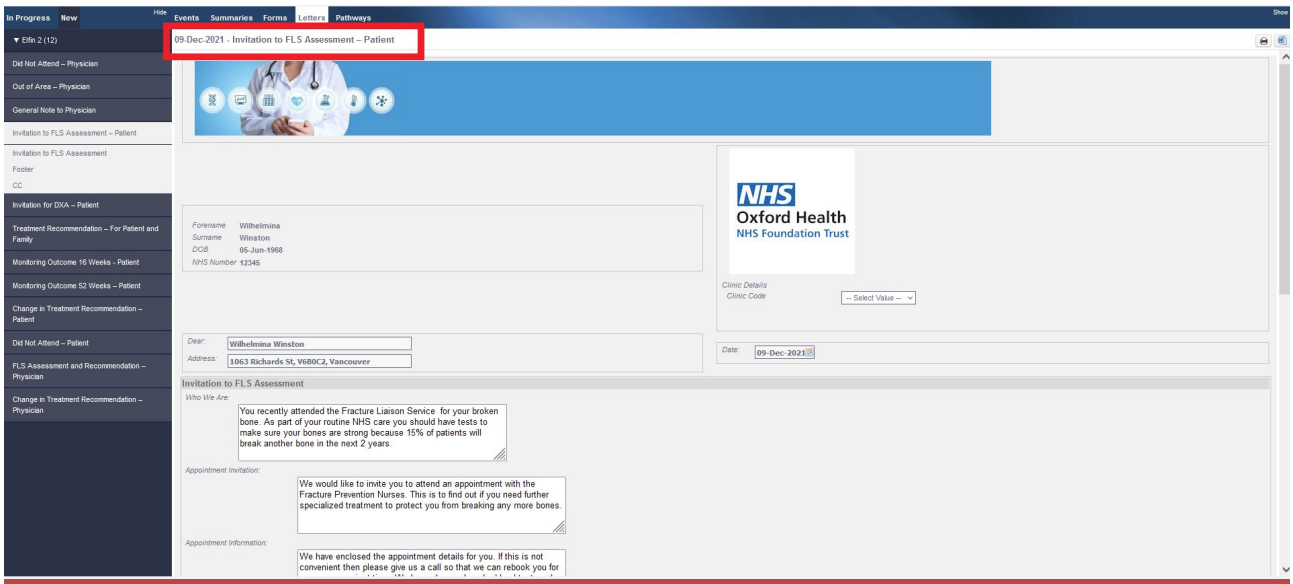
16.2. Using Sub-Pathways

- one with sub pathways

16.3. Pathways with Repeating Loops

- one with repeating loops

--- a lifestyle assessment – takes BMI, if your BMI is > 30 --> diet and exercise plan



17. Clinical Correspondence

17.1. Creating a Letter to the Patient

1. Quit and Navigate to the Elfin 2 application.
2. Register a Patient in Elfin 2.
3. Select that patient.
2. Navigate to “Letters” in your chosen application.

2. Click on any one of the letters with the ending “-Patient”

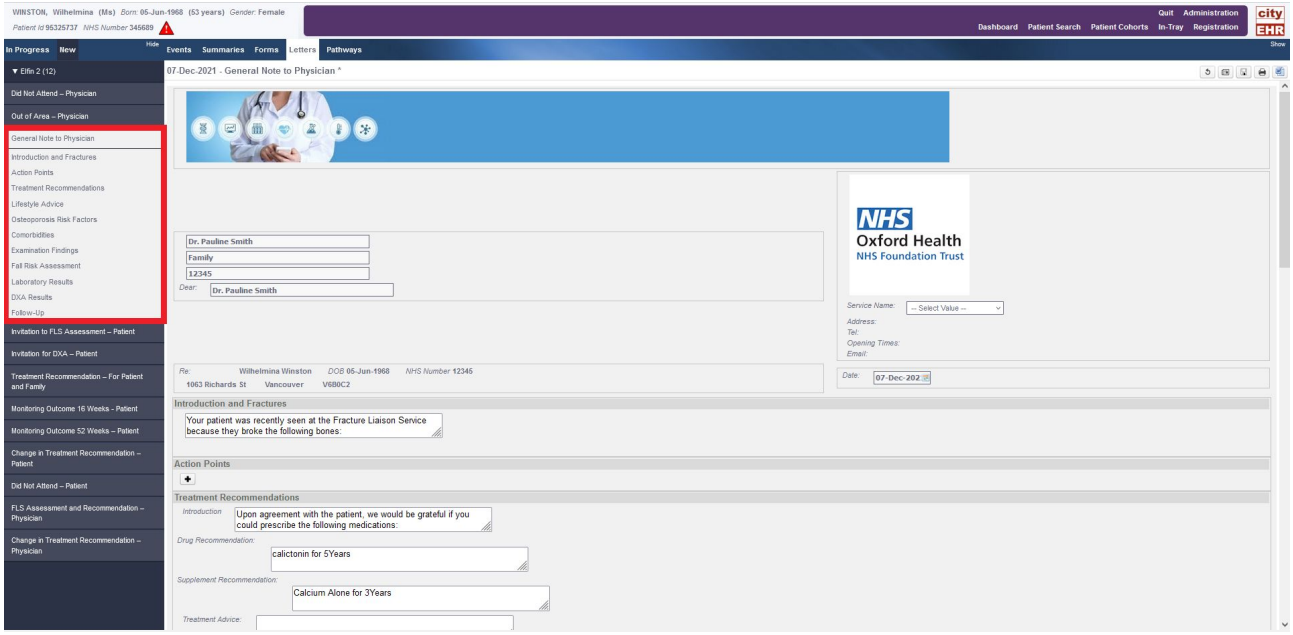
3. Navigate around this letter. Below is an example of what the letter called “Invitation to FLS Assessment - Patient” looks like. Click inside the large text boxes filled with text – you should be able to customize these.

4. You should be able to export the patient letter to word. See step 7.3 for exporting instructions.

17.2. Creating a Letter to the GP

1. Navigate to “Letters” in your chosen application. For this exercise, we will use the application called Elfin 2. Please note that the process works the same as in the Feature Demo.

2. Navigate to a GP Letter on the menu on the left of the screen, like you did for Patient Letters. See example below.

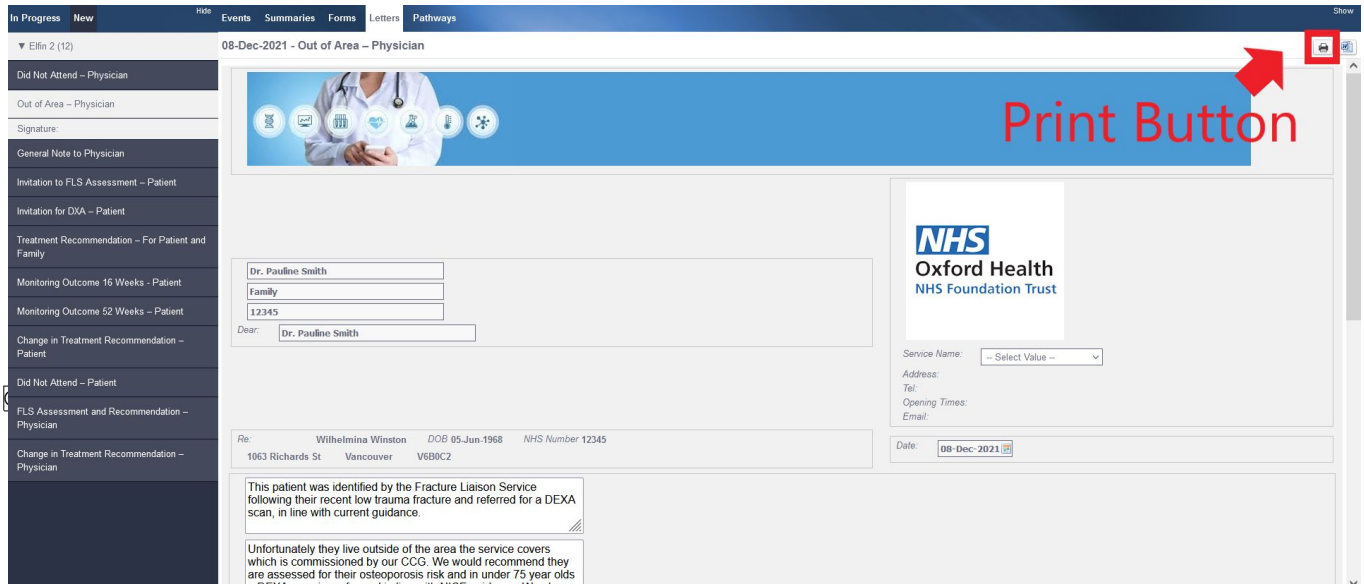


3. You can export this letter and also print it. Please see section 7.3 for instructions on how to do so.

17.3. Printing and Exporting to Wordprocessors

1. Press the button with the “Word” or the “Print” Icon at the top right of the screen.

Word Button:



Print Button:

