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## **i2b2 Background and Overview**

i2b2 (Informatics for Integrating Biology and the Bedside) is an NIH-funded National Center for Biomedical Computing based at Partners HealthCare System. i2b2 was developed as a scalable informatics framework designed for translational research. i2b2 was designed primarily for cohort identification, allowing users to perform an enterprise-wide search on a de-identified repository of health information to determine the existence of a set of patients meeting certain inclusion or exclusion criteria.

In layman terms, i2b2 allows researchers to determine feasibility of a study by identifying whether or not a sizable amount of patients exist with their study-specific criteria

### **Search Criteria**

The i2b2 repository contains detailed information on UAB patients, drawn from the UAB electronic health record and Enterprise Clinical Data Warehouse. These data are made available to UAB researchers through “self-service” access via the i2b2 user interface in several different forms:

**Level 1** – summary data only (patient counts) in which queries are limited to Limited Data Set views (dates – including dates of birth, cities, states and zip codes with other Protected Health Information (PHI) excluded); counts with less than 5 but greater than 0 will be reported as “less than 5”. This access has been certified by the IRB as not human-subjects related.

**Level 2** – detailed, patient-level data in which queries are limited to Limited Data Set views of the data (dates – including dates of birth, cities, states and zip codes, but with other Protected Health Information (PHI) excluded). These data are made available via i2b self-service pursuant to an IRB exemption for the i2b2 system.

**Level 3** – Upon request by human mediated consultation – detailed, fully identifiable patient data. These data are made available to researchers with appropriate, specific approval from the IRB, possibly, but not necessarily, through expedited review and waiver of consent, as per standard IRB procedures for access to human subjects’ data.

## **i2b2 as a National Resource**

i2b2 is rapidly becoming the de-facto standard for cohort identification and hypothesis generation at research centers across the US and abroad. i2b2 is a widely adopted tool among Clinical and Translational Science Award (CTSA) sites and other Academic Medical Centers, and has also found increasing use at other organizations for research and clinical performance improvement initiatives.

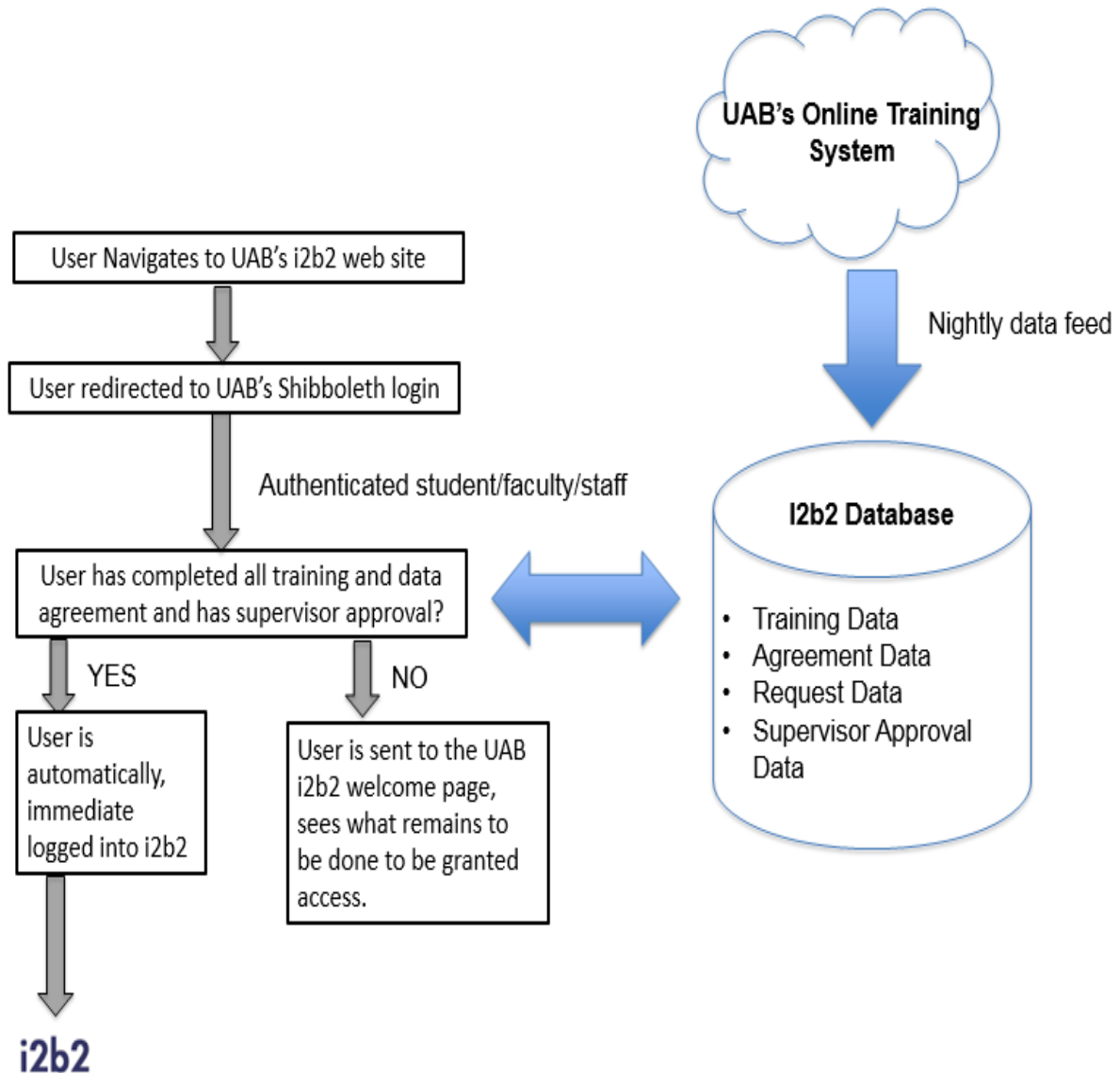
## **Accessing i2b2**

Access to i2b2 is available to UAB personnel via Blazer ID, but also requires validation of several other items. Upon completion of the access request, i2b2 will verify the following:

- HIPAA Training
- IRB Human Subject Protection Training
- Acknowledgement of Restrictions on the Use of Limited Data Sets
- Supervisor approval for non-faculty. After filling out the access request form presented to new users, non-faculty will be given an email link so that their supervisor can approve or deny i2b2 access.

Register for one of the required training courses by going to UAB Faculty and Staff Learning System.

# Authentication and Verification



# REQUEST

**blazed0 - Your Checklist to Gain Access to i2b2 at UAB**  
member, student

✘ Access to i2b2 requires successful completion of at least one of the following courses:

- HIPAA Privacy/Security Training
- IRB Investigator 101 Initial Training
- IRB Investigator 101 Continuing Ed

Register for one of these required training courses by going to [UAB Faculty and Staff Learning System](#). Please note that information about course completion comes into i2b2 overnight, so there will be a short delay between course completion and i2b2 access.

✘ You must complete the form below.

i2b2 Access Request Form

<b>Your Blazer ID</b>	<input type="text" value="blazed0"/>
<b>Your UAB Email</b>	<input type="text" value="Your Email"/>
<b>Your UAB Phone</b>	<input type="text" value="Your UAB Phone Number"/>
<b>Your First Name</b>	<input type="text" value="Your First Name"/>
<b>Your Last Name</b>	<input type="text" value="Your Last Name"/>
<b>Your School</b>	<input type="text" value="Your School's Name"/>
<b>Your Department</b>	<input type="text" value="Your Department's Name"/>
<b>Why you need access</b>	<input type="text" value="Please describe why you need access to i2b2. If you know of a specific data set (project) in i2b2, describe it."/>
<b>Supervisor Email</b>	<input type="text" value="Your Supervisor's Email. Required for non-faculty access."/>
<b>Supervisor Name</b>	<input type="text" value="Your Supervisor's Name. Required for non-faculty access."/>
	<input type="button" value="Submit This Request"/>

✘ Annual acknowledgement of restrictions on the use of limited data sets.

You will need to reaffirm this acknowledgement once a year.

✘ You have NOT YET been assigned to an i2b2 project/data set. (This will happen automatically when all items above are successfully completed.)

# Learning Management System

UAB THE UNIVERSITY OF ALABAMA AT BIRMINGHAM  
 Knowledge that will change your world

Search  Go

Faculty & Staff Learning System Quick Links UAB Quicklinks

**UAB Learning System**  
 Powered by HealthStream®

Home ErtTech Contact Us Forms Need Help?

Learning System (LMS) Login

Instructions: To login please click on the button above and enter your Blazer ID and strong password. For any questions, please call the Learning System (LMS) Support Desk at 205-996-4444 or email us at [learningsystem@uab.edu](mailto:learningsystem@uab.edu). Forgot your password? Click this link to change your password if needed: [Change Password](#)

What's New? How To...  
 Non-Employee Access Need Help?  
 Forms Contact Us

Note: Course related email notifications, also called Alerts, will now come from "hs-alerts@healthstream.com". We recommend adding the "hs-alerts@healthstream.com" email address to your safe senders so that these alerts aren't automatically pushed to your Junk email box. Also, course completion is recorded in Eastern Time, so if a course has a strict date deadline, it should be completed by 11PM CST.

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<https://www.uab.edu/learningsystem>

Log In

Search for Limited Data Set

**UAB Learning System**  
 Powered by HealthStream®

Campus (University) | Logout

To Do Completed Profile ▾ Catalog Connections Help [Take a Tour](#)

Catalog


Results *Showing 1 of 1*

**Acknowledgement of Restrictions on the Use of Limited Data Sets - CCTS** [Info](#)


**COURSE** ACTIVITIES: Test, Course Attachment

[Show additional information ▾](#)

# Learning Management System

 COURSE Acknowledgement of Restrictions on the Use of Limited Data Sets [Enroll >](#) **Click Enroll**

STATUS: Not Yet Started EST. TIME: 15m

 COURSE Acknowledgement of Restrictions on the Use of Limited Data Sets

STATUS: Not Yet Started EST. TIME: 15m

Learning Activities [Overview](#)

Learning Activities *in this Course*

[Read Terms and Conditions of Limited Data Set \(LDS\)](#) [View](#) **Click View**

COURSE ATTACHMENT STATUS: Not Yet Started

**Attestation** [Locked](#)

TEST STATUS: Not Yet Started

# Learning Management System

## Instructions

Please click on the attachment below to read the terms and conditions of using LDS.

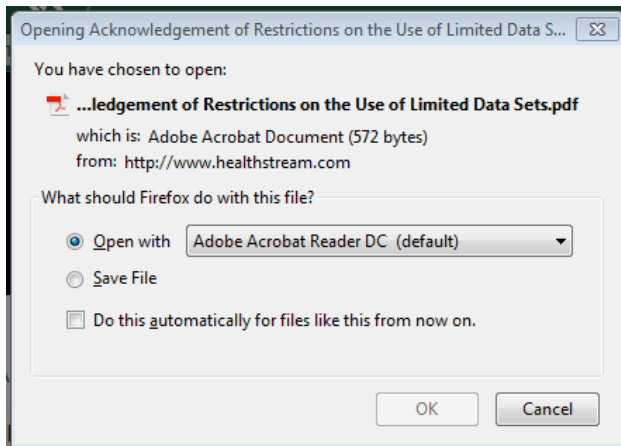
## Attachment

LDS Terms and Conditions

FILE TYPE: pdf UPDATED: Feb 3, 2016 at 10:49am CT

Open

Click Open



Open the PDF



# Learning Management System

## Acknowledgement of Restrictions on the Use of Limited Data Sets

**Read, Save and close  
the Document**

As a condition of receipt of a Limited Data Set (LDS) from the UAB i2b2 system, you agree to the following terms and conditions:

1. The research is supported by and approved by your superiors.
2. You acknowledge and accept that UAB is not permitted to release to you the key to the code that links information to individual research subjects.
3. You are the individual responsible for the use of these data and any subsequent publications. You will follow the appropriate human subjects research, data security and privacy protections and will maintain the confidentiality of these data in compliance with all applicable UAB policies and procedures as the data sets may contain Protected Health Information (PHI).
4. Use and disclosure of an LDS:
  - a. As the Recipient, you agree that you will provide a full title and explanation of your research pertaining to the use of the LDS, as requested in the form provided at the time of data access.
  - b. You will only give access to the LDS to other individuals who are within UAB and have completed Human Subjects Research and HIPAA training; you will provide the names of these other individuals on request.
  - c. You agree to apprise all individuals that have access to the LDS of the terms and conditions of data use.
  - d. You shall use appropriate safeguards to protect the LDS from misuse or inappropriate disclosure and to prevent any use or disclosure of the LDS other than as provided by law or regulation.
  - e. You shall not attempt to identify individuals to whom the data pertain or attempt to contact such individuals.
  - f. That you are making use of previously collected ("on the shelf") data only and you shall not attempt to carry out subsequent data queries for the purposes of collecting data ("updates") about individuals whose data are in the LDS.
5. You will use the data only for the research use described and will maintain the LDS as per UAB policy.
6. You shall report to the UAB Privacy Office any unauthorized use or disclosure for the PII of which you become aware. You will take reasonable steps to any further use or disclosure. To contact the UAB Privacy Office, call (205) 996-5051 or e-mail ssearson@uabmc.edu.
7. You agree to these terms of use for as long as you retain the LDS, unless otherwise terminated by applicable law or regulation.

This Acknowledgement applies to the LDS resulting from the i2b2 query and shall continue as long as I retain the LDS, unless otherwise terminated by applicable law or regulation. I may terminate this Acknowledgement by returning or destroying the LDS and providing a written notice to the i2b2 administration at: Director of Research Commons, UAB CCTS, 111 PCAM, 1720 2nd Avenue South, Birmingham, AL 35294-0007. Should I commit a material breach of this Acknowledgement, which is not cured within thirty (30) days after I receive a notice of such a breach from i2b2, then i2b2 will discontinue disclosure of LDS and will report the breach to the UAB Privacy Office by phone at (205) 996-5051 or e-mail ssearson@uabmc.edu.

# Learning Management System

**i** **Course Attachment**  
Have you completed Read Terms and Conditions of Limited Data Set (LDS)?

**Mark as complete**

Learning Activities *in this Course*

<b>Read Terms and Conditions of Limited Data Set (LDS)</b> COURSE ATTACHMENT   STATUS: Completed	✓
<b>Attestation</b> TEST   STATUS: Not Yet Started	<input type="button" value="Start"/>

**Click to start the Attestation**

You are about to take a test

- Length: **1** question(s).
- To Pass: Score **100%** (**1** out of **1** questions).
- Click **Complete Test** at the end to score the test.
- This test is not timed.

## Introduction

Please read the acknowledgement/attestation statement below.

Do not close the test: If you do, the test will be scored and you might not be able to re-take it.

**Start the Test (Attestation)**

# Learning Management System

Question 1 of 1

By clicking Yes below, I acknowledge/attest that I have read and understand the terms, conditions, and restrictions on the Use of Limited Data Sets.

Yes

No

Complete Test

Click "Complete Test" to acknowledge/attest

**Attestation**  
STATUS: Passed SCORE: 100 %

Congratulations, you passed this test!

Question 1 of 1 **CORRECT**

By clicking Yes below, I acknowledge/attest that I have read and understand the terms, conditions, and restrictions on the Use of Limited Data Sets.

Your Answer  
Yes

Exit Test

Exit Test

**Congratulations!**  
You have successfully completed this course.

Return to To Do   View Certificate   View Transcript

## Supervisor Approval, only for non-faculty

i2b2@UAB

Your i2b2 Access Request Has Been Saved

Please send your supervisor an email about this request by clicking the link below.

[Click This Link to Email Your Supervisor](#)

[Return to the UAB i2b2 web page](#)

Send	To...	
	Cc...	
	Bcc...	
Subject:		UAB Employee is requesting access to i2b2 at UAB

The user below has requested access to i2b2. Your name was submitted as their supervisor. If you approve this request simply use 'REPLY ALL' and put the word 'APPROVED' into the email body.

If you want to know more about i2b2 at UAB, click here: [https://i2b2-uab.hs.uab.edu/webclient/uab\\_i2b2\\_Helper.php](https://i2b2-uab.hs.uab.edu/webclient/uab_i2b2_Helper.php)

First Name:  
Last Name:  
Office Phone:  
Department:  
School:  
Reason For Request: |

## To access the i2b2 program

Go to:

**https://i2b2-uab.hs.uab.edu**

**UAB Central Authentication System**  
Enter your BlazerID and password:

BlazerID

Password

**Log In**

**Having trouble logging in?**  
Visit BlazerID Central for help or to reset your password.  
Contact AskIT at 205-996-5555 if you have any problems using this system or your BlazerID.

**Security Notice**  
For security reasons, quit your web browser when finished accessing services that require authentication. Be wary of any program or web page that asks for your BlazerID and password. Legitimate UAB web pages prompting for your BlazerID and password should have addresses that begin with https:// (not http.) and contain "uab.edu". Also, your browser should visually indicate that you are accessing a secure page, usually a padlock icon.  
This system is available only for authorized purposes by authorized users. Use for any other purpose may result in disciplinary action or criminal prosecution against the user.

[Accessibility](#) | [Disclaimer](#) | [Web Pages Policy](#) | [Contact](#) | © 2016 UAB

**i2b2@UAB Login**

UAB presently has only one host. Just click SELECT to continue.

i2b2 Host:  
i2b2-LDS

**Select**

1

1. **UAB i2b2 Host** – Presently, UAB has only one host which appears in the dropdown menu at login. Simply click “Select” to navigate to the next page.

## Navigating the Workbench



### Helpful Hints in this Guide

For those who prefer to learn a software tool by exploring independently rather than following a User Guide, a light bulb icon is used within this guide to highlight helpful and nonobvious tips.

### Workbench Screen

Following the validation of your login credentials, the **i2b2 Query & Analysis Tool** screen is displayed and available for use. The basic **i2b2** workbench screen provides six primary tabbed panes for identifying, building and running cohort discovery queries. These panes are indicated in the figure below and described in the accompanying text.

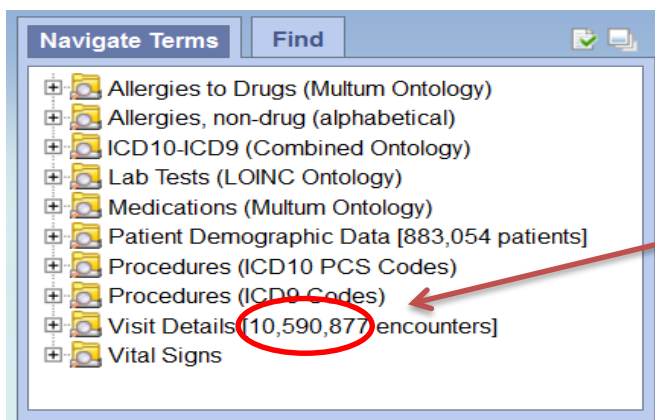
The screenshot shows the i2b2 Query/Analysis Tool interface. The top navigation bar includes the UAB logo, the tool name, project name (UAB LDS), user name (MATTHEW WYATT), and links for Find Patients, Analysis Tools, Help, and Logout. The interface is divided into several panes:

- 1**: **Navigate Terms** pane, containing a tree view of various clinical ontologies such as Allergies to Drugs, ICD10-ICD9, Lab Tests, Medications, Patient Demographic Data, Procedures, Visit Details, Admission Source Code, Discharge Disposition, Inpatient/Outpatient Code, Length of Stay, and Vital Signs.
- 2**: **Find** button located next to the Navigate Terms pane.
- 3**: **Workplace** pane, showing a folder named 'mcwyatt'.
- 4**: **Previous Queries** pane, displaying a list of recent queries with details like patient demographics and dates.
- 5**: **Query Tool** pane, featuring a 'Query Name' field, a 'Temporal Constraint' dropdown set to 'Treat Independently', and three columns for defining query groups (Group 1, Group 2, Group 3) with sub-columns for Dates, Occurs > 0x, and Exclude.
- 6**: **Show Query Status** and **Graph Results** panes at the bottom right.

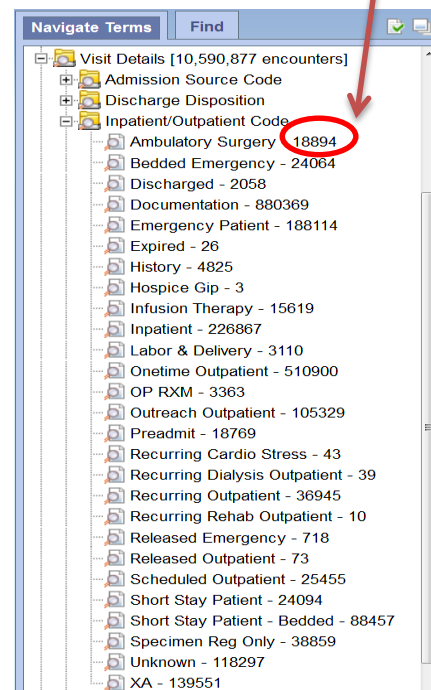
Additional interface elements include a 'drop a term on here' instruction in the Query Tool pane and buttons for 'Run Query', 'Clear', and 'Print Query' at the bottom of the Query Tool pane.

1. **Navigate Terms** - This is where you will locate search concepts using a hierarchical folder structure.
2. **Find Terms** -In this pane, you can find search concepts using a representative word, phrase or specific code to describe the concept
3. **Workplace** - This is where you will create personal folders for storing your queries.
4. **Previous Queries** -This pane shows a log of previous queries for the current user.
5. **Query Tool** -This is your main work area where you will define and refine the criteria for your query.
6. **Query Status** -You will be able to monitor progress and see results in this pane.

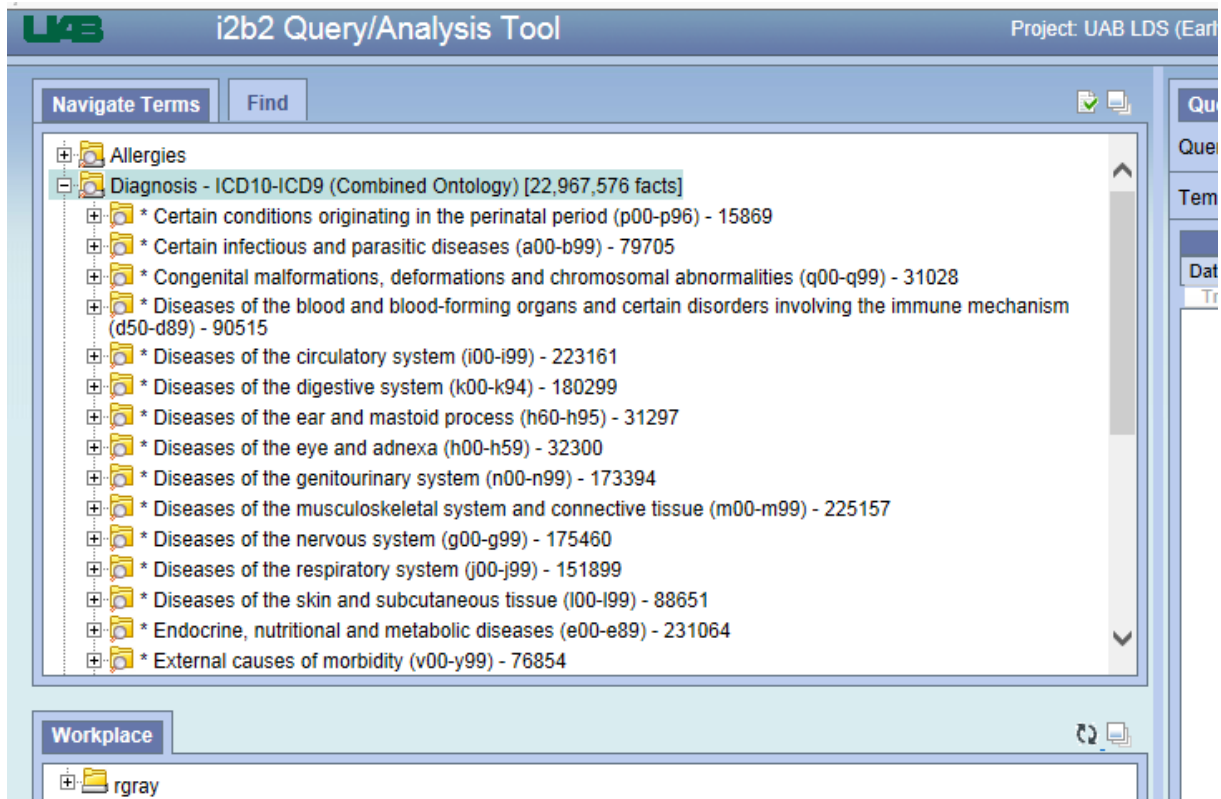
## Navigate Terms



The numbers after the folders and/or concepts is the count of unique patients who have that documented.




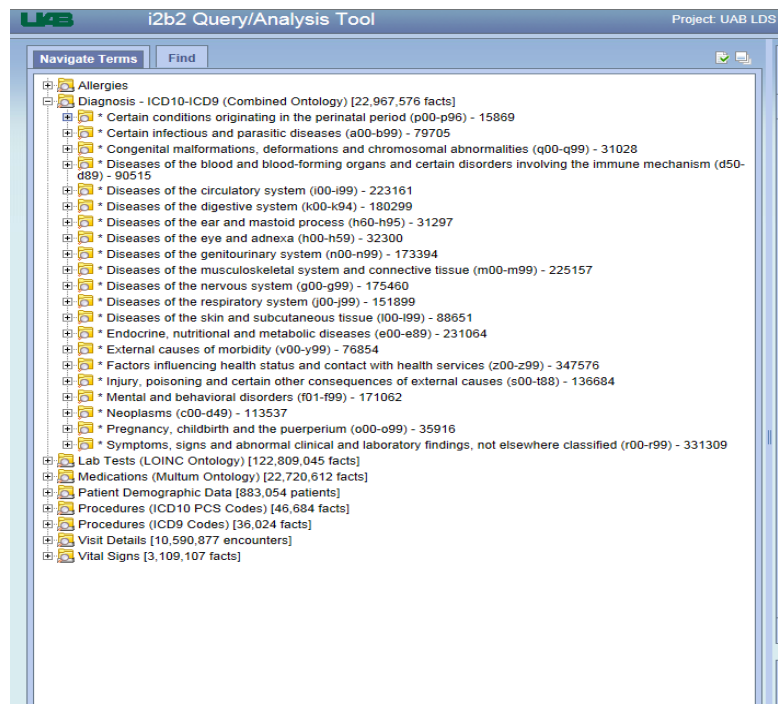
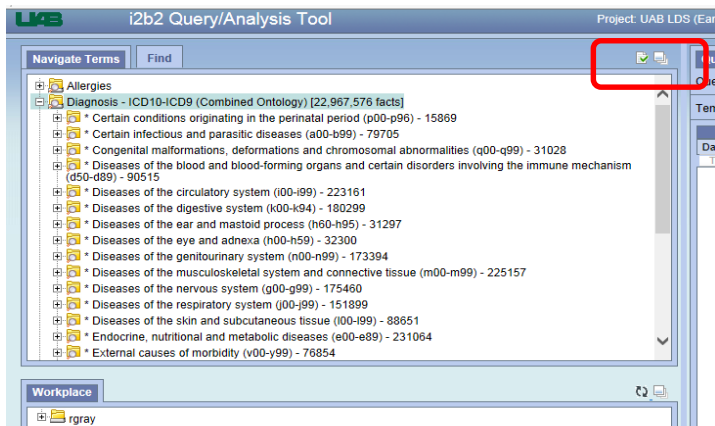
To expand a folder click the (+) and to close click the (-)





## Resize Workspace

 The **Resize Workspace** icon will toggle between the default tabbed pane size and a vertically expanded view of the pane. This can help minimize the amount of vertical scrolling. Any tabbed pane that includes this **Resize Workspace** icon will allow you to expand the tab vertically to the full available height of the browser window. This is a very useful option!



# Constructing and Running your Query

## Selecting Query Criteria

The **Navigate Terms** pane provides a hierarchical tree of search concepts that can be used to find and specify query criteria. You can search through demographics, diagnoses, vitals, problems, procedures, and features of the visit.

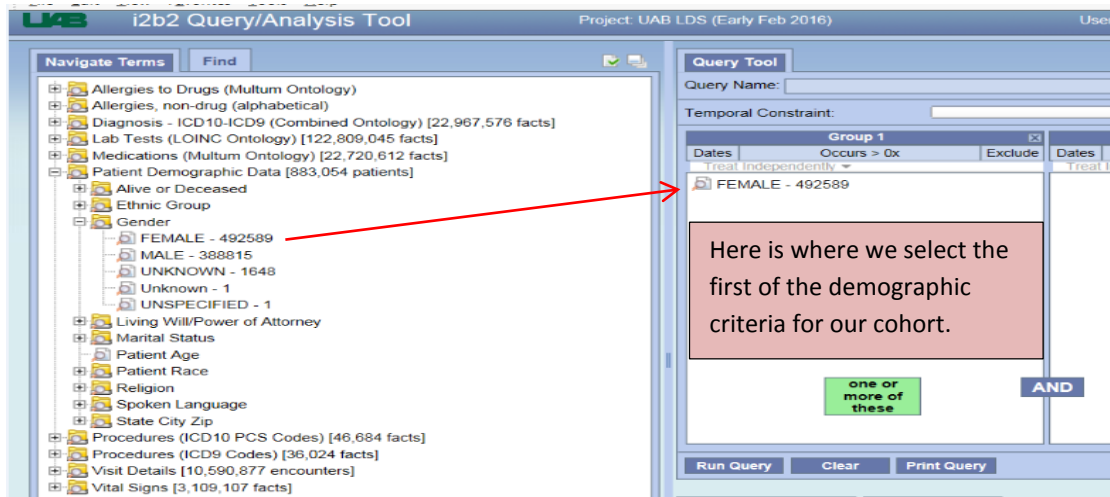
## Building Your Query (with a worked example)

Imagine that you want to conduct a trial of a new migraine drug and are designing your study and recruitment plan. You may want to know: how many patients in our database are women, 18 years or older, get migraine headaches with auras (ICD9 codes: 346.0, 346.00, 346.01, 346.02, 346.03), and who are not currently pregnant?

**Follow the pink boxes to see follow a sample cohort query.**

Once you find the concept in the **Navigate Terms** or **Find Terms** tabbed pane,

1. Click, hold and drag the term from the **Navigate Terms** pane.
2. Drop it into the next available **Group panel** (e.g. Group 1 below) this will add it to the active query criteria.



- The search will turn up cases that meet any one of the criteria dropped into a single Group. In logical terms, these items are grouped by “OR”. A green informational message will pop up to remind you of this relationship; it will say “one or more of these”. In the example below, a patient will be included if she has any of the migraine diagnoses listed in Group 2.

- The criteria in one Group will be treated as an “AND” with items in another Group. In other words, both Groups will have to be true. In the example, the patients will have to be female and have one of the diagnoses in Group 2.

Remember: Criteria placed in the same Group are evaluated to see if any one of them is true. In most cases, each demographic category should get its own group. So, for example, you would not place Gender criteria and Language criteria in the same group, or else you will get –say – patients who are either Female or speak Dutch.

The screenshot shows the i2b2 Query/Analysis Tool interface. The top navigation bar includes 'Project: UAB LDS (Early Feb 2016)', 'User: PAMELA GRAY', and 'Find Patients | Analysis Tools | Help | Log'. The main interface is divided into several sections:

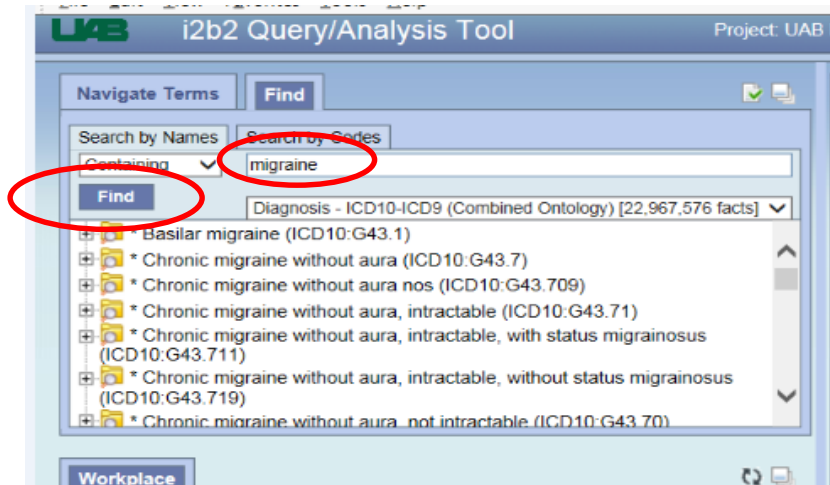
- Navigate Terms / Find:** Search by Names (containing 'migraine with aura') and Search by Codes. A list of ICD-10 codes for migraines is displayed.
- Query Tool:** Query Name field, Temporal Constraint set to 'Treat all groups independently', and a table for defining query groups.
- Group 1:** Contains the criterion 'Patient Age >= 18 years'.
- Group 2:** Contains the criterion 'FEMALE - 492589'.
- Group 3:** Contains two criteria: '\* Migraine with aura, not intractable, without status migrainosus (ICD10:G43.109) - 860' and '\* Migraine with aura, intractable, without status migrainosus (ICD10:G43.119) - 56'.
- Logical Connectors:** 'AND' connectors are placed between Group 1 and Group 2, and between Group 2 and Group 3. 'one or more of these' labels are placed below each group.
- Workplace:** A workspace area with a file icon and the name 'ptery'.
- Bottom Bar:** 'Run Query', 'Clear', 'Print Query' buttons, and a status indicator '3 Groups'.

Two red callout boxes provide additional context:

- Box 1: 'Here we have added a second demographic criterion. Note that it must be put in a new group in order to identify cases for which “age>=18 years” is true' (pointing to Group 1).
- Box 2: 'These are the diagnostic criteria for patients with migraine headaches with auras. Only one condition in this group has to be true for a patient to be included.' (pointing to Group 3).

## Using “Find” Terms to Help Develop Your Query

Although **Navigate Terms** can often be used as the primary tool to build a query, **Find Terms** offers additional options for finding the criteria you need. These options include **Search by Names** and **Search by Codes**. Using **Search by Names**, you can find your query terms by searching for full words, partial words or phrases.



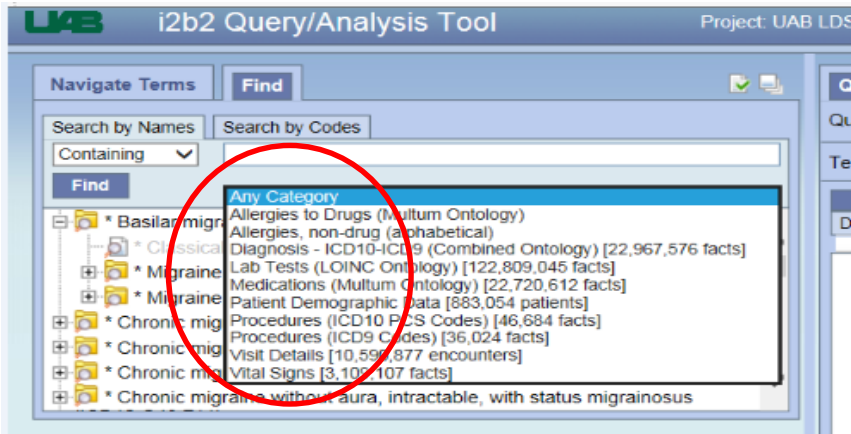
After selecting Find Terms, make sure you select **Search by Names** (it will be shown in lighter-greener shade of blue). Once you enter the search terms, click the **Find** button.

Here we have found the ICD9 codes for migraine headaches by using: **Find Terms > Search by Name**.

A pull-down menu allows you to choose what sort of match you want between the terms that are found and the words/phrase you have entered. You can choose: Containing, Exact, Starting with, or Ending with.

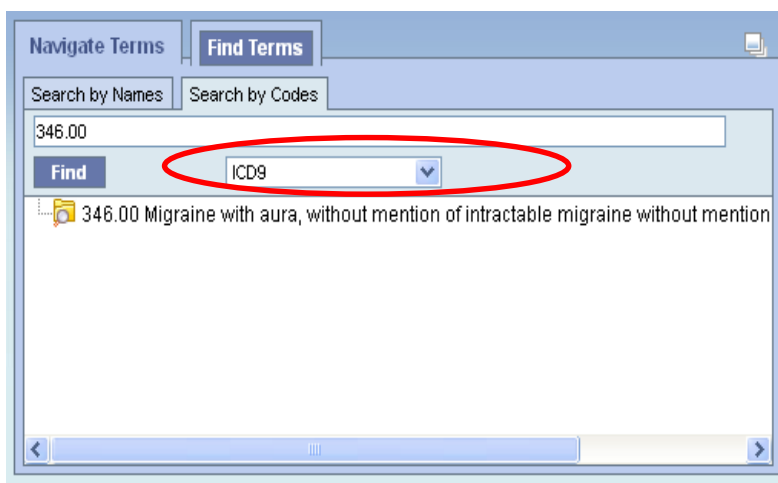


A second pull-down menu allows you to indicate the category of the term you are seeking. For example, in the search above for terms related to “migraine”, the option “Diagnoses ICD9” was chosen.



If your initial search turns up no matches, try using different names for the condition or therapy you are seeking. For example, many cancers are referred to “malignant neoplasms” in the Diagnoses ICD9 vocabulary.

If you know the code you are looking for and don’t want to have to navigate the hierarchy in the **Navigate Terms** tab, you can use the **Search by Codes** option under **Find Terms**. Make sure you click on **Search by Codes** after selecting **Find Terms**.



As with searching by names, when searching by codes, you have the option of limiting the search to certain categories.

**Find Terms > Search by Codes** only works if you provide the exact code. If you would like to search for terms using a code, but want to find all ICD9 or CPT codes that include a string (for example, you want all codes that have “346.” as part of the code including 346.00, 346.01, 346.02, etc.), you can use the

**Search by Names** option and enter the code string. This works because all the terms that are searched by name include the code as part of the name. For example, “346.03 Migraine with aura, with intractable migraine, so stated, with status migrainosus”.



Note that the **Find Terms** mode of finding criteria for your search does not allow you to specify modifiers (i.e. principal vs. secondary diagnosis) for your diagnostic criteria. However, if you mouse-over the folder icon to the left of a term once you have found it, you’ll see the full pathway for the term within the code hierarchy. You can use that information to go back to the **Navigate Terms** mode, navigate to the terms you are interested in, and select the modifiers you want.

### **Demographics**

The age field searches for the patient’s age today (at the time of the search) as opposed to the age at the time of the clinical encounter.

### **Diagnoses vs. Problems**

Diagnoses are associated with a particular encounter, whereas Problems, which come from the problem list in the patient’s medical record, are meant to provide a succinct overview of the patient’s most important health information. The Problems will include chronic medical conditions, family history, past tests, and past procedures.

## Editing Your Query



1. To delete a criterion you have already dropped into a group, right-click on the icon to the left of the term and select **Delete**. (See number 1 in red circle below.)
2. To delete a whole group, click on the **X** on the upper right-hand corner of the Group box.
3. To create a new Group, which will appear to the right of the existing Groups, click **New Group**.
4. To clear all search information that is currently in the Groups of the **Query Tool** pane, click **Clear**.

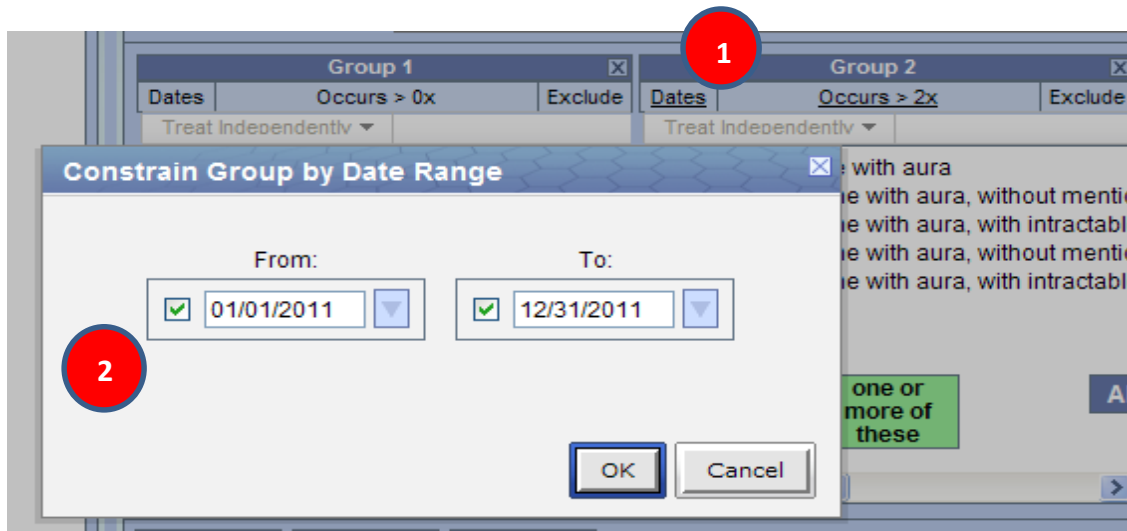
The screenshot shows the Query Tool interface with three groups: Group 1, Group 2, and Group 3. Group 1 contains the term 'Female'. Group 2 contains several migraine-related terms. Group 3 is empty. The interface includes a 'Query Name' field, a 'Temporal Constraint' dropdown set to 'Treat all groups independently', and a list of terms with 'AND' connectors between groups. At the bottom, there are buttons for 'Run Query', 'Clear', 'Print Query', and 'New Group'. The status bar shows '2 Groups'.

## Refining Your Query

### Constraining Dates of Encounter



In some cases you will choose to restrict your search to encounters that took place within a certain time period. To include only certain dates, click on **Dates** at the top left of the given Group panel (see 1 in figure). A pop-up window will allow you to specify the date range (2) and once the dates are selected the word Dates will be underlined in the panel (1). **Note that the date constraint function works best when applied to the diagnoses or procedures.**





### Adding Exclusion Criteria

You can create a group of criteria and then click **Exclude** (3) to exclude all patients that meet any of the criteria in the list. A pink informational message (4) reminds you that “none of these” will be included.

**Group 1** [X]

Dates Occurs > 0x **3** Exclude

Treat Independently ▾

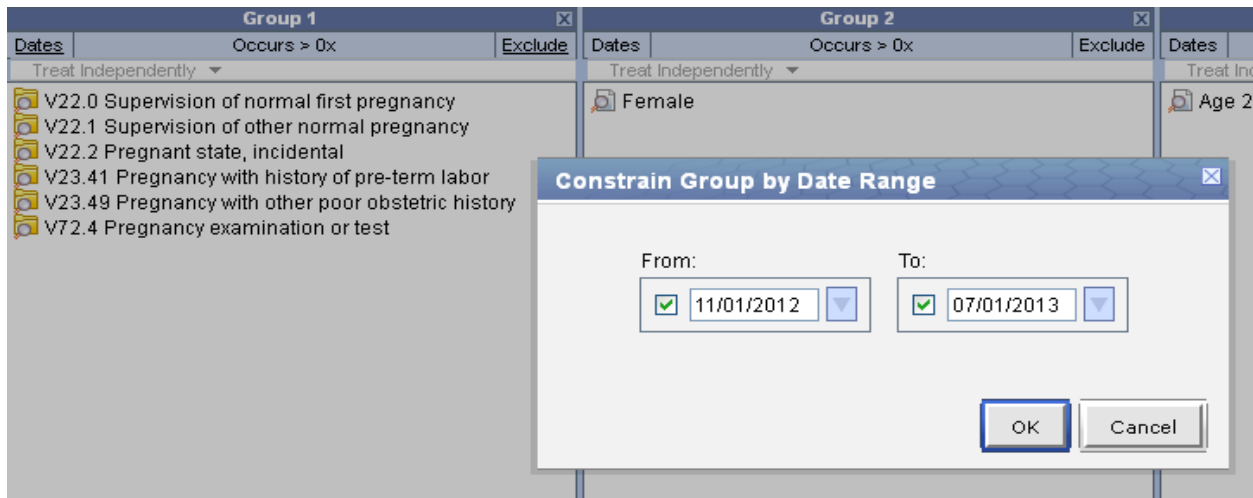
- V22.0 Supervision of normal first pregnancy
- V22.1 Supervision of other normal pregnancy
- V22.2 Pregnant state, incidental
- V23.41 Pregnancy with history of pre-term labor
- V23.49 Pregnancy with other poor obstetric history
- V72.4 Pregnancy examination or test

**4** none of these All

Run Query Clear Print Query

Here we exclude patients with pregnancy in their medical record.

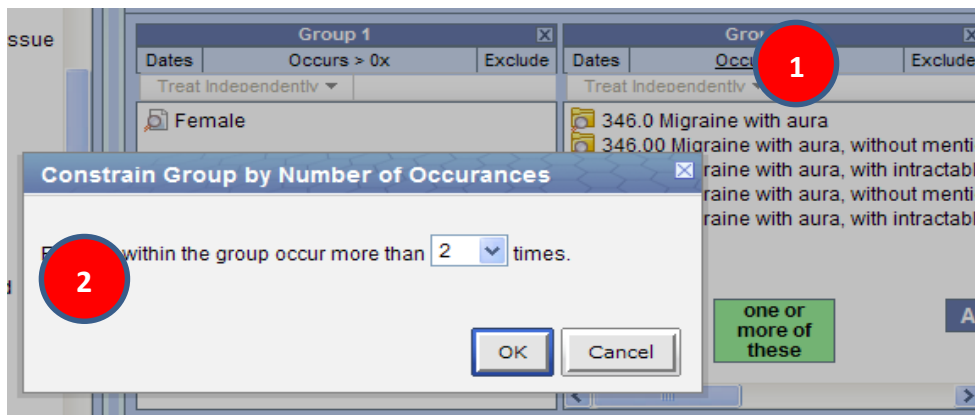
If we exclude all patients with pregnancy-associated diagnoses, we would actually be excluding all patients who ever had a pregnancy in their medical record. For our example, we're interested in patients who are currently pregnant. To find that out, let's restrict the search for pregnancy codes to the last eight months (here, November 1, 2012 until July 1, 2013). To do this, we make use of both the **Dates** option and the **Exclude** option.



### Multiple Occurrences

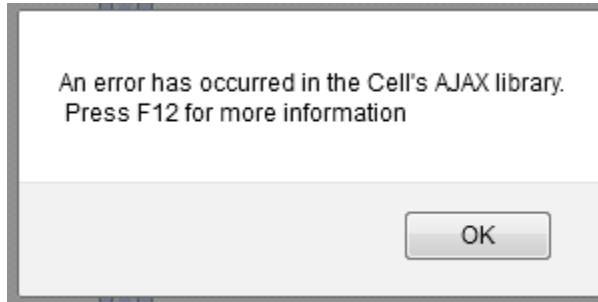
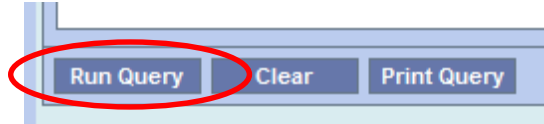


In some cases you may choose to make your selection criteria more conservative (more specific) by choosing only to include patients who have a particular diagnosis (or treatment, etc.) in their record more than once. To do so, click on **Occurs > 0x** (see 1 in figure). The constraint window will pop up where you can specify the number of occurrences (2). The label on the group will change to reflect the additional constraint (1).



### Running Your Query

Click on **Run Query** at the bottom of the Query Tool pane.

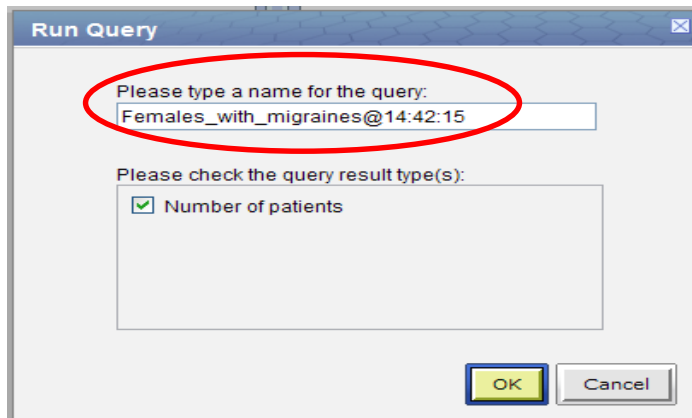


Sometimes this error happens when running a query.

**Just click OK and run it again**

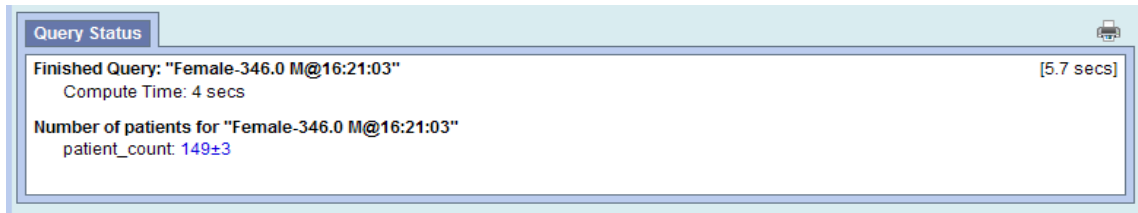



“Run Query” windows will pop-up. Before clicking **OK** you can rename the query. You may want to do this for easier reference when you retrieve the query at a later time. We recommend that you leave the time of the query (to the right of the “@”).



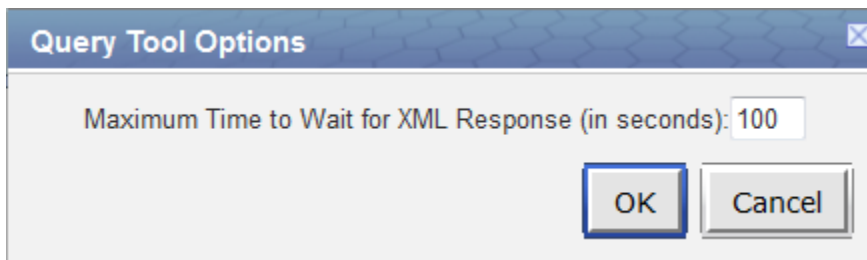
**Query Status Tab**

The **Query Status** panel shows the result of the query for the aggregate number of potential patients. This number has been obfuscated so that it is true to within 3 patients.



i2b2 has a session configuration for how long to wait before the query will move to the background and allow the user to continue with other queries without waiting for one to complete by clicking the "Show Options" icon in the upper right. 

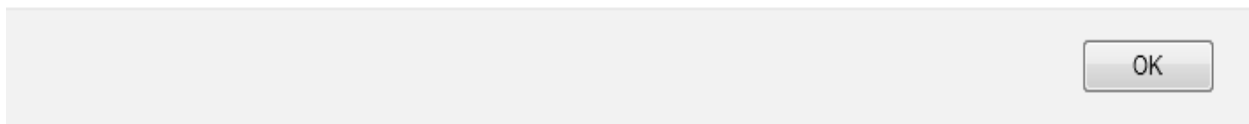
Setting this lower will allow the user to continue work without waiting without canceling a query.



When a query reaches that time, it will present a message that the query will continue to run in the background:

Your query has timed out and has been rescheduled to run in the background. The results will appear in "Previous Queries"

Prevent this page from creating additional dialogs



## Advanced Query Tools

## Previous Queries

Every time you run a query it is listed in the **Previous Queries** tab of your workbench screen. It will be assigned a default name that includes the time it was run, unless you specified a new name before running the query. You can rename a query once it is logged in the list of **Previous Queries**.



You may want to retrieve a previous query to see the results again or to tweak some parameters and run the modified query. To do either of those, select the query in the **Previous Queries** tab, drag it to the text box labeled **Query Name**, and click the **Run Query** button. See screen shot below.

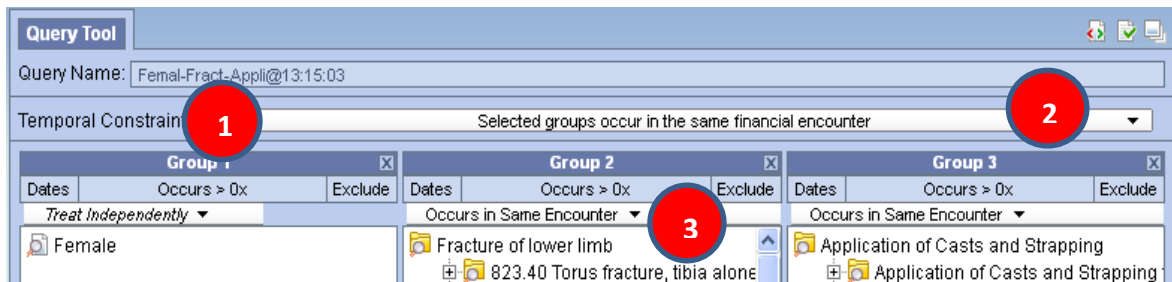
The screenshot displays the i2b2 Query & Analysis Tool interface. The 'Previous Queries' tab is circled in red, showing a query named 'females with migraines and no pregnancy [6-12-2011]'. A red arrow points from this query to the 'Query Name' field in the 'Query Tool' pane. The 'Query Tool' pane shows a query with three groups: Group 1 (Female), Group 2 (Migraine with aura codes), and Group 3 (Pregnancy codes). The query is constrained to 'Treat all groups independently'. The 'Query Status' pane shows the query is finished and returned 265±3 patients.

## Temporal Constraint

In the default situation, all of the groups have to be true for a patient in order for the patient to be counted towards your cohort (this is the “AND” between the group panels) and the truth value of each group is found independent of the other groups. However, you have the option to constrain the query so that the groups will only be true if their events coincide with the timing of events in another group. So, for example, if you have entered a list of diagnosis codes in Group 1 and a list of procedure codes in Group 2, you can constrain the search for patients to those who have documented procedures in Group 2 during the same encounters when the diagnoses in Group 1 were documented in their record.

The option to constrain the criteria to common encounters, can be found in the pull-down menu for the **Temporal Constraint** (see 1 in the figure below) field in the Query Tool pane. The default is “Treat all

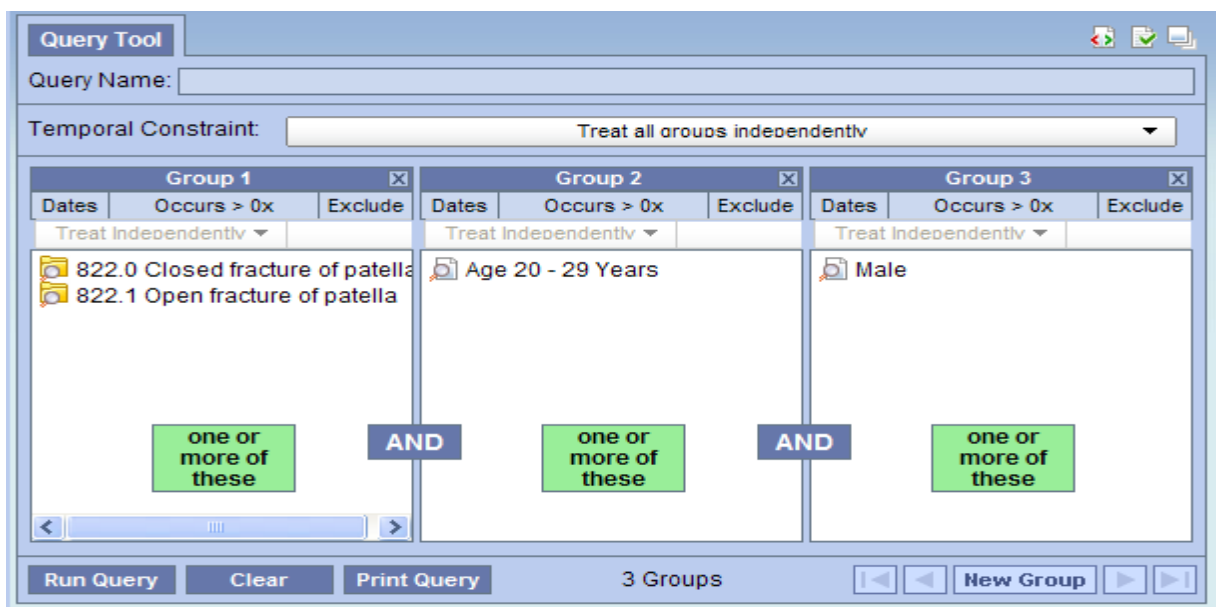
groups independently.” You can choose “Selected groups occur in the same financial encounter” (2). Once you select the “same financial encounter” option, the headings of all the Group boxes will change to, “Occurs in Same Encounter” (3). Note that there is a bug in the software that sometimes causes problems when “Occurs in Same Encounter” is applied to a group that contains Demographics criteria. Therefore, we advise that you go to the heading of groups that include Demographics criteria and turn the heading (in the white bar) back to “Treat independently”. See, for example, Group 1 in the figure below. We are working on having this problem fixed.



### Tips for Optimizing your Query

To optimize the search time for your query, choose the most restrictive criteria as your first Group and move to increasingly broad categories as you move to the right.

For example, if you are searching for males in their 20’s who have broken their knee caps, the best way to construct the query is shown in the figure below. Group 1 narrows the cohort to only patients who have broken their patella (knee caps), Group 2 selects those aged 20-29 within that group, and Group 3 selects only the males from within that cohort.

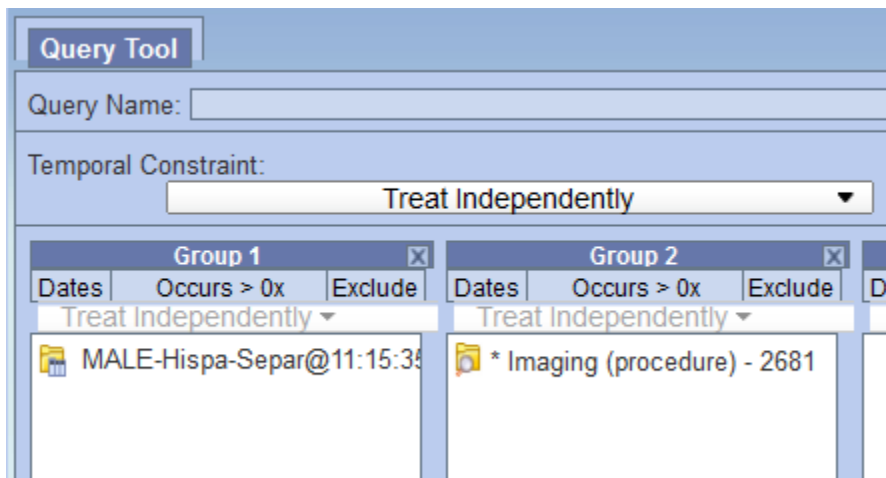


### Using Previous Queries

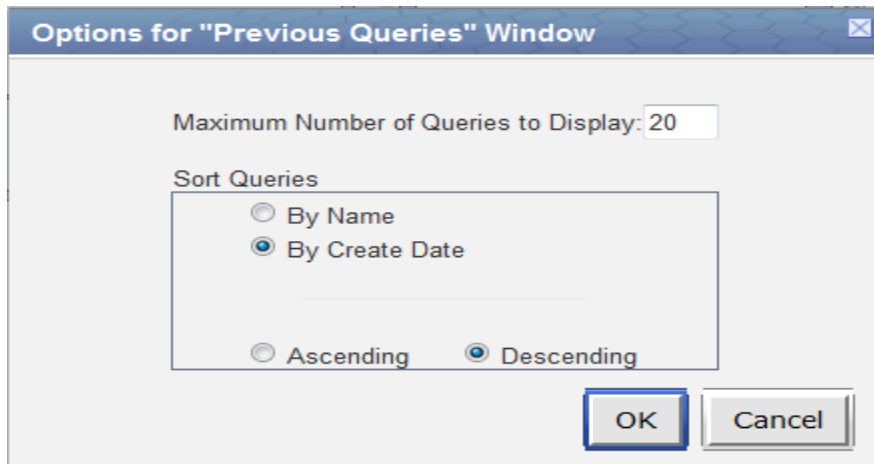
Users can drag a query from Previous Queries to the “Query Name” in the Query Tool to reload them.



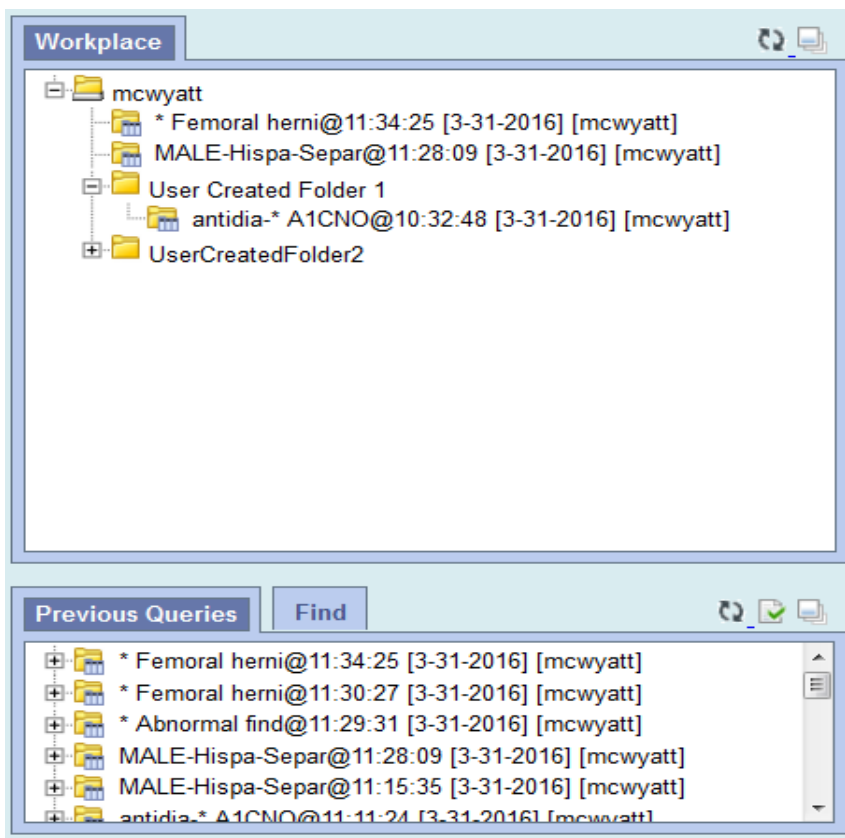
Users may also drag a previous query into the query criteria and use it as a constraint like any concept. (For example: patients must be in the results of this previous query (in group 1) AND have an imaging procedure (in group 2)).



Previous Query Options: Users can set the display for the previous queries to show more queries, or change the sort order

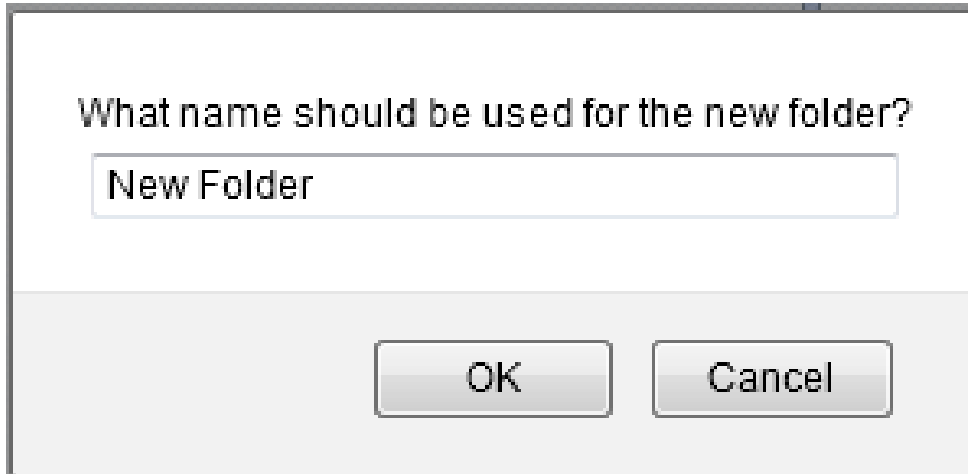


**Workplace:** the user can drag previous queries to their workspace in order to organize and keep track of important queries, final results, etc.

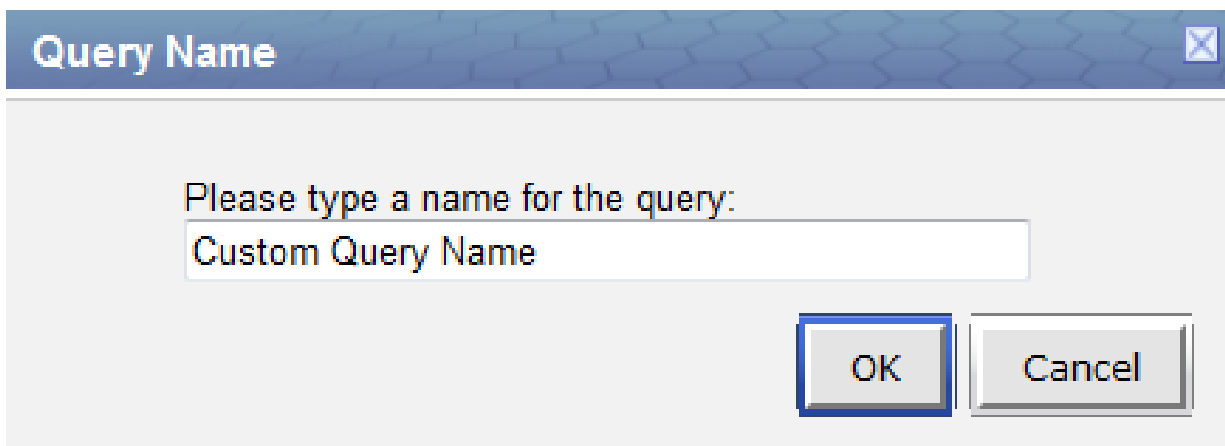




Additional folders can be created by right clicking on any folder in the workplace.



Queries in either the Workplace or the Previous Queries can be renamed at any time.



## Examples:

White Hispanics with an allergy to penicillin

The screenshot shows a 'Query Tool' window with the following details:

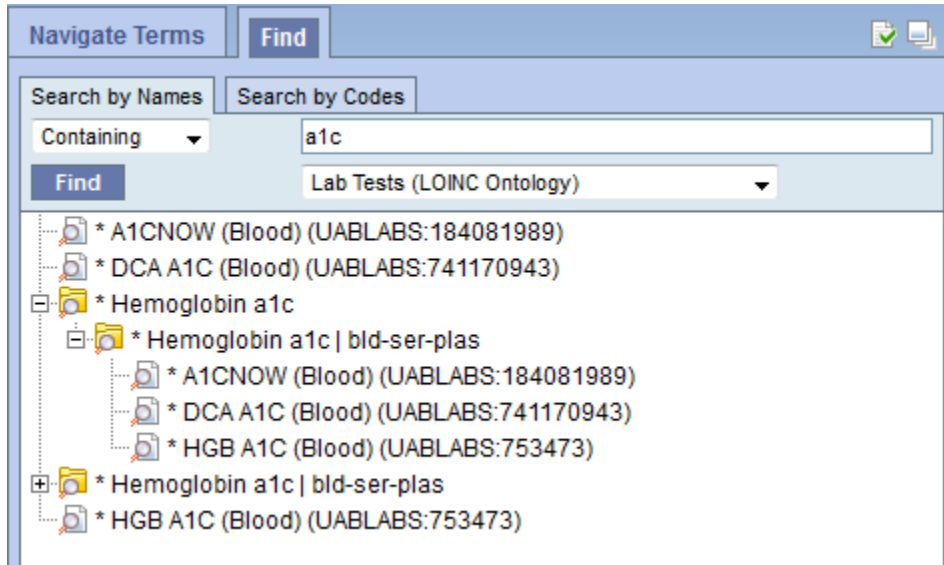
- Query Name:** Hispa-White-\* pen@09:22:03
- Temporal Constraint:** Treat Independently
- Group 1:** Hispanic/Latino - 11297
- Group 2:** White - 363037
- Group 3:** \* penicillins - 67807

The groups are connected by 'AND' operators. Each group has a green box labeled 'one or more of these' and a dropdown menu set to 'Treat Independently'. The interface includes buttons for 'Run Query', 'Clear', 'Print Query', and 'New Group'. Below the query tool, the 'Graph Results' tab is active, displaying:

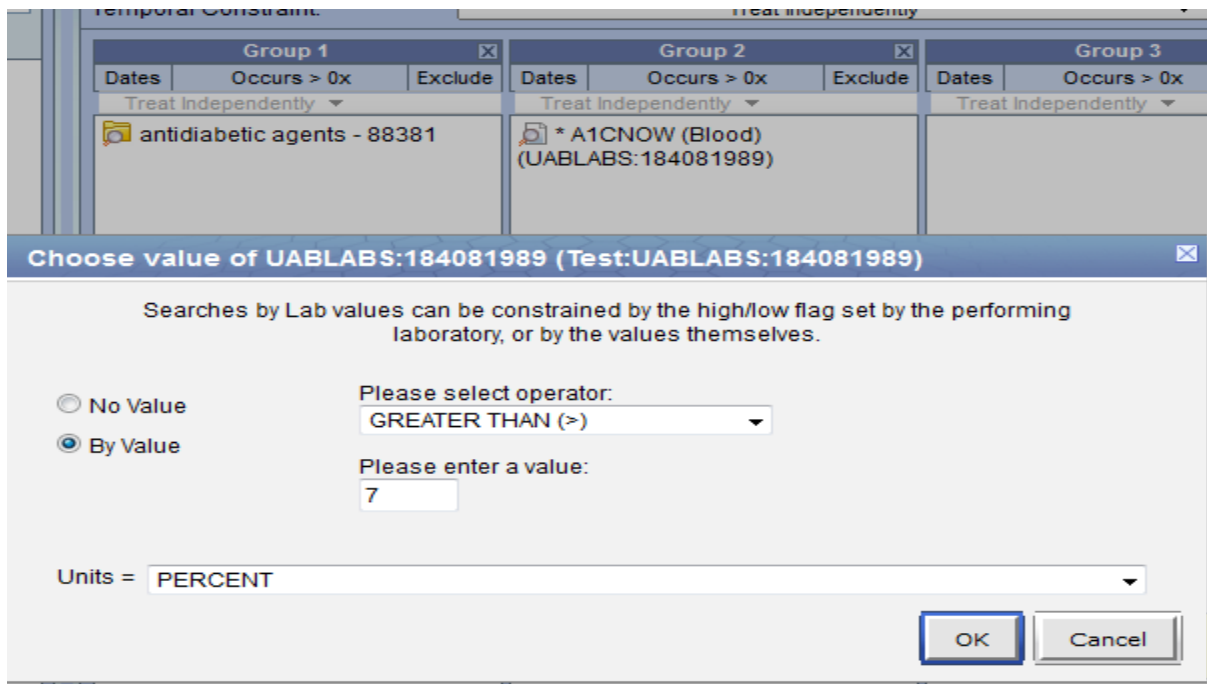
Number of patients  
**88**  
For Query "Hispa-White-\* pen@09:22:03"

People with a record for antidiabetic medication AND a Hemoglobin A1c over 7%

Search for A1C



Selecting one test and setting the criteria of greater than 7%



Results for having any record at any time of an antidiabetic medication AND a HGB A1c at any time over 7%. UAB has 3 TEST FOR A1c

**Query Tool**

Query Name:

Temporal Constraint:

Group 1			Group 2			Group 3		
Dates	Occurs > 0x	Exclude	Dates	Occurs > 0x	Exclude	Dates	Occurs > 0x	Exclude
Treat Independently			Treat Independently			Treat Independently		
antidiabetic agents - 88381			* A1C NOW (Blood) (UABLABS:184081989) >= 7 PERCENT * DCA A1C (Blood) (UABLABS:741170943) >= 7 PERCENT * HGB A1C (Blood) (UABLABS:753473) >= 7 PERCENT					

**Query Tool**

Query Name: antidia-\* A1CNO@09:49:08

Temporal Constraint:

Group 1			Group 2			Group 3		
Dates	Occurs > 0x	Exclude	Dates	Occurs > 0x	Exclude	Dates	Occurs > 0x	Exclude
Treat Independently			Treat Independently			Treat Independently		
antidiabetic agents - 88381			* A1C NOW (Blood) (UABLABS:184081989) >= 7 PERCENT * DCA A1C (Blood) (UABLABS:741170943) >= 7 PERCENT * HGB A1C (Blood) (UABLABS:753473) >= 7 PERCENT					
one or more of these			AND			one or more of these		
			AND			drop a term on here		

Run Query Clear Print Query 2 Groups << >> New Group >>>

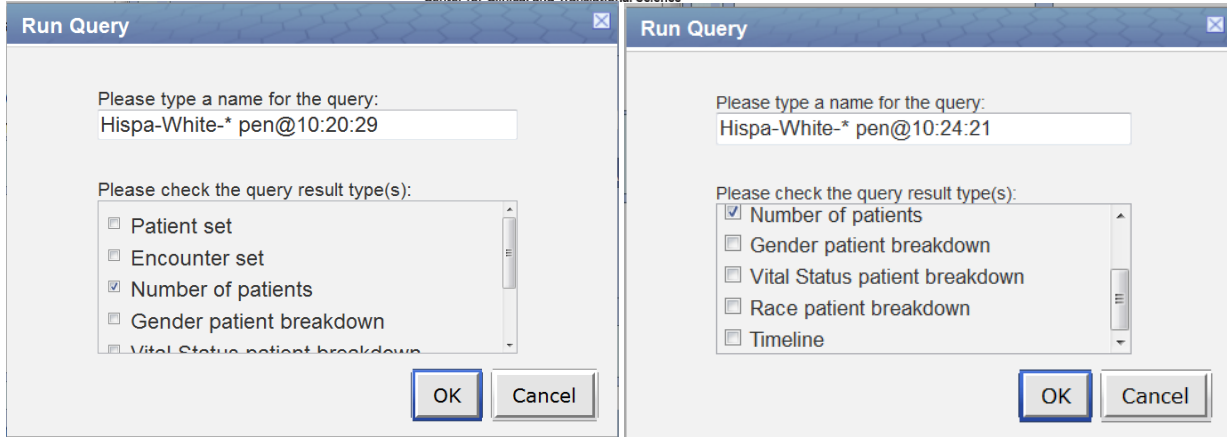
Show Query Status Graph Results

Number of patients

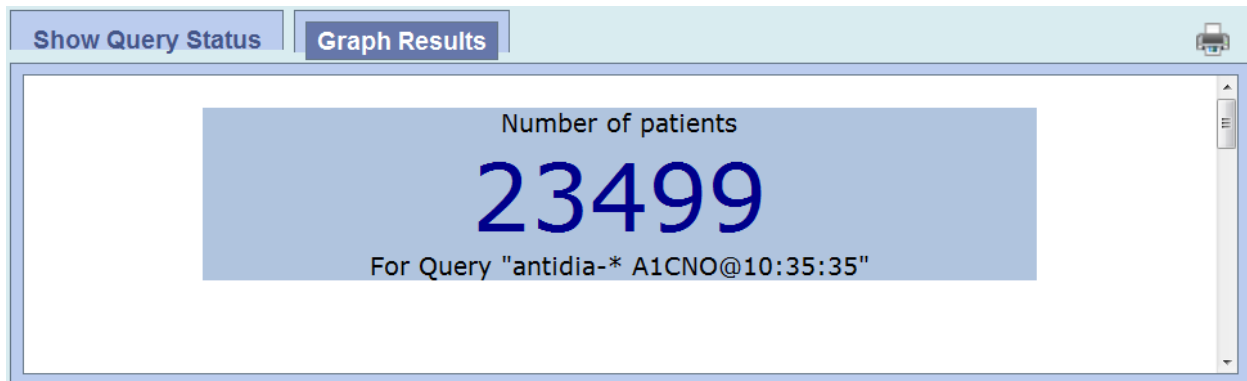
# 23499

For Query "antidia-\* A1CNO@09:49:08"

When Running a Query, the user has various options:



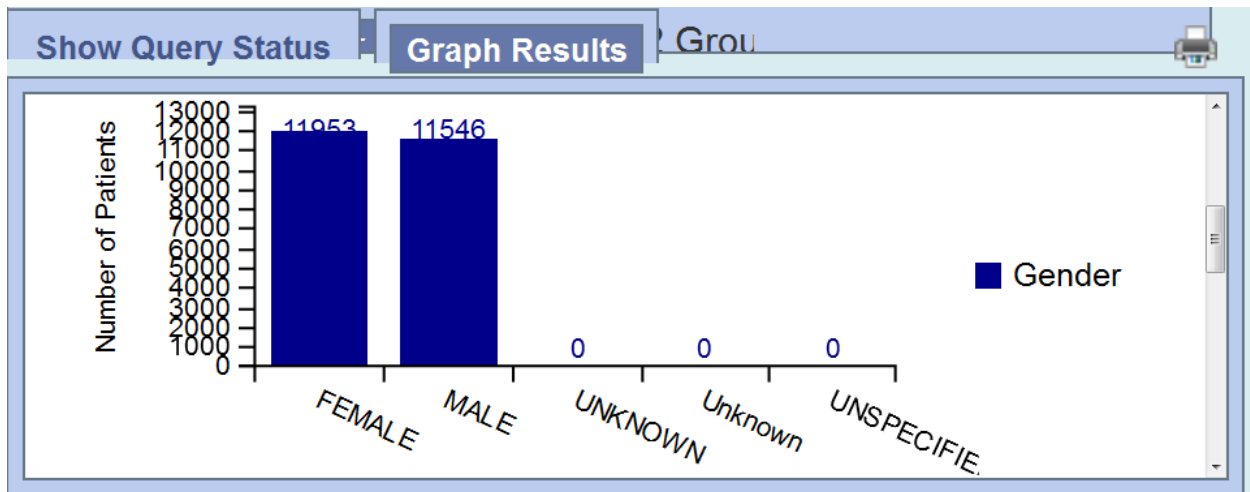
**Count:** simple count of the results. Single Number – Typical for iterating over the query criteria before finalizing on the patient set of interest.



**Gender Breakdown:**

**Gender patient breakdown for "antidia-\* A1CNO@10:35:35"**

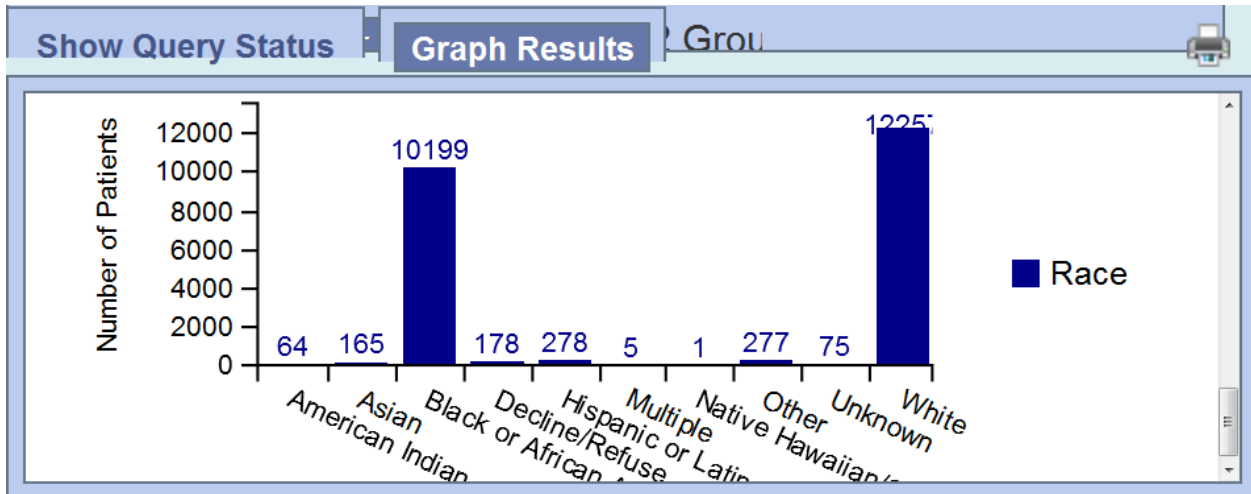
FEMALE: 11953  
MALE: 11546  
UNKNOWN: 0  
Unknown: 0  
UNSPECIFIED: 0



**Race Breakdown:**

**Race patient breakdown for "antidia-\* A1CNO@10:35:35"**

American Indian or Alaska Native: 64  
 Asian: 165  
 Black or African American: 10199  
 Decline/Refuse: 178  
 Hispanic or Latino: 278  
 Multiple: 5  
 Native Hawaiian/Other Pacific Islander: 1  
 Other: 277

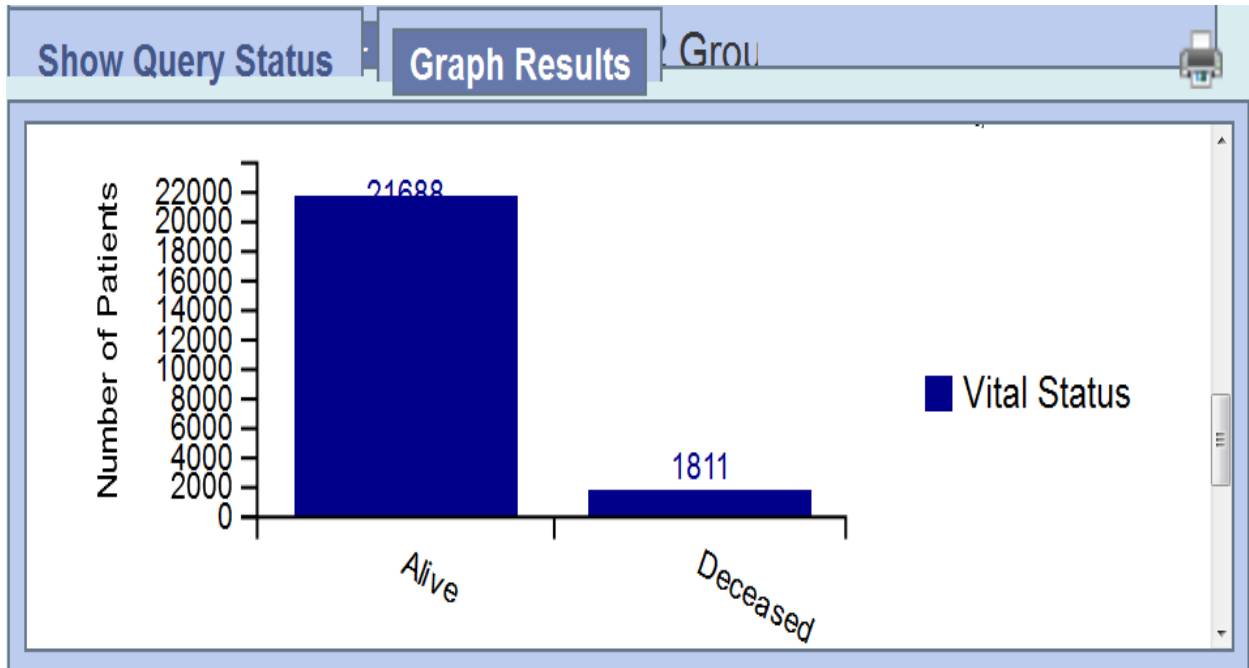


**Vital Status Breakdown:**

**Vital Status patient breakdown for "antidia-\* A1CNO@10:35:35"**

Alive: 21688

Deceased: 1811



**Patient Set: Created the list of patients in order to download the dataset.**

**Encounter Set: Not currently used**



**Timeline: Not currently used**

Changing the Query to require that the medication and the lab result occurs on the same encounter date.

The screenshot shows the 'Query Tool' interface. At the top, the 'Query Name' is 'antidia-\* A1CNO@09:49:08'. Below it, the 'Temporal Constraint' is set to 'Treat Independently'. A dropdown menu is open, showing options: 'Treat all groups independently', 'Selected groups occur in the same financial encounter', and 'Define sequence of Events'. The main area contains a list of groups. Group 1 is 'antidiabetic agents - 88381'. Group 2 contains three lab result terms: '\* A1CNOW (Blood) (UABLABS:184081989) >= 7 PERCENT', '\* DCA A1C (Blood) (UABLABS:741170943) >= 7 PERCENT', and '\* HGB A1C (Blood) (UABLABS:753473) >= 7 PERCENT'. The groups are connected by 'AND' connectors. There are green boxes labeled 'one or more of these' and a yellow box labeled 'drop a term on here'. At the bottom, there are buttons for 'Run Query', 'Clear', 'Print Query', and 'New Group', along with a '2 Groups' indicator and navigation arrows.

Results when requiring the same encounter

**Query Tool** ✓ 📄

Query Name:

Temporal Constraint:

Group 1			Group 2			Group 3		
Dates	Occurs > 0x	Exclude	Dates	Occurs > 0x	Exclude	Dates	Occurs > 0x	Exclude
Occurs in Same Encounter ▼			Occurs in Same Encounter ▼			Occurs in Same Encounter ▼		
one or more of these			AND			one or more of these		
			AND			drop a term on here		

2 Groups

🖨️

Number of patients

# 18024

For Query "antidia-\* A1CNO@09:51:36"

Changing the query to require that the medication be between 12/1/20115 and 1/31/2016

The screenshot displays a 'Query Tool' interface. At the top, there is a 'Query Name' field. Below it, a 'Temporal Constraint' section shows 'Selected groups occur in the same financial year'. The main area contains two columns: 'Group 1' and 'Group 2'. Each column has a 'Dates' column, an 'Occurs > 0x' column, and an 'Exclude' column. Under 'Group 1', the 'Dates' column contains 'Occurs in Same Encounter' and the 'Occurs > 0x' column contains 'antidiabetic agents - 88381'. Under 'Group 2', the 'Dates' column contains 'Occurs in Same Encounter' and the 'Occurs > 0x' column contains '\* A1CNOW (Blood) (UABLABS:184081989) >= 7'. A dialog box titled 'Constrain Group by Date Range' is open in the foreground. It has two date fields: 'From:' with a dropdown arrow and a checked checkbox, containing '12/01/2015'; and 'To:' with a dropdown arrow and a checked checkbox, containing '01/31/2016'. At the bottom of the dialog are 'OK' and 'Cancel' buttons. The background interface has buttons for 'Run Query', 'Clear', and 'Print Query', and a status bar showing '2 Groups'.

Results after constraining for medication within the 2 month period

**Query Tool** 📄 🖨️

Query Name:

Temporal Constraint:

Group 1			Group 2			Group 3		
Dates	Occurs > 0x	Exclude	Dates	Occurs > 0x	Exclude	Dates	Occurs > 0x	Exclude
Occurs in Same Encounter ▼			Occurs in Same Encounter ▼			Occurs in Same Encounter ▼		
<div style="border: 1px solid gray; padding: 5px;">antidiabetic agents - 88381</div>			<div style="border: 1px solid gray; padding: 5px;">                     * A1CNOW (Blood)                      (UABLABS:184081989) &gt;= 7 PERCENT                      * DCA A1C (Blood)                      (UABLABS:741170943) &gt;= 7 PERCENT                      * HGB A1C (Blood)                      (UABLABS:753473) &gt;= 7 PERCENT                 </div>					
one or more of these			AND			one or more of these		
			AND			drop a term on here		

2 Groups

🖨️

Number of patients

# 1427

For Query "antidia-\* A1CNO@09:55:39"

Clicking the Print Query icon just above the results box shows the detail criteria of the query as well as the results

Query Name: antidia-* A1CNO@09:55:39 Temporal Constraint: Selected groups occur in the same financial encounter		
<b>Group 1</b>		
Date From: 12/01/2015 Date To: 1/31/2016 Excluded? false Occurs X times: > 0 Relevance %: 100 Temporal Constraint: Occurs in Same Encounter		
Path	Concept/Term	Other Information
medications\multum\antidiabetic agents	antidiabetic agents	
<b>Group 2</b>		
Date From: none Date To: none Excluded? false Occurs X times: > 0 Relevance %: 100 Temporal Constraint: Occurs in Same Encounter		
Path	Concept/Term	Other Information
LOINC \ Loincparts \ Hematology/coagulation \ Hematology \ Hemoglobin normal variant \ Hemoglobin a \ Hemoglobin a1 \ Hemoglobin a1c \ Hemoglobin a1c   bld-ser-plas \ Hemoglobin a1c/hemoglobin.total:mass fraction:point in time:whole blood:quantitative~UABLABS:184081989 A1CNOW (Blood) (UABLABS:184081989)	* A1CNOW (Blood) (UABLABS:184081989) >= 7 PERCENT	GE : 7 PERCENT
LOINC \ Loincparts \ Hematology/coagulation \ Hematology \ Hemoglobin normal variant \ Hemoglobin a \ Hemoglobin a1 \ Hemoglobin a1c \ Hemoglobin a1c   bld-ser-plas \ Hemoglobin a1c/hemoglobin.total:mass fraction:point in time:whole blood:quantitative~UABLABS:741170943 DCA A1C (Blood) (UABLABS:741170943)	* DCA A1C (Blood) (UABLABS:741170943) >= 7 PERCENT	GE : 7 PERCENT
LOINC \ Loincparts \ Hematology/coagulation \ Hematology \ Hemoglobin normal variant \ Hemoglobin a \ Hemoglobin a1 \ Hemoglobin a1c \ Hemoglobin a1c   bld-ser-plas \ Hemoglobin a1c/hemoglobin.total:mass fraction:point in time:whole blood:quantitative~UABLABS:753473 HGB A1C (Blood) (UABLABS:753473)	* HGB A1C (Blood) (UABLABS:753473) >= 7 PERCENT	GE : 7 PERCENT

**Finished Query: "antidia-\* A1CNO@09:55:39"**

[113.0 secs]

Compute Time: 111 secs

**Patient Set for "antidia-\* A1CNO@09:55:39"**

**Number of patients for "antidia-\* A1CNO@09:55:39"**

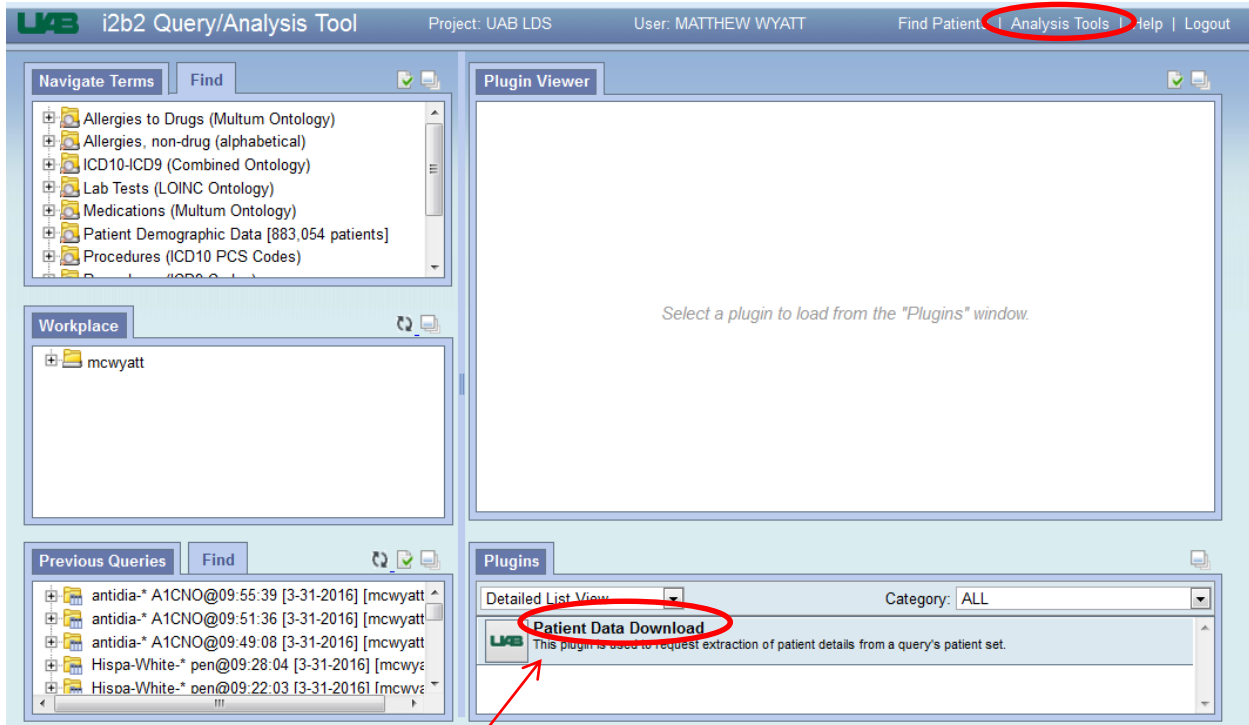
patient\_count: 1427

## Patient Data Download:

Getting to the Download and/or request a consultation screen

Click "Analysis Tools" at the top Right:





Click the Patient Data Download Plugin



The Plugin is loaded into the i2b2

**Navigate Terms** Find

- ⊞ Allergies to Drugs (Multum Ontology)
- ⊞ Allergies, non-drug (alphabetical)
- ⊞ ICD10-ICD9 (Combined Ontology)
- ⊞ Lab Tests (LOINC Ontology)
- ⊞ Medications (Multum Ontology)
- ⊞ Patient Demographic Data [883,054 patients]
- ⊞ Procedures (ICD10 PCS Codes)
- ⊞ Procedures (ICD9 Codes)
- ⊞ Visit Details [10,590,877 encounters]
- ⊞ Vital Signs

**Patient Data Download**

**Self-Service Limited Data Set Download**

---

- **What facts do you want to download?** By default, all fact types will be downloaded for selected patient sets. This might be too much data, so you can limit what is downloaded below.
- **IMPORTANT:** With each download, you acknowledge that you have read and understood the terms and conditions of receiving access to Limited Data Set (LDS) from the UAB i2b2 system. This agreement applies for as long as you retain the LDS.

**Limit Fact Type**

Meds   
  Labs   
  Diagnoses   
  Vitals

**Limit Date Range**

From:    
 To:

**Limit Details**

Download all data rows   
  Download a summary (get patient counts for each concept)

**Workplace**

⊞ mcwyatt

**Previous Queries** Find

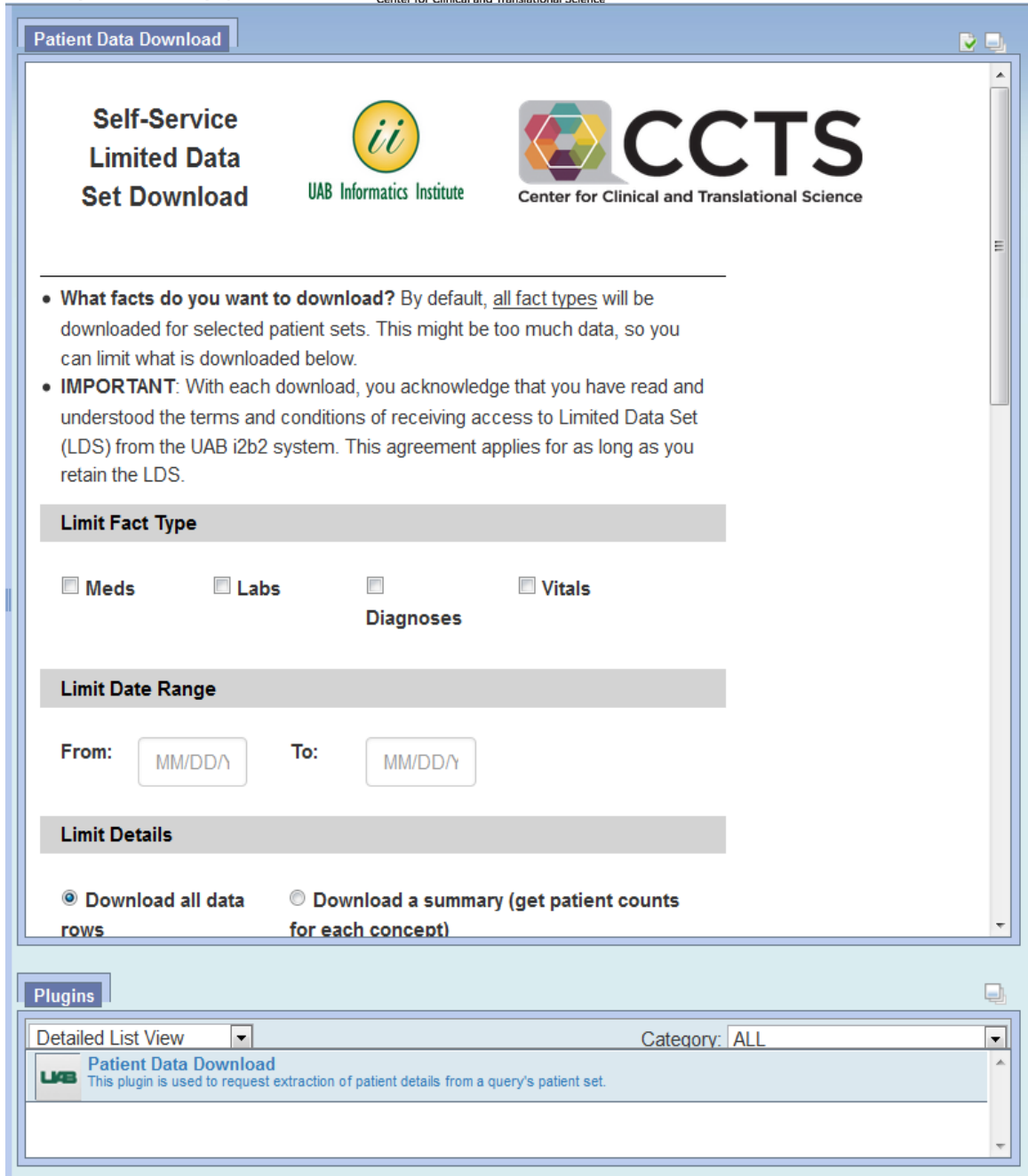
- ⊞ antidia-\* A1CNO@09:55:39 [3-31-2016] [mcwyatt]
- ⊞ antidia-\* A1CNO@09:51:36 [3-31-2016] [mcwyatt]
- ⊞ antidia-\* A1CNO@09:49:08 [3-31-2016] [mcwyatt]
- ⊞ Hispa-White-\* pen@09:28:04 [3-31-2016] [mcwyatt]
- ⊞ Hispa-White-\* pen@09:22:03 [3-31-2016] [mcwyatt]

**Plugins**

Detailed List View Category: ALL

**UAB Patient Data Download**

This plugin is used to request extraction of patient details from a query's patient set.



The screenshot shows a web application window titled "Patient Data Download". The main content area has a header with the text "Self-Service Limited Data Set Download" and logos for "UAB Informatics Institute" and "CCTS Center for Clinical and Translational Science". Below the header, there are two bullet points: "What facts do you want to download?" and "IMPORTANT: With each download, you acknowledge that you have read and understood the terms and conditions of receiving access to Limited Data Set (LDS) from the UAB i2b2 system. This agreement applies for as long as you retain the LDS." The interface includes three sections: "Limit Fact Type" with checkboxes for "Meds", "Labs", "Diagnoses", and "Vitals"; "Limit Date Range" with "From:" and "To:" date input fields; and "Limit Details" with radio buttons for "Download all data rows" (selected) and "Download a summary (get patient counts for each concept)". At the bottom, there is a "Plugins" section with a dropdown menu set to "Detailed List View" and a "Category: ALL" dropdown. A single plugin is listed: "Patient Data Download" with a description: "This plugin is used to request extraction of patient details from a query's patient set."


The Plugin Screen, or other screens can be resized or maximized by clicking the “Resize Workspace” icon






The Data Download Plug-In allows the user to select any patient set that has been created, and download various types of facts, or summary data.

**Self-Service Limited Data Set Download**





- What facts do you want to download? By default, all fact types will be downloaded for selected patient sets. This might be too much data, so you can limit what is downloaded below.
- IMPORTANT:** With each download, you acknowledge that you have read and understood the terms and conditions of receiving access to Limited Data Set (LDS) from the UAB i2b2 system. This agreement applies for as long as you retain the LDS.

**Limit Fact Type**

Meds
 Labs
 Diagnoses
 Vitals

**Limit Date Range**

From:  To:

**Limit Details**

Download all data rows
  Download a summary (get patient counts for each concept)

**Information Recorded with this Download**

*Displaying your most recently recorded project information; you may alter this information for each download request.*

**\*Title of Research Project**

**\*Description of the Research Project**

**List Blazer IDs of Others Who Will View/Use This Data (comma separated)**

**\*Select at Least One Data Set**

*Only completed queries that return patient sets are displayed below. Most recent is first.*

<input type="checkbox"/> Patient Set for antidia-* A1CNO@09:55:39	Patients in Set: <b>1427</b>	Created 03/31/2016 09:55:42 AM
<input type="checkbox"/> Patient Set for antidia-* A1CNO@09:51:36	Patients in Set: <b>18024</b>	Created 03/31/2016 09:51:38 AM
<input type="checkbox"/> Patient Set for antidia-* A1CNO@09:49:08	Patients in Set: <b>23499</b>	Created 03/31/2016 09:49:15 AM
<input type="checkbox"/> Patient Set for Hispa-White-* pen@09:28:04	Patients in Set: <b>88</b>	Created 03/31/2016 09:28:07 AM
<input type="checkbox"/> Patient Set for * Nk-* C@14:08:13	Patients in Set: <b>513</b>	Created 03/30/2016 02:08:17 PM
<input type="checkbox"/>	Patients in Set:	Created 03/28/2016 05:01:19 PM

Wait Screen when download is processing

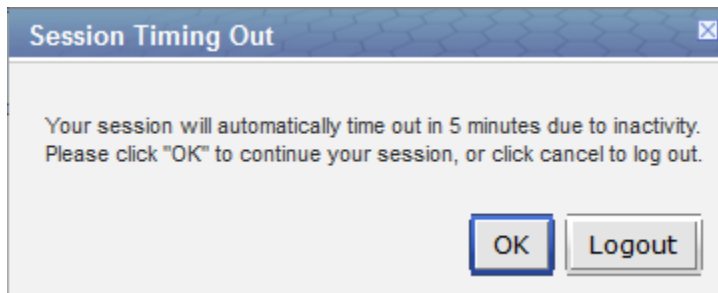
Patient Data Download

**Self-Service Limited Data  
Set Download**

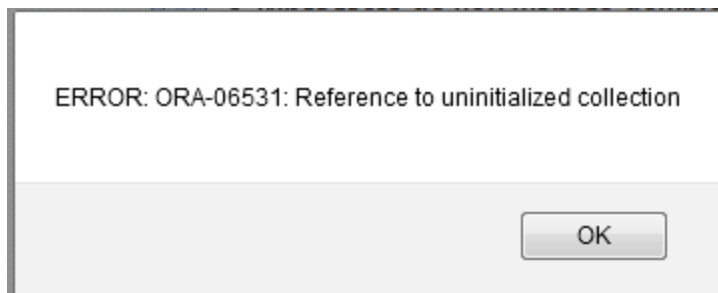


Your download is underway. Please wait.

### Time out Message:



**Error☺**. Should not happen when everything is up and running

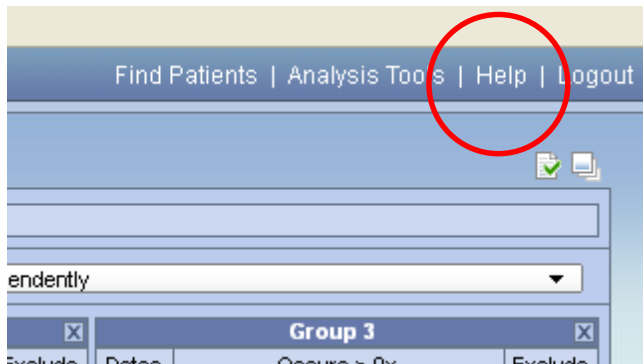


The cell's status message could not be understood.

OK

## Additional Help

Additional online help for the general i2b2 tool is available from the i2b2 organization and can be accessed by clicking Help in the upper right-hand side of the workbench.



If you would like an in-person demonstration of i2b2 or have further questions, please contact the

UAB CCTS  
[Pittman Center for Advanced Medical Studies](#)  
(PCAMS)  
1924 7th Avenue South  
Birmingham, AL 35233

We will do our best to respond to your inquiry within 2-3 business days.