Leveraging the OHDSI ecosystem

as a developer

OMOP Team, IQVIA
March 2021

Training series plan

+ Session 1 : Course Introduction
  - OMOP CDM and vocabulary overview, OMOP conversion, data quality, examples of previous research and use cases, introducing ATLAS and OHDSI tools

+ Session 2: OMOP CDM/Vocabulary Tutorial
  - Concept, Concept mapping, Hierarchy, Ancestors, and OMOP CDM

+ Session 3: Cohort and Cohort Characterization
  - Concept sets, cohort definition, and cohort characterization

+ Session 4: Treatment Pathways and Incident Rates
  - Treatment pathways, Incidence rates, and Characterization using R

Table of contents

+ Exercise review from previous session
+ Introduction of influenza study in ATLAS
+ **ATLAS concept sets and cohorts**
  - Data sources
  - Concept sets
  - Cohort building
  - Build cohorts for example case study – exercise
+ **ATLAS characterizations**
  - Cohort characterization (default and customized features)
  - Build characterization for example case study – exercise
+ **Homework**

Ground Rules

+ This session will be recorded
+ Please make sure your microphones are muted
+ Type your questions in the chat or bring them to the Q& A session
+ Turn off your camera

Exercise Review from Session #1

Session #1 Homework – Proposed concepts

		CONCEPT ID	CONCEPT NAME	OHDSI SOURCE
Influenza		4266367		
Type 2 diabetes				https://atlas.ohdsi.org/#/conceptset/27/expression
Lung disease			chronic obstructive pulmonary disease (COPD)	https://atlas.ohdsi.org/#/conceptset/59/expression
Cancer		443392	Malignant neoplastic disease	
		4144289	H/O: malignant neoplasm	
Immunodeficiency		433740	Immunodeficiency disorder	
Heart Disease	Cardiomyopathy	321319	Cardiomyopathy	
	Myocardial infarction			https://atlas.ohdsi.org/#/conceptset/44/expression
	Heart Failure			https://atlas.ohdsi.org/#/conceptset/57/expression
Hypertension				https://atlas.ohdsi.org/#/conceptset/21/expression
Asthma				https://atlas.ohdsi.org/#/conceptset/60/expression
Renal Disease		45768812	Anemia in chronic kidney disease	https://atlas.ohdsi.org/#/cohortdefinition/228/conceptsets
		194385	Aneurysm of renal artery	
		46271022	Chronic kidney disease	
		192279	Disorder of kidney due to diabetes mellitus	
		4263367	Glomerulonephritis	
		261071	Glomerulosclerosis	
		201313	Hypertensive renal disease	
		193253	Nephritis	
		195314	Nephrotic syndrome	
		192359	Renal failure syndrome	

Exercise Review from Session #2

Session #2 Homework – Proposed solutions

https://drive.google.com/drive/folders/1-zqBUMOKFC2zk_EvPsGPg-c36uWSjNTa

Introduction of Influenza Study in ATLAS

Influenza Study

Treatments and outcomes of influenza patients during hospital stay

Study Topic

Baseline demographics and clinical characteristics, treatment patterns and outcomes of patients diagnosed with influenza initiating treatment in the US hospital setting: a retrospective cohort study using administrative data.

Objectives

Primary Objectives

- Describe the treatment patterns of hospitalized influenza patients:
  - Drugs - (a) antivirals (b) antibiotics (c) corticosteroids
  - Procedures - (a) mechanical ventilation (b) tracheostomy (c) extracorporeal membrane oxygenation (d) oxygen therapy
- Describe the length of the hospital stay by conditions of interest:
  - (a) diabetes (b) lung disease (c) cancer (d) immunodeficiency (e) heart disease (f) hypertension (g) asthma (h) kidney disease

Secondary Objectives

- Describe the baseline demographics and clinical characteristics of hospitalized influenza patients.

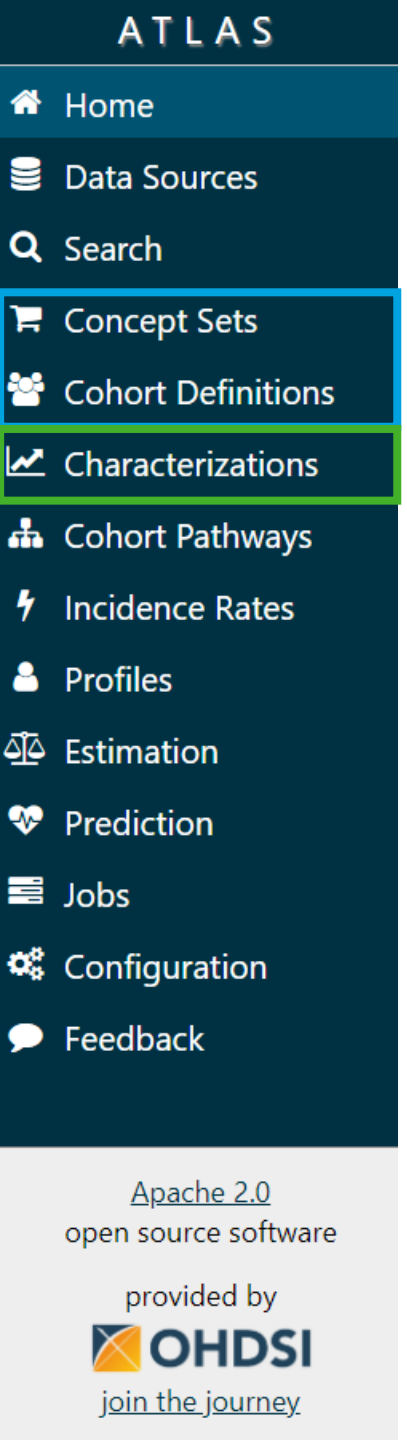
Influenza Study – Cohort Definition

Study Population

- Persons hospitalized during the **2008-2009 influenza season** with a diagnosis of influenza **21 days prior** or during the **hospital stay**, with **no prior continuous enrollment** required and with **no influenza hospitalization in the 6 months prior** to hospital admission.

Inclusion Criteria

- Patients with claims for a **hospital stay** between **1st September 2008** and **1st April 2009** (**index date**). All hospital stays during the study period are of interest.
- Patient is **≥ 18** years of age at **index date**.
- Patient has at least **1 diagnosis/measurement** of influenza **21 days prior to index start date** (hospital admission) or up to **index end date** (hospital discharge date).
- Patient has **0 months of prior continuous enrollment** prior to hospital admission.
- **EXCLUDE** patients with evidence of **hospitalization for influenza** in the **6 months prior to index date**.



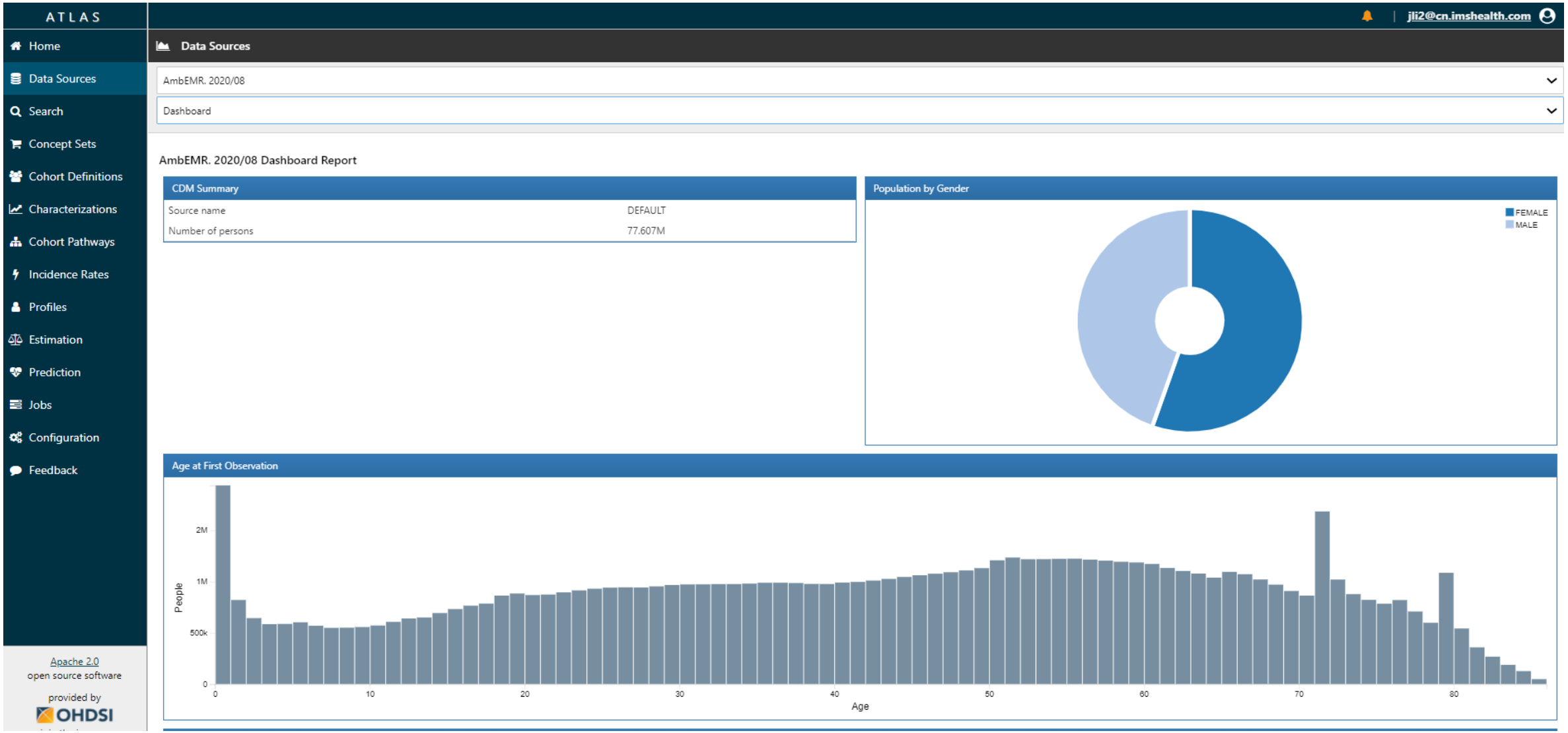
Analysis plan for the example study in ATLAS

- **Part 1**
  - Build concepts sets
  - Build cohort definitions

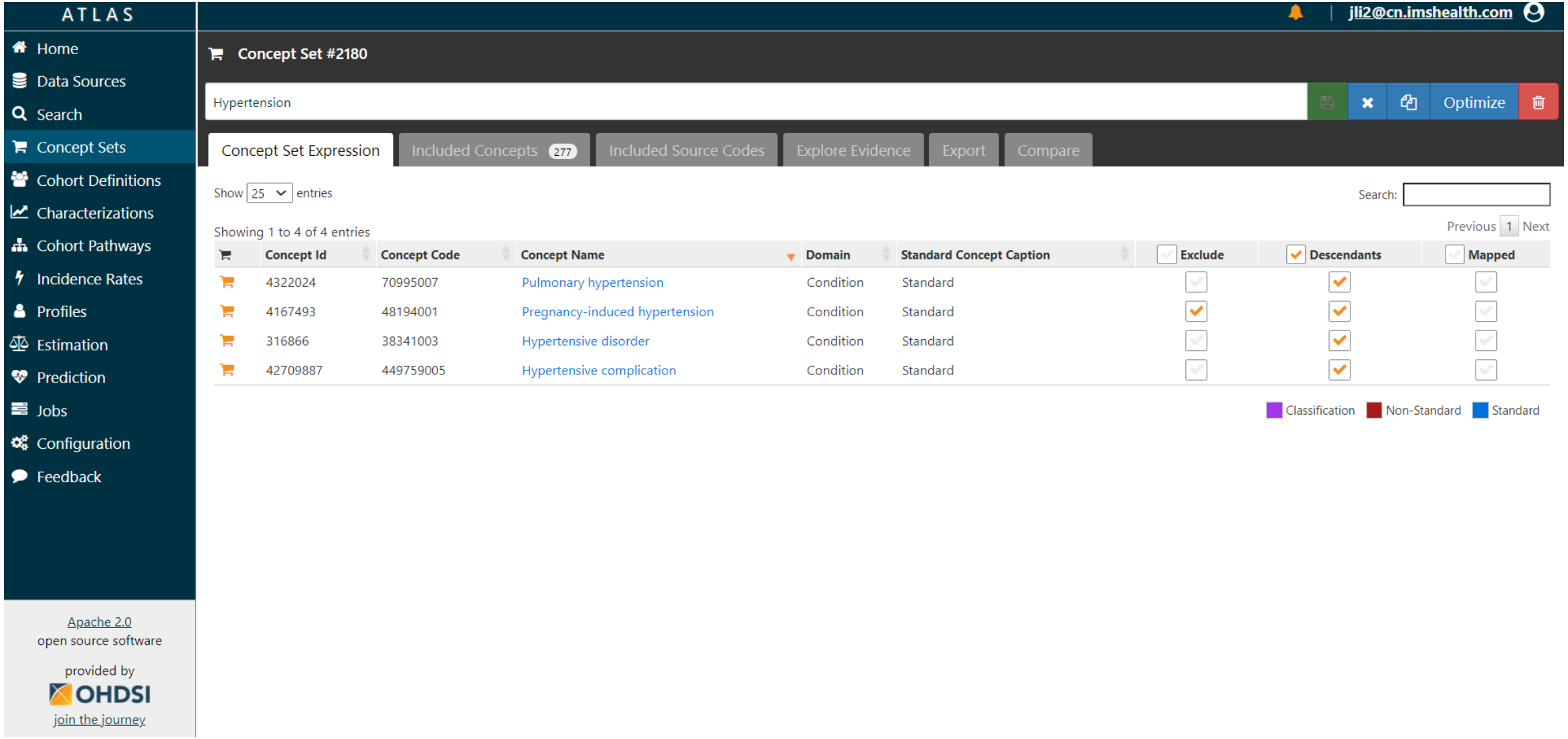
- **Part 2**
  - Characterization of the study cohort

ATLAS Concept Sets Lecture, Demo & Exercise

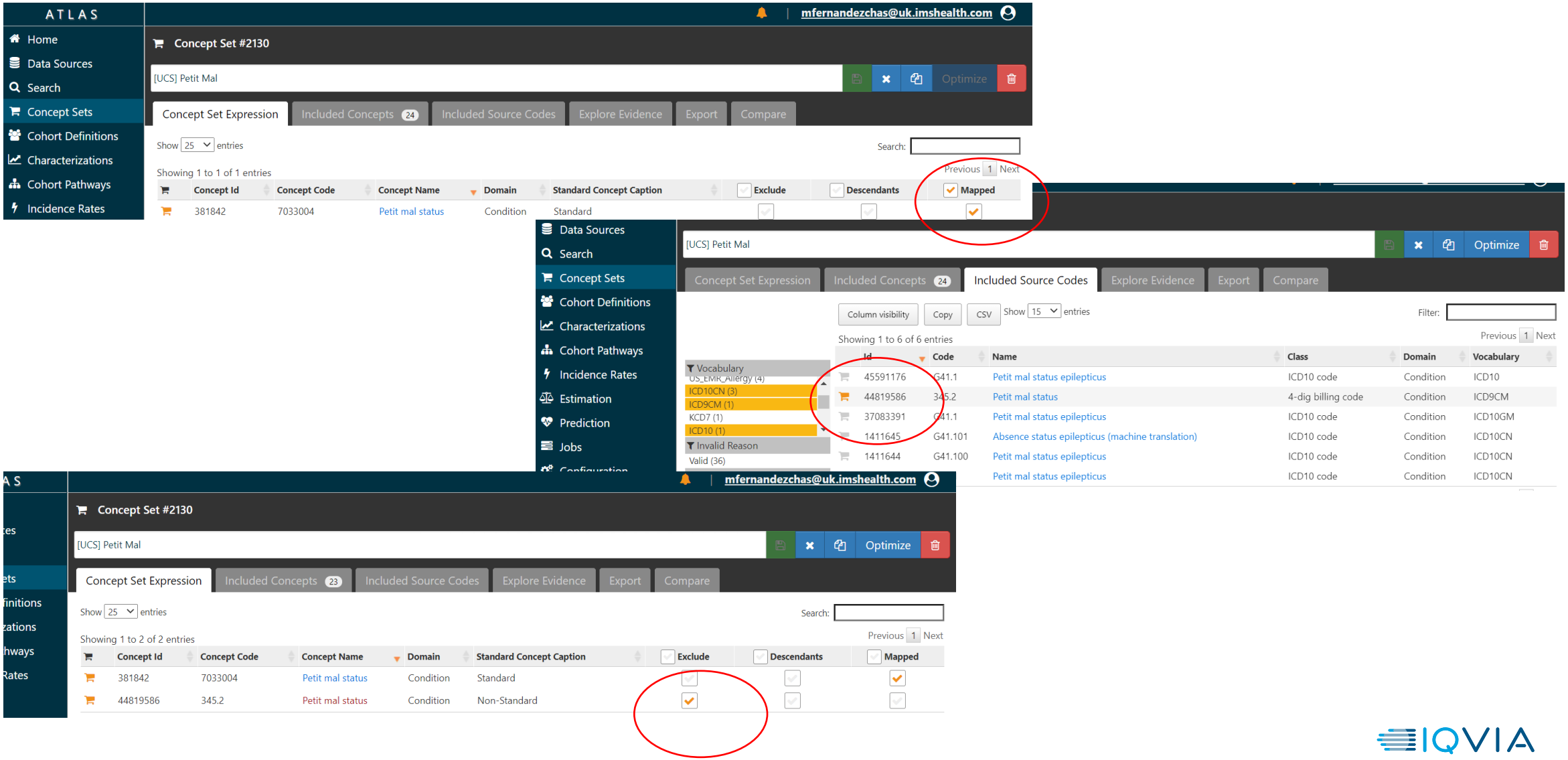
ATLAS – Data Sources



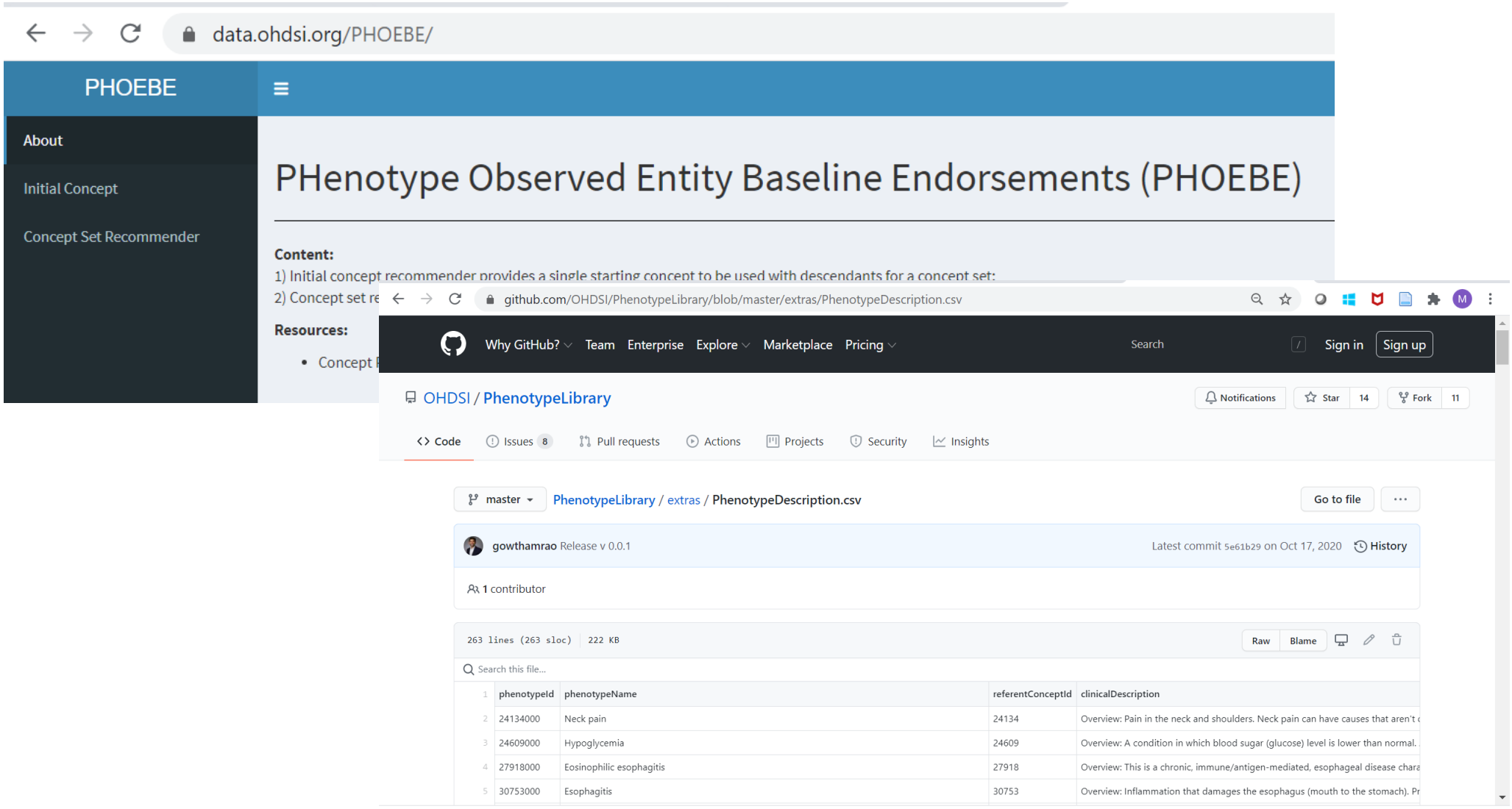
ATLAS – Concept Sets



ATLAS – Concept Sets



ATLAS – Concept Sets (Resources: phenotypes, Phoebe)



ATLAS – Concept Sets – Demo

- influenza
- type 2 diabetes
- lung disease
- cancer
- immunodeficiency
- heart disease
- hypertension
- asthma
- kidney disease

https://athena.ohdsi.org/search-terms/start

ATLAS – Concept Sets – Exercise

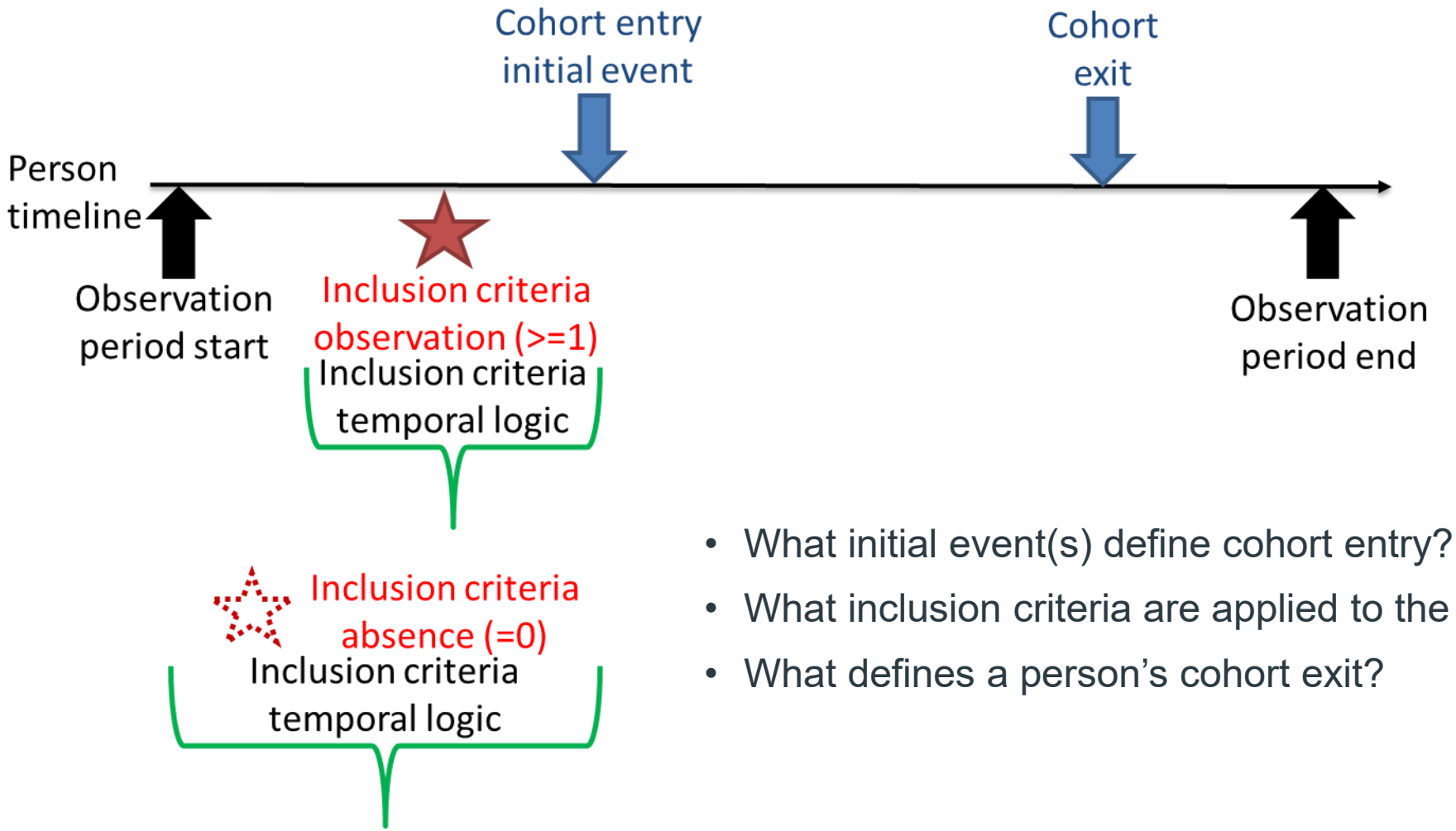
- influenza
- type 2 diabetes
- lung disease
- cancer
- immunodeficiency
- heart disease
- hypertension
- asthma
- kidney disease

https://athena.ohdsi.org/search-terms/start

ATLAS Cohort Definition Lecture, Demo & Exercise

ATLAS – Cohort definitions

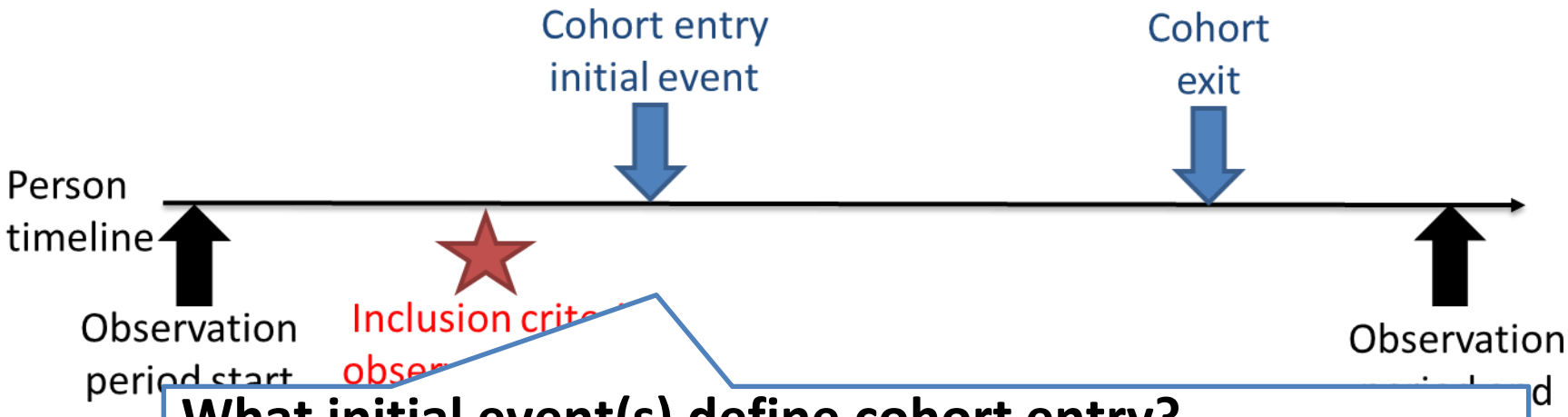
Dissecting the anatomy of a cohort definition



- What initial event(s) define cohort entry?
- What inclusion criteria are applied to the initial events?
- What defines a person's cohort exit?

ATLAS – Cohort entry event

Dissecting the anatomy of a cohort definition

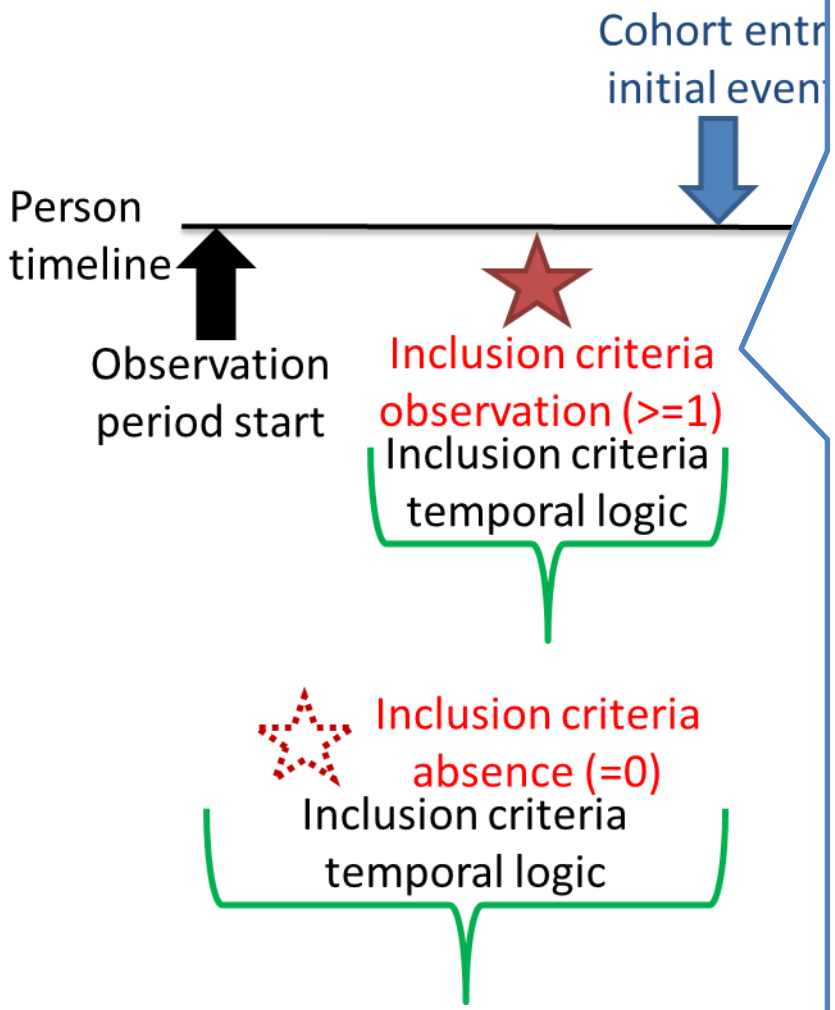


What initial event(s) define cohort entry?

- Events are recorded time-stamped observations for the persons, such as drug exposures, conditions, procedures, measurements and visits.
- The event index date is set to be equal to the event start date
- Initial events defined by a domain, concept set, and any domain-specific attributes required

ATLAS – Cohort inclusion criteria

Dissecting the anatomy of a cohort definition



What inclusion criteria are applied to the initial events?

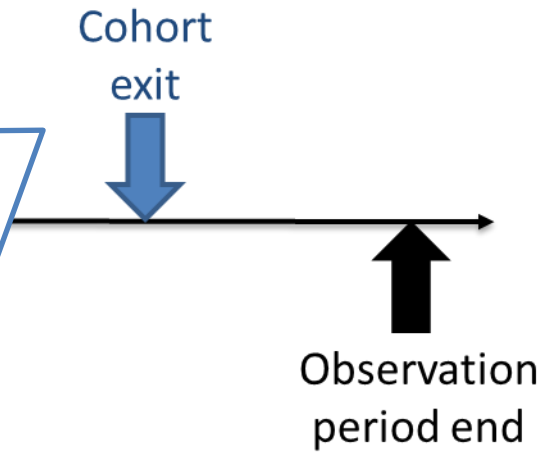
- The qualifying cohort will be defined as all persons who have an initial event and satisfy all qualifying inclusion criteria.
- Each inclusion criteria is defined by domain(s), concept set(s), domain-specific attributes, and the temporal logic relative to initial events
- Each qualifying inclusion criteria can be evaluated to determine the impact of the criteria on the attrition of persons from the initial cohort (example use case: clinical trial feasibility)

ATLAS – Cohort exit

Dissecting the anatomy of a cohort definition

What defines a person's cohort exit?

- Cohort exit signifies when a person no longer qualifies for cohort membership
- Cohort exit can be defined in multiple ways:
  - End of observation period
  - Fixed time interval relative to initial event
  - Last event in a sequence of related observations (ex: persistent drug exposure)
  - Censoring observations
- Cohort exit strategy will impact whether a person can belong to the cohort multiple times during different time intervals



BREAK

10 mins

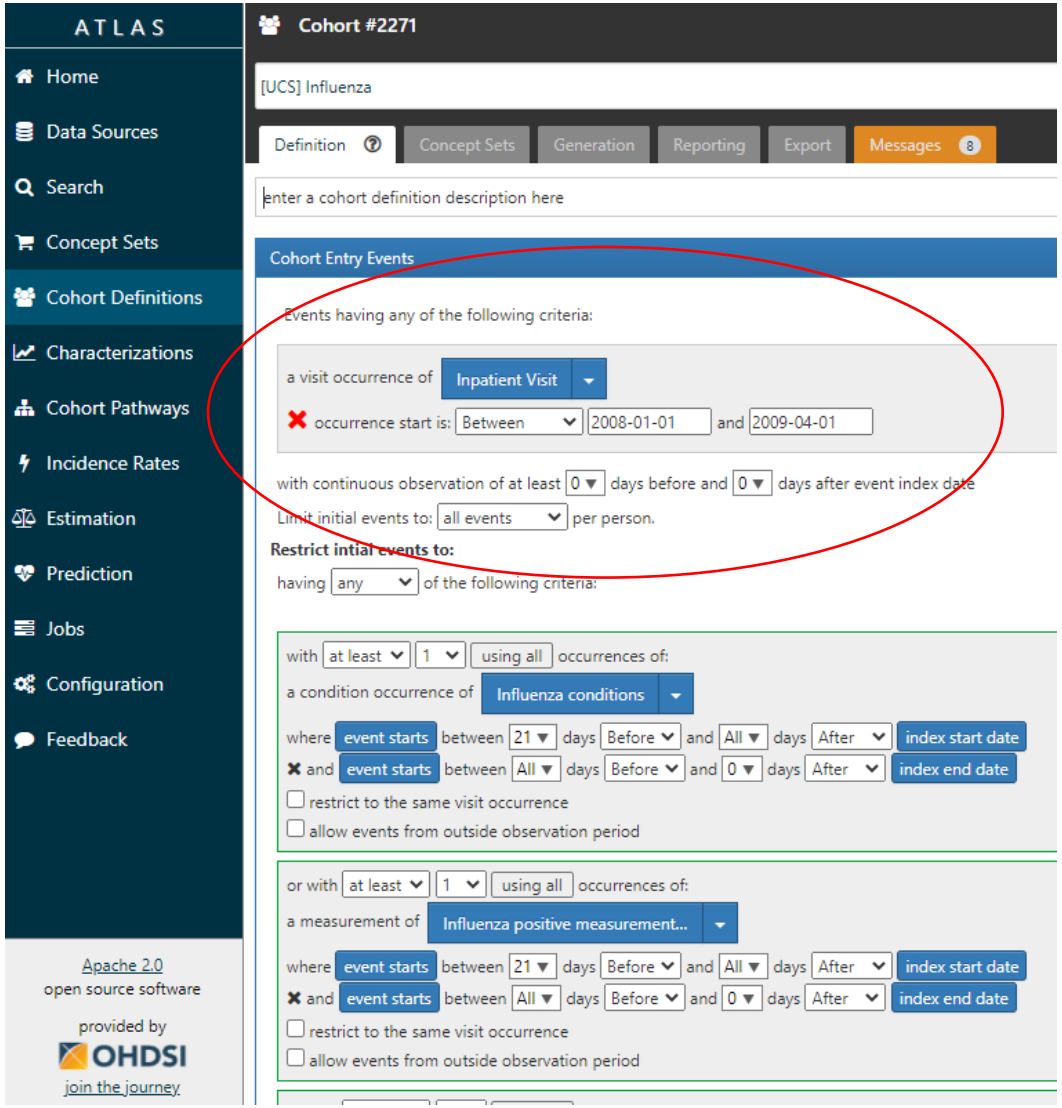
ATLAS – Cohort Definition – Demo

Persons hospitalized with influenza, no prior observation required, 2008-2009 season
https://atlas.ohdsi.org/#/cohortdefinition/117

Initial Event Cohort

People having any of the following:

- A visit occurrence of **inpatient visit**
  - Occurrence start is between **2008-09-01 and 2009-04-01** (inclusive)
- With continuous observation of at least **0 days prior** and **0 days after** event **index date**
- Limit initial events to: **all events per person.**



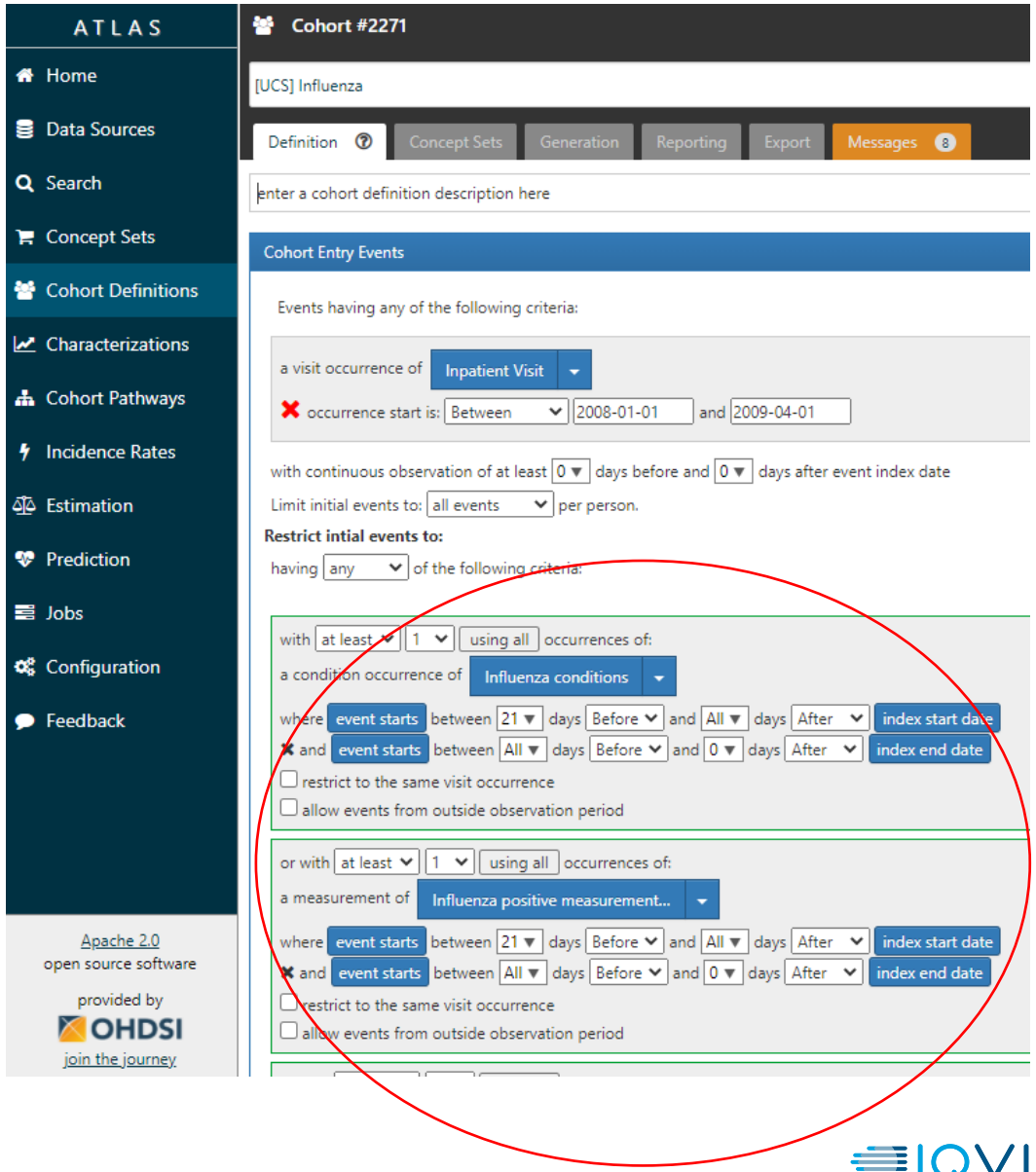
ATLAS – Cohort Definition – Demo

For people matching the **Primary Events**, include:

Having any of the following criteria:

- at least 1 occurrence of a **condition occurrence** of **influenza** where **event**
  starts between **21 days before** and **all days after index start date** and **event**
  starts between **all days before** and **0 days after index end date**

- or at least 1 occurrence of a **measurement** of **influenza** (pre-coordinated positive measurements) where **event**
  starts between **21 days before** and **event all days after index start**
  date starts between **all days before** and **0 days after index end date**



ATLAS – Cohort Definition – Demo

For people matching the **Primary Events**, include:

Having any of the following criteria:

- at least 1 occurrences of an **observation** of **influenza** testing (excluding Ab testing)
  - value as concept is any of: detected, positive, present

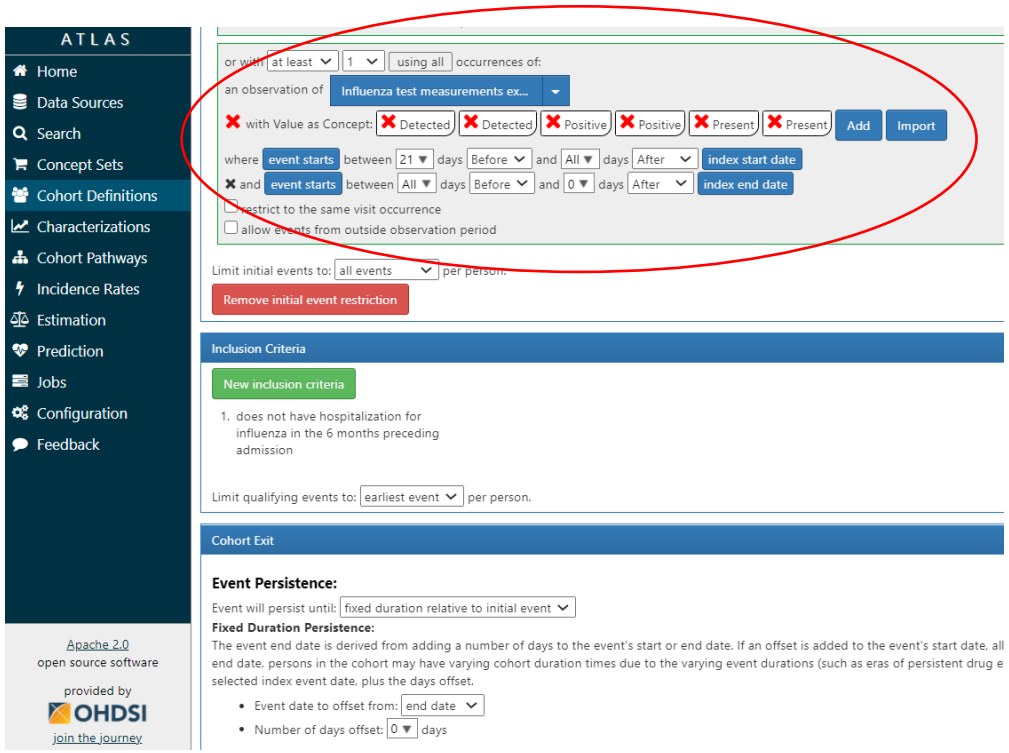
  where **event**
  starts between **21 days before** and **all days after index start date** and **event**
  starts between **all days before** and **0 days after index end date**

- or at least 1 occurrences of a **measurement** of Influenza testing (excluding Ab testing)
  - value as concept is any of: detected, positive, present

  where **event starts** between 21 days before and all days after index start date and **event**
  starts between all days before and 0 days after index end date*

Limit cohort of initial events to: **all events per person.**

*** Exercise**



ATLAS – Cohort Definition – Exercise

1.- Download the concept sets from OHDSI Atlas (4 in total – 1xcondition diagnosis, 2xcondition measurements and 1xinpatient visit):

https://atlas.ohdsi.org/#/cohortdefinition/117/conceptsets

2.- Build the influenza cohort as shown in the demo and save it as '[UCS] Influenza cohort 2008 to 2009'.

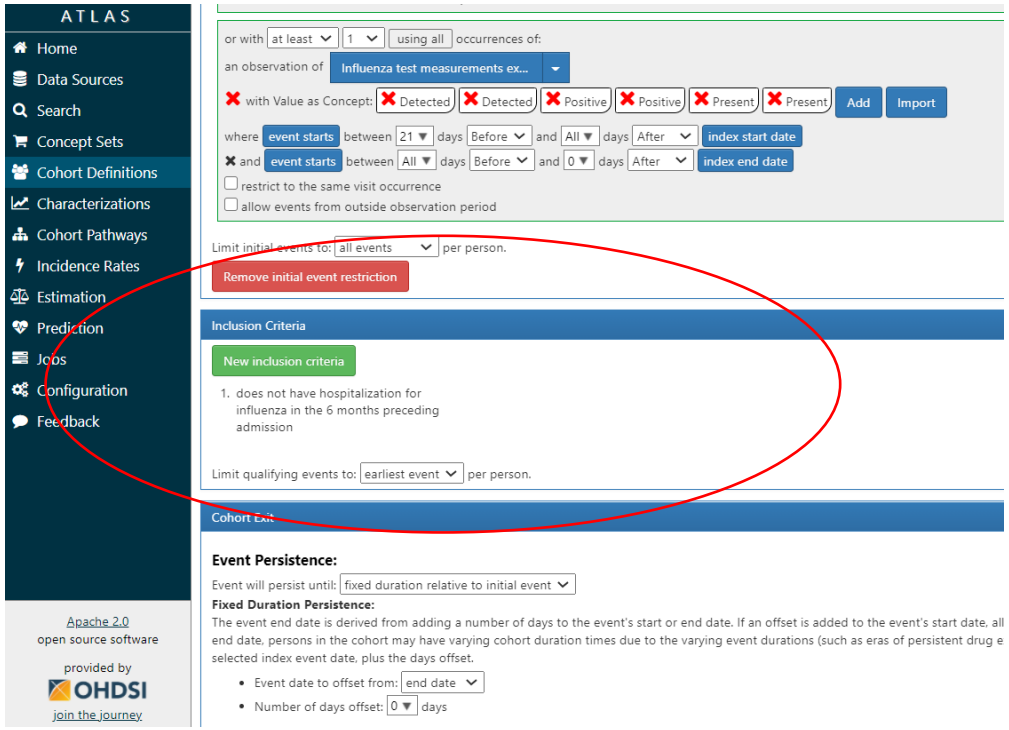
3.- Now, add the following criteria:

For people matching the **Primary Events**, include:

Having any of the following criteria:

- or at least 1 occurrences of a **measurement** of **influenza** testing (excluding Ab testing)
  - value as concept is any of: detected, positive, present (SNOMED and LOINC)

where **event starts** between **21 days Before** and **all days After index start date** and **event starts** between **all days Before** and **0 days After index end date**



4.- Add the following inclusion rules:

Inclusion Criteria #1: age >=18

Inclusion Criteria #2: does not have hospitalization for influenza in the 6 months preceding admission

Limit qualifying cohort to: **earliest event per person.**

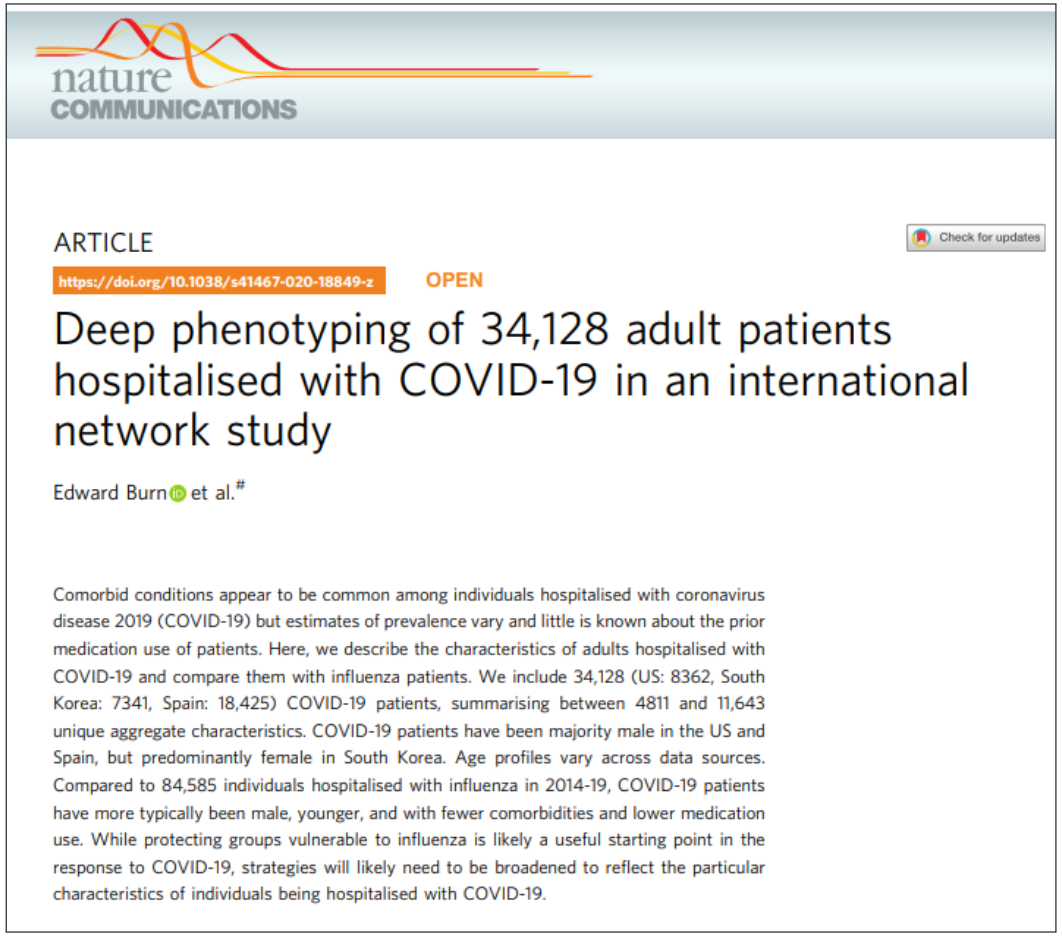
BREAK

30 mins

ATLAS Characterization Lecture, Demo & Exercise

Characterization Study Example

- Describe baseline characteristics for those **hospitalized** for **COVID-19** as compared to those hospitalized for **influenza**
- Findings:
  - Patients hospitalized with COVID are systematically different from those hospitalized with flu
  - COVID hospitalized patients, when compared those hospitalized for influenza:
    - Greater proportion are male and slightly younger
    - Fewer comorbidities and lower medication use
- Utilized claims and electronic medical records from 10 databases across 3 different countries



nature COMMUNICATIONS

ARTICLE

Check for updates

https://doi.org/10.1038/s41467-020-18849-z OPEN

Deep phenotyping of 34,128 adult patients hospitalised with COVID-19 in an international network study

Edward Burn et al.#

Comorbid conditions appear to be common among individuals hospitalised with coronavirus disease 2019 (COVID-19) but estimates of prevalence vary and little is known about the prior medication use of patients. Here, we describe the characteristics of adults hospitalised with COVID-19 and compare them with influenza patients. We include 34,128 (US: 8362, South Korea: 7341, Spain: 18,425) COVID-19 patients, summarising between 4811 and 11,643 unique aggregate characteristics. COVID-19 patients have been majority male in the US and Spain, but predominantly female in South Korea. Age profiles vary across data sources. Compared to 84,585 individuals hospitalised with influenza in 2014-19, COVID-19 patients have more typically been male, younger, and with fewer comorbidities and lower medication use. While protecting groups vulnerable to influenza is likely a useful starting point in the response to COVID-19, strategies will likely need to be broadened to reflect the particular characteristics of individuals being hospitalised with COVID-19.

https://www.nature.com/articles/s41467-020-18849-z

Characterization Results – Comparison of Sources/Locations

Fig. 1: Age of patients hospitalised with COVID-19 and of patients hospitalised with influenza.

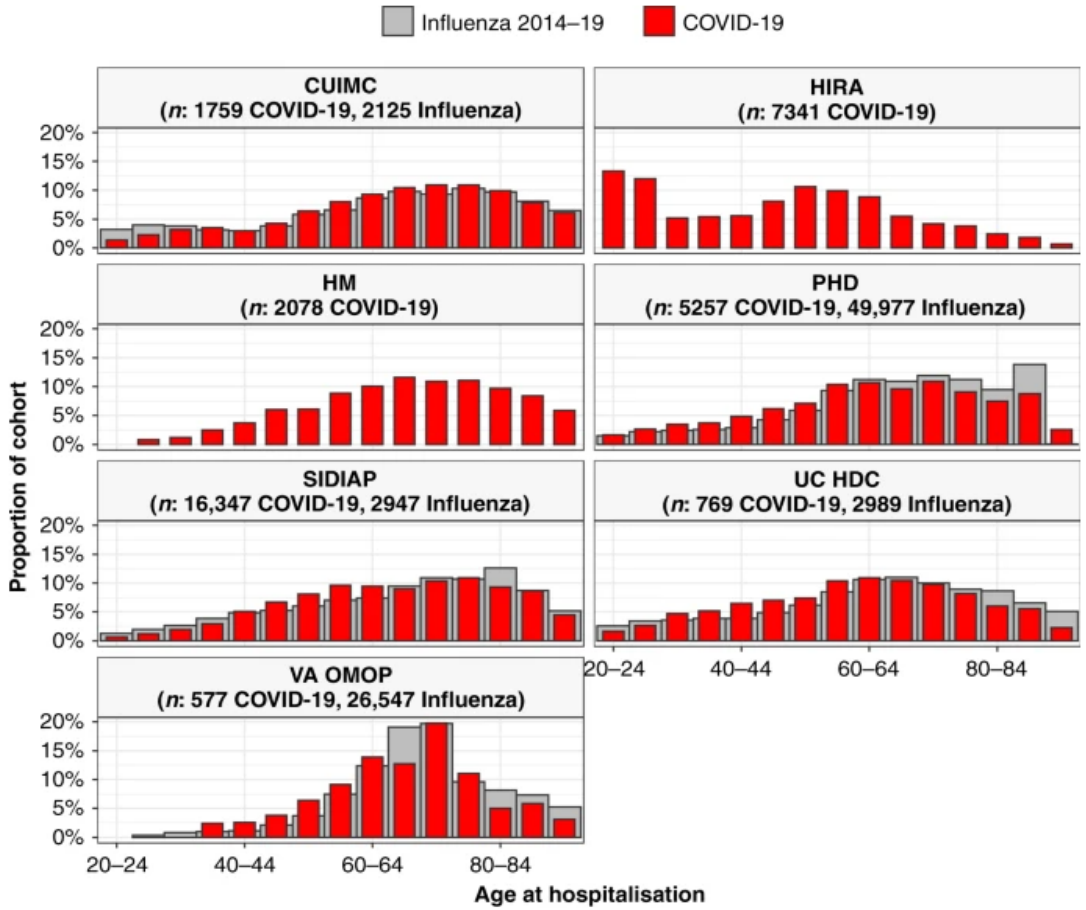
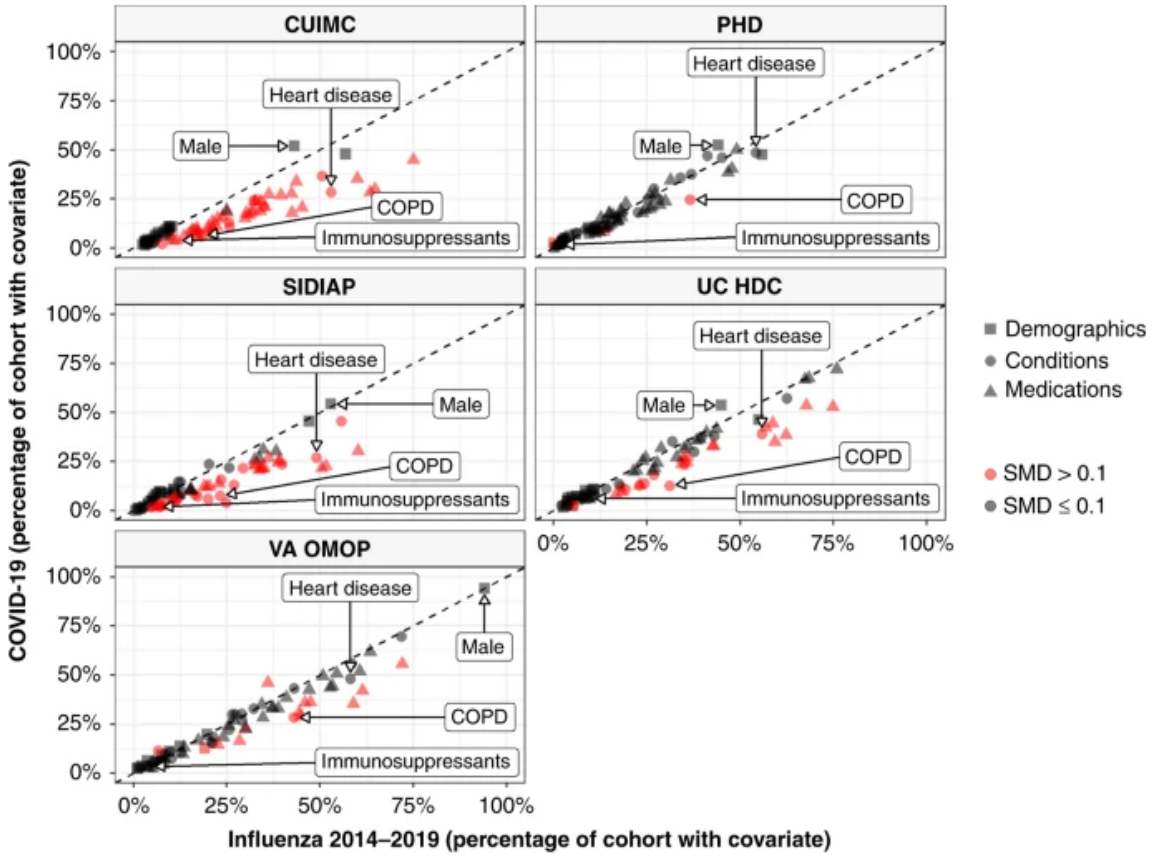


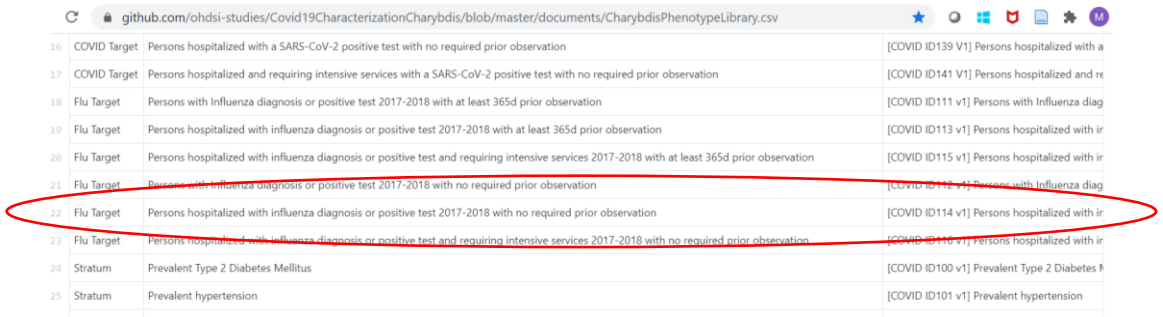
Fig. 4: Characteristics of COVID-19 patients compared to 2014–2019 Influenza patients.

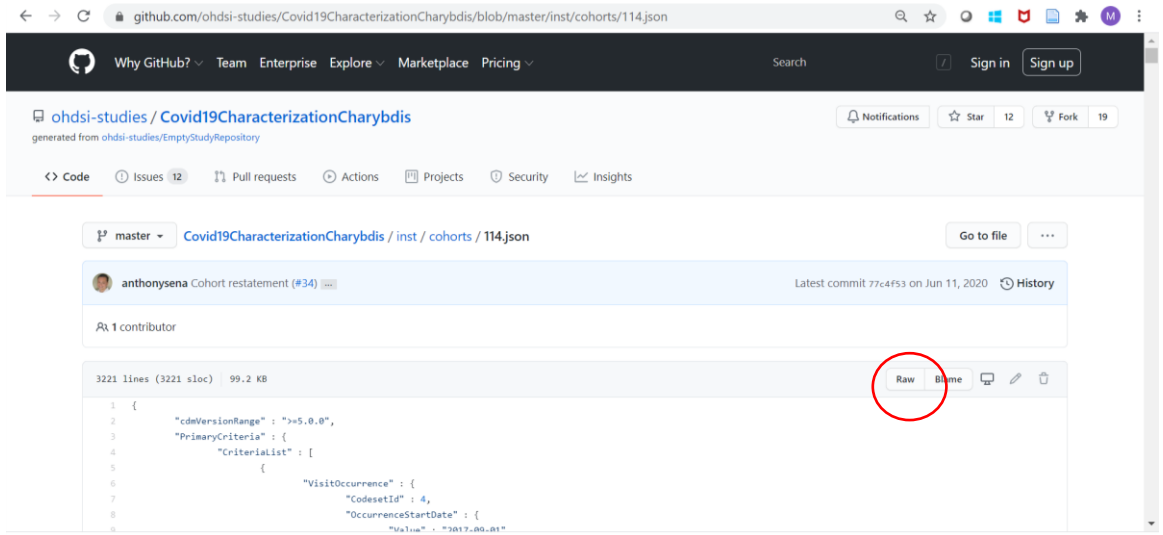


Source: https://www.nature.com/articles/s41467-020-18849-z

Characterizations from GitHub to ATLAS – part 1

https://github.com/ohdsi-studies/Covid19CharacterizationCharybdis





To recreate one of the cohorts from the paper:

1. Locate phenotype library in the documents folder

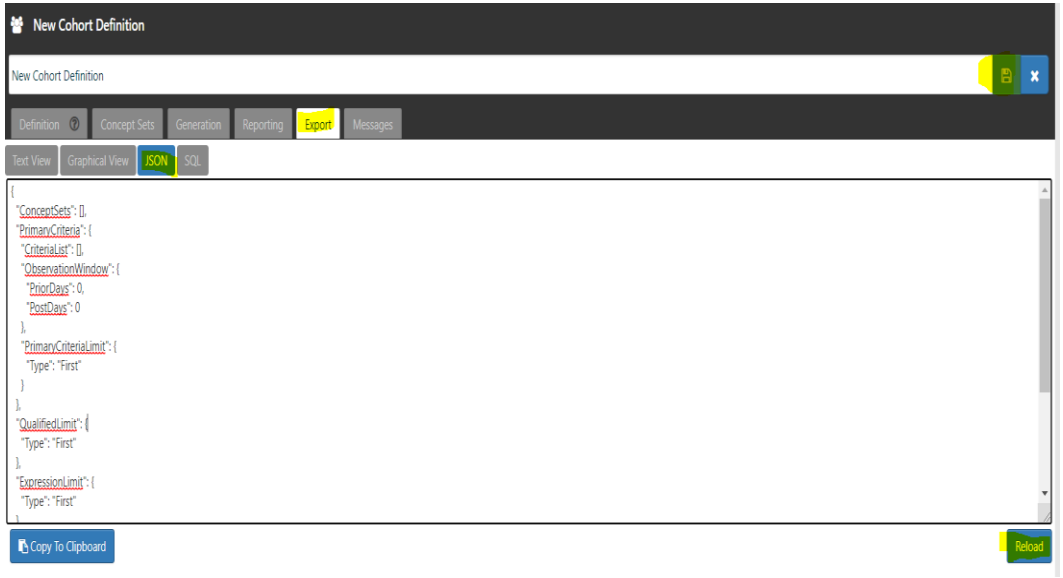
   https://github.com/ohdsi-studies/Covid19CharacterizationCharybdis/blob/master/documents/CharybdisPhenotypeLibrary.csv

2. Choose the ones of interest from the list (114 and 135)

3. Go to the inst folder
4. Click on the JSON file you chose (114 and 135)
5. Click on the raw button
6. Copy all lines of code or 'Save as…' a JSON file (114.json and 135.json)

Characterizations from GitHub to ATLAS – part 1

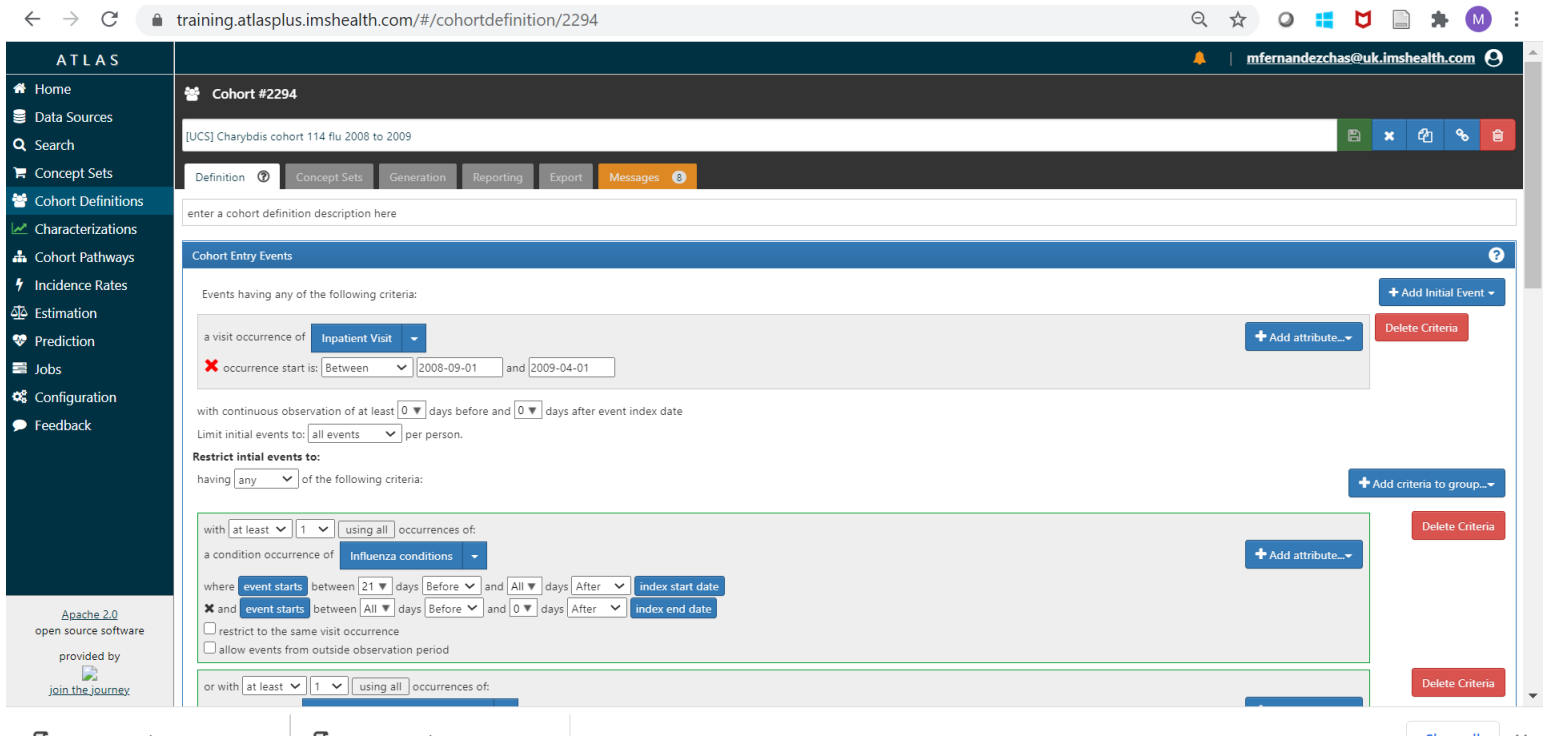
https://github.com/ohdsi-studies/Covid19CharacterizationCharybdis



In ATLAS:

1. Create a brand new Cohort Definition
2. Under the Export – JSON tabcpaste your copied code into this section
3. Press the **Reload** green button
4. Press the **SAVE** green button

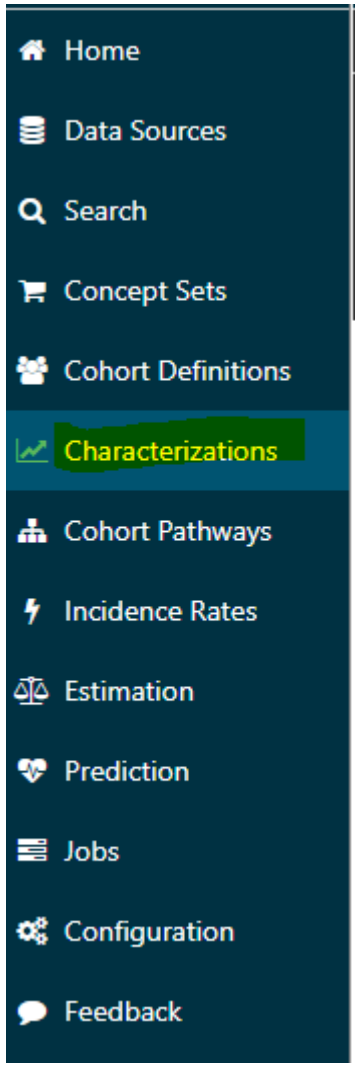
ATLAS characterization stage 1 - definition



On the ‘Definition’ tab, the contents of the JSON file are automatically converted into a cohort definition

You can now update the cohort with the dates of the influenza season under study (2008-2009 in our case)

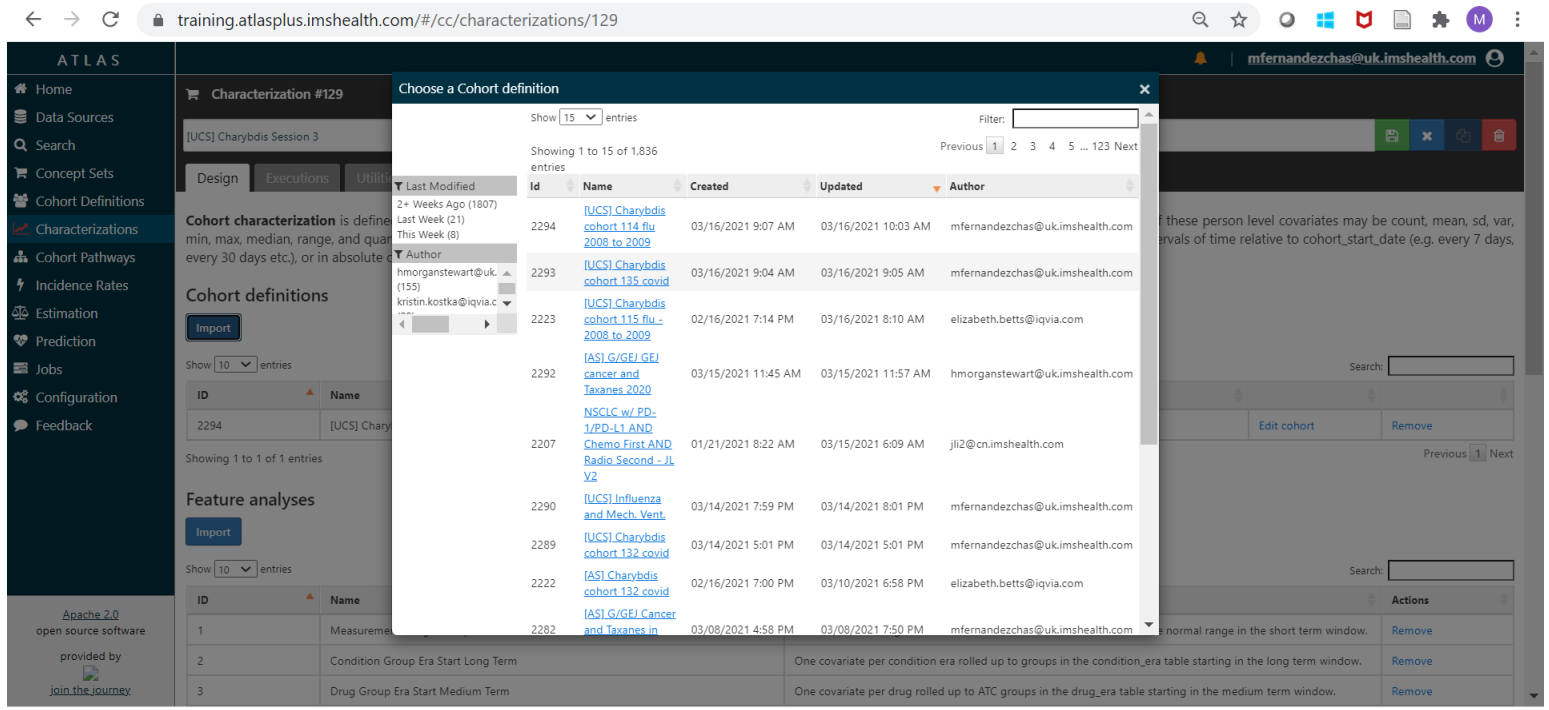
Characterizations from GitHub to ATLAS – part 2



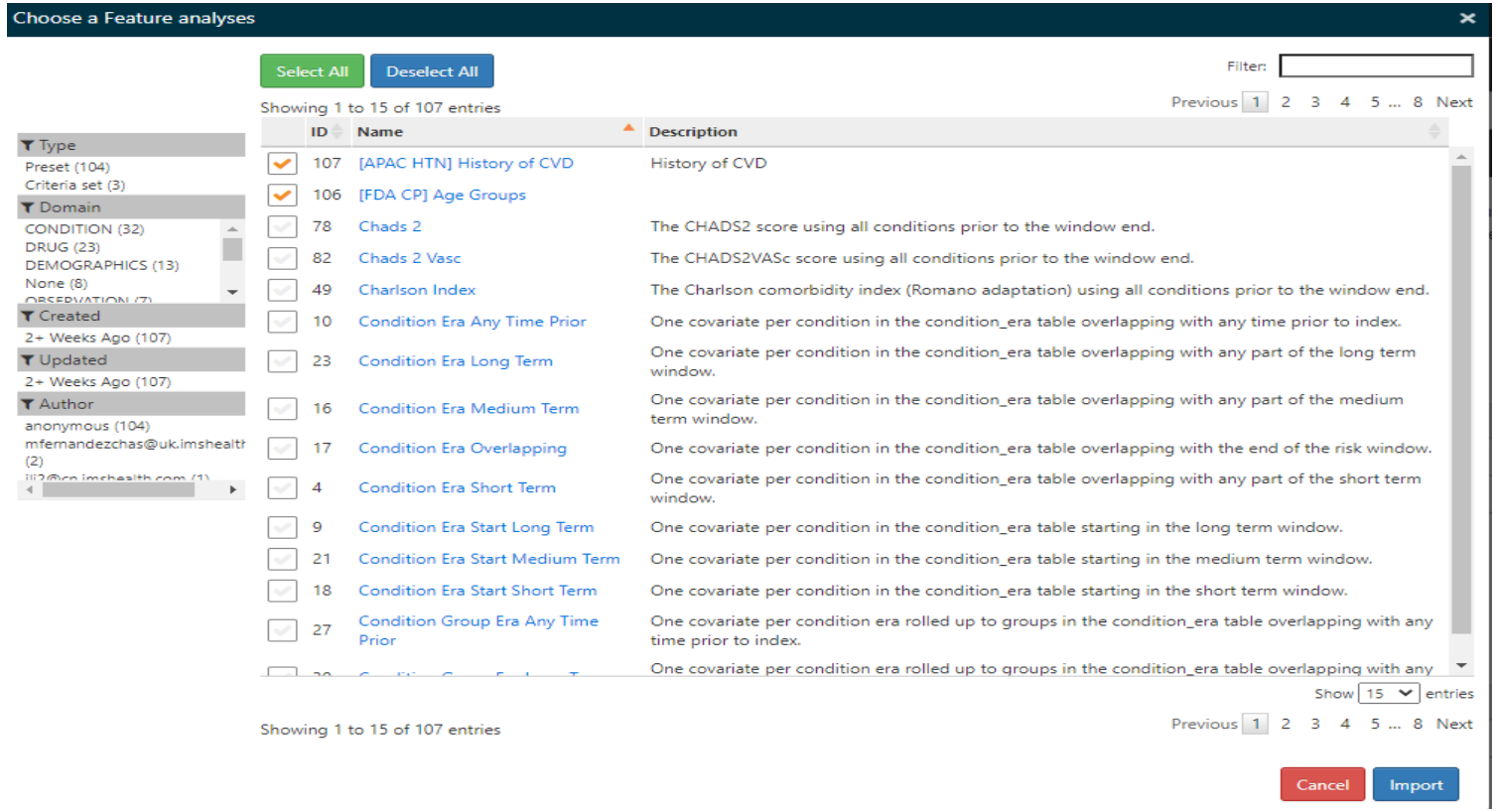
Go to Characterizations in ATLAS;

Create a New Characterization

Import your cohort(s)



Characterizations from GitHub to ATLAS – part 3



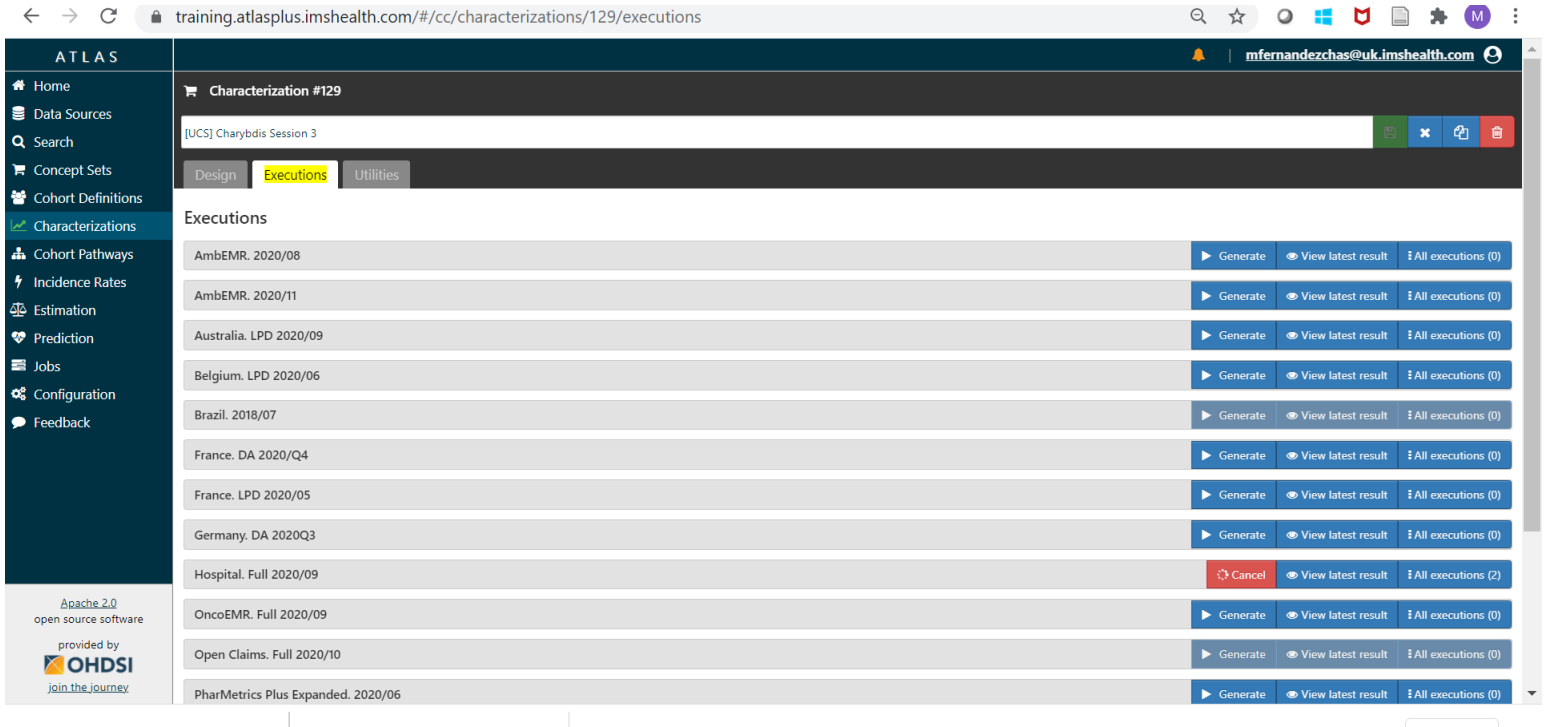
Select preset feature analysis, import

Save the characterization (green button by title)

Go to the Executions tab, click Generate to create results from data sources

View latest results to see data for your chosen cohort(s) on that data source – next slide

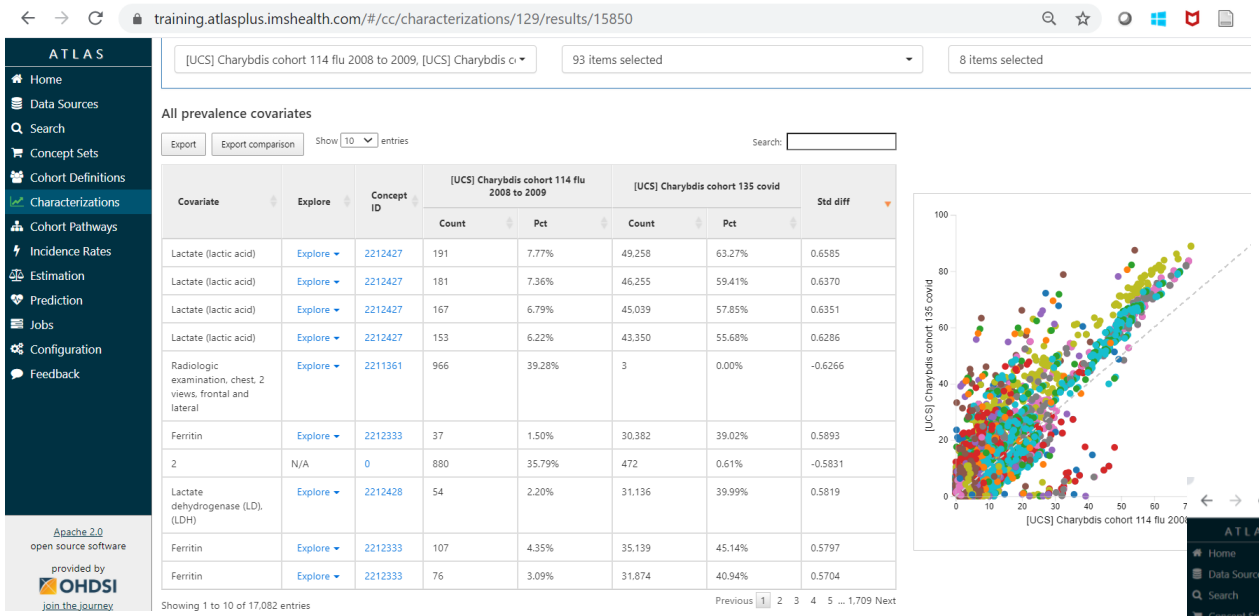
Characterizations from GitHub to ATLAS – part 4



Go to the Executions tab, click ‘generate’ for desired data source(s)

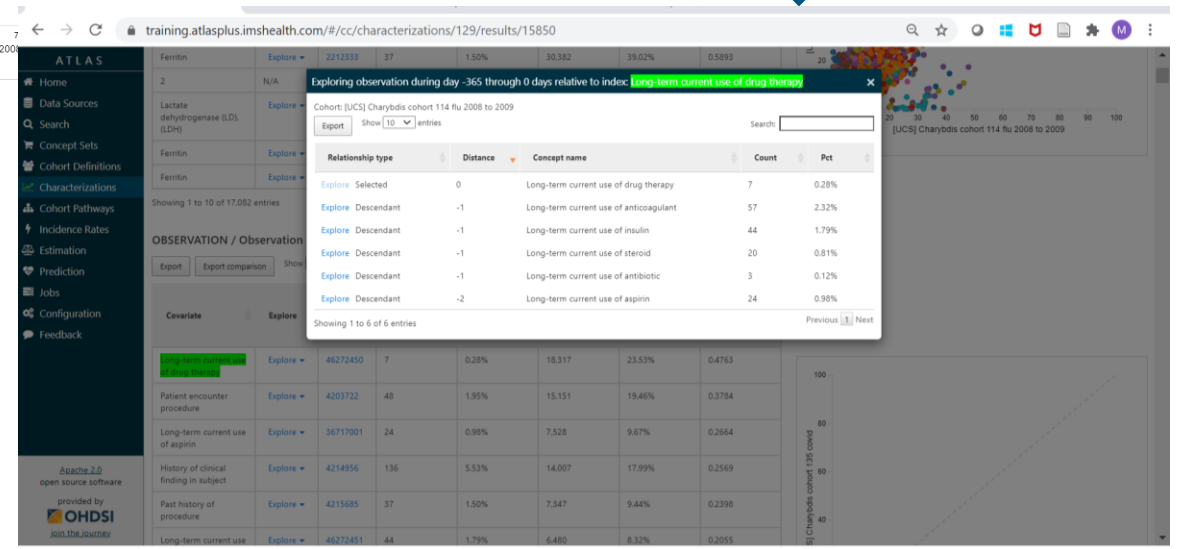
View latest results to see data for your chosen cohort(s) on that data source

Characterizations from GitHub to ATLAS – part 4



Results for the characterization will be shown in the Execution tab

Use Explore to view detail of covariates



ATLAS Characterization – Exercise 1

From the list of the **RD2D consortium** questions already answered :

- **Among adults hospitalized with influenza, how many were put on a mechanical ventilator per subgroup (age, gender)?**

  Influenza Cohort

  - Use your influenza cohort or download the one from the OHDSI ATLAS website:

    https://atlas.ohdsi.org/#/cohortdefinition/117

    And save it as '[UCS] Influenza cohort 2008 to 2009' or any other name of your preference
  - Update the dates to reflect the 2008-2009 influenza season (1st September 2008 and 1st April 2009)

  Mechanical Ventilation Inclusion

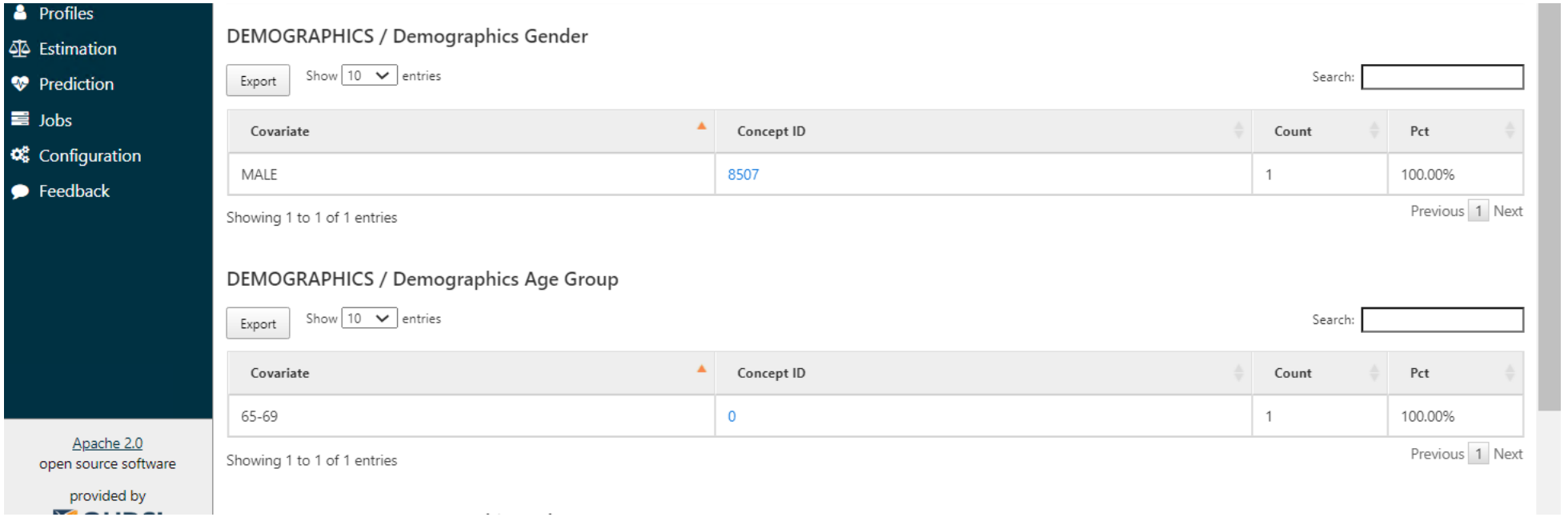
  - Add mechanical ventilation to the inclusion criteria during the hospital stay (between index date and end date). Note that this is a multidomain concept (condition, observation and procedure). You will need to add one criteria per domain, and then select 'having ANY of the following criteria', otherwise, if the default 'ALL' is left, you will get 0 counts:

    https://atlas.ohdsi.org/#/conceptset/49/expression
  - Save the new cohort as '[UCS] Influenza cohort 2008 to 2009 mech. vent.' or any other name of your preference.

  Characterization

  - Create a new characterization and save it as '[UCS] Influenza cohort 2008 to 2009 mech. vent. analysis'
  - Import your new influenza and ventilation cohort
  - Include the age group and gender features
  - Execute in the OHDSI CDM V5 database and check the results

ATLAS Characterization – Exercise 1 Answer



ATLAS Characterization – Exercise 2

- **Among adults hospitalized with influenza and pneumonia between 1st September 2008 and 1st April 2009, which group has the highest Charlson comorbidity index?**

  Influenza Cohort

  - It has already been defined in the previous exercise

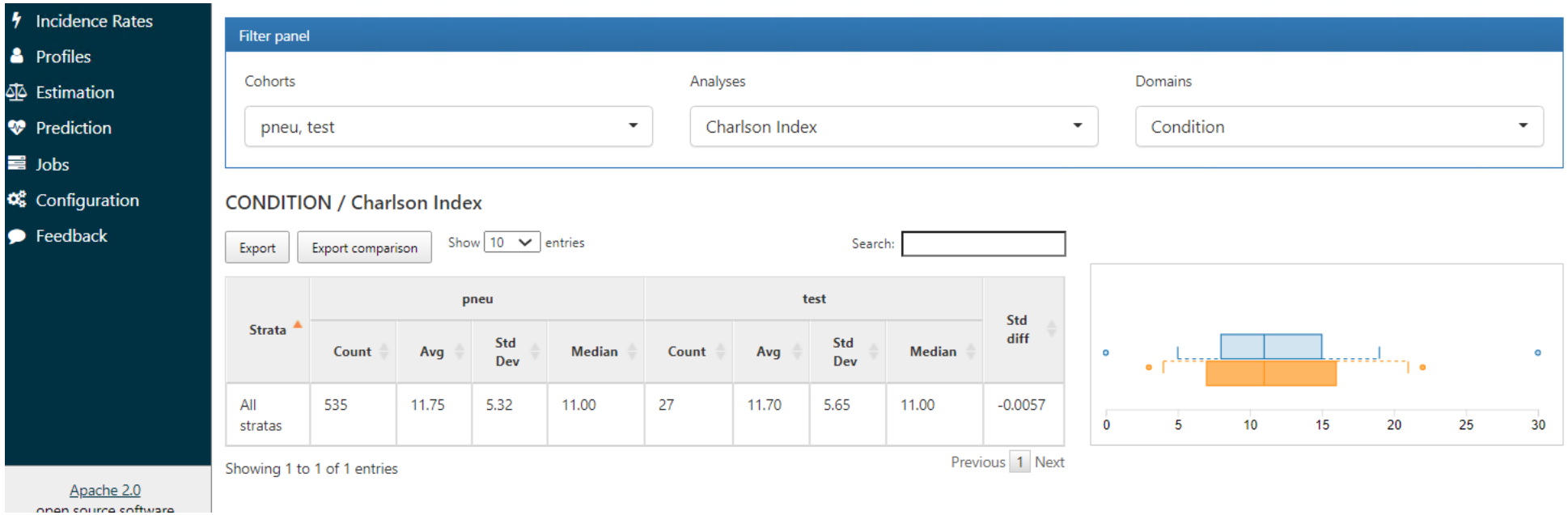
  Pneumonia Cohort

  - Create a copy of this influenza cohort and rename as '[UCS] Pneumonia 2008 to 2009'. Replace the condition 'influenza' by the condition 'pneumonia' and delete the measurement criteria. You will need a new concept for 'pneumonia' (concept_id = 255848 and descendants).

  Characterization

  - Create a new characterization and save it as '[UCS] Influenza and Pneumonia cohort 2008 to 2009 Analysis'
  - Import your new influenza and pneumonia cohorts
  - Include the Charlson Index as the feature of the analysis (Preset feature ID = 49 calculates the Charlson comorbidity index using all conditions prior to the window end)
  - Execute in the OHDSI CDM V5 database and check the results

ATLAS Characterization – Exercise 2 Answer



ATLAS Characterization – Homework

From the list of the **RD2D consortium** questions already answered :

- **Among adults hospitalized with COVID-19, how many were put on a mechanical ventilator per subgroup (age, gender)?**
  - Download the COVID-19 cohort from the Charybdis website:

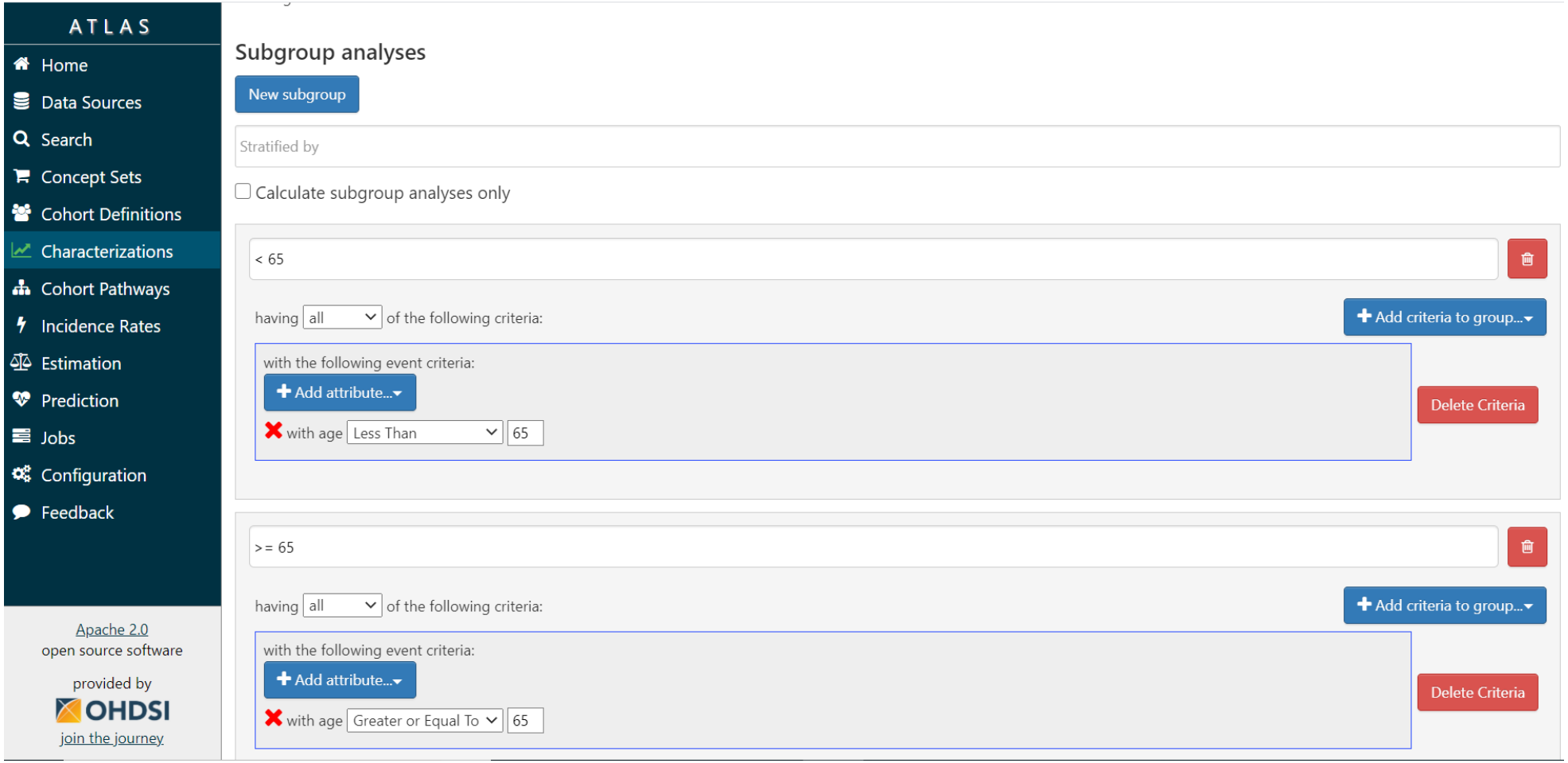
    https://atlas.ohdsi.org/#/cohortdefinition/198
  - Add mechanical ventilation as described in Exercise 1
  - Save the new cohort as '[UCS] Covid-19 cohort mech. vent.' or any other name of your preference.
  - Create a new characterization and save it as '[UCS] Covid-19 cohort mech. vent. analysis'
  - Import your new COVID-19 and mechanical ventilation cohort
  - Include the age group and gender features
  - Execute in your own database and check the results
- **Compare your results with the RD2D consortium results for COVID-19:**

  https://covid19questions.org/component/content/article/32-q-a/70-among-adults-hospitalized-with-covid-19-how-many-were-put-on-a-mechanical-ventilator-per-subgroup-age-ethnicity-gender-and-race?Itemid=279

ATLAS Characterization – Customized Features – Demo

Subgroup Analyses

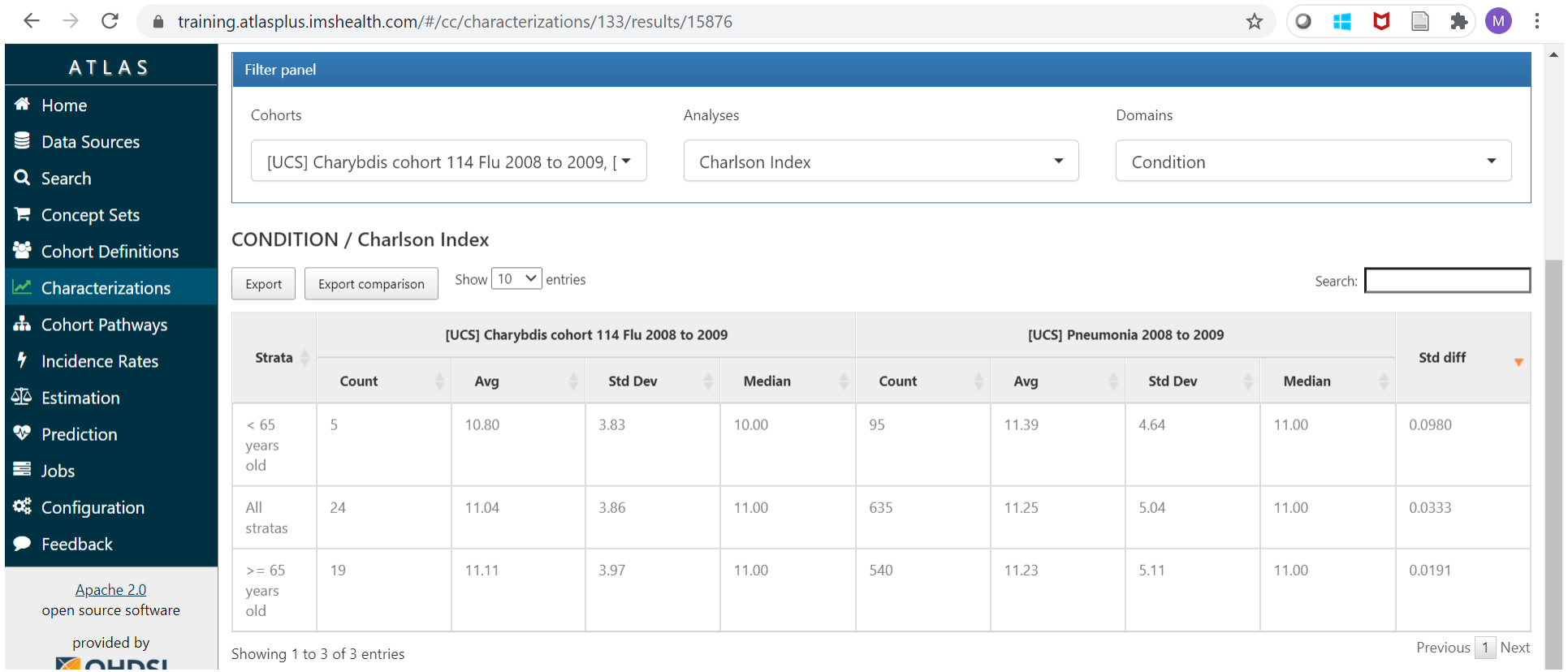
- Patients under 65, over 65



ATLAS Characterization – Customized Features – Demo

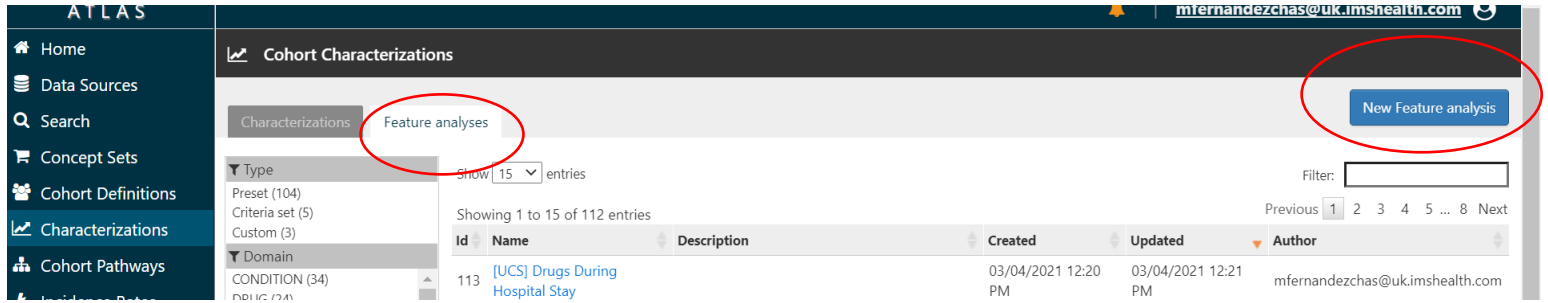
Subgroup Analyses

- Patients under 65, over 65



ATLAS Characterization – Customized Features – Demo

Customized features using SQL



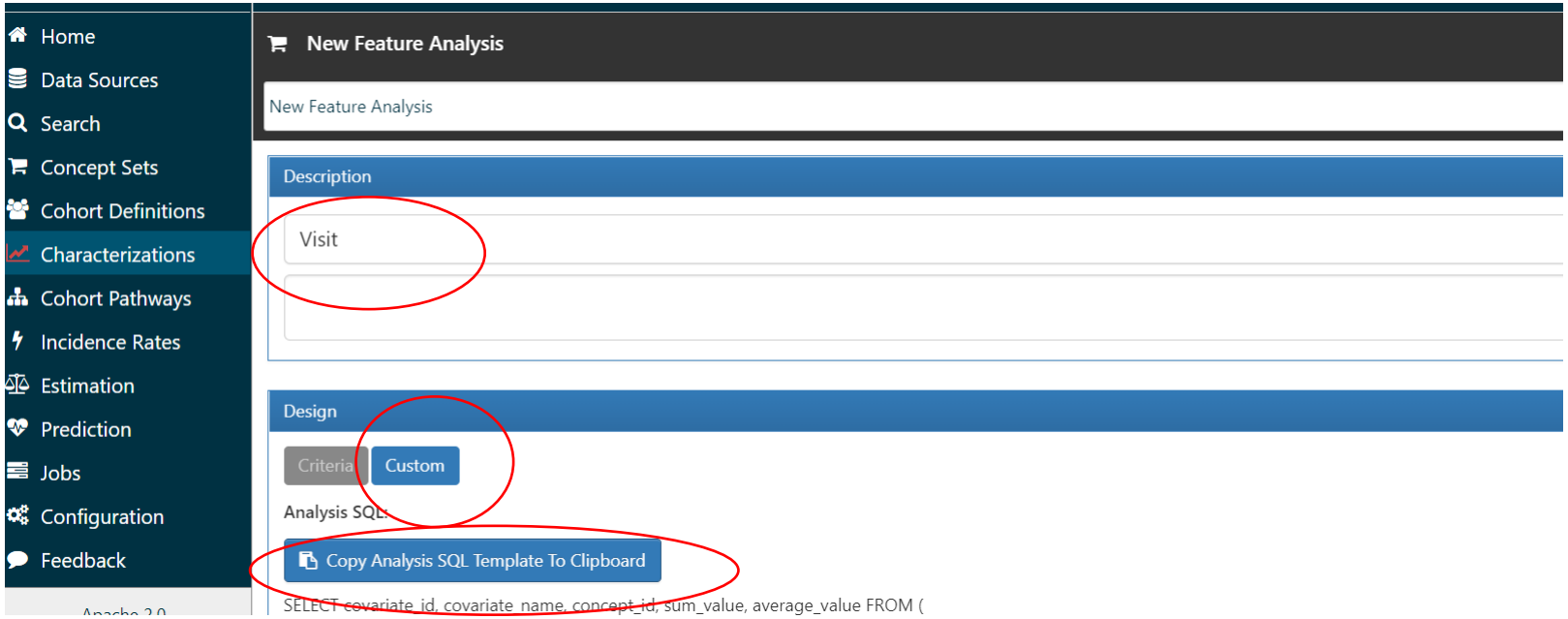
1.- Select Feature Analysis on the left

2.- Select New Feature Analysis on the right

3.- Choose the Visit Domain

4.- Click on the Custom button

5.- Click on 'Copy Analysis SQL Template to Clipboard'



ATLAS Characterization – Customized Features – Demo

Customized features using SQL

SQL Template

Feature SQL Template.sql

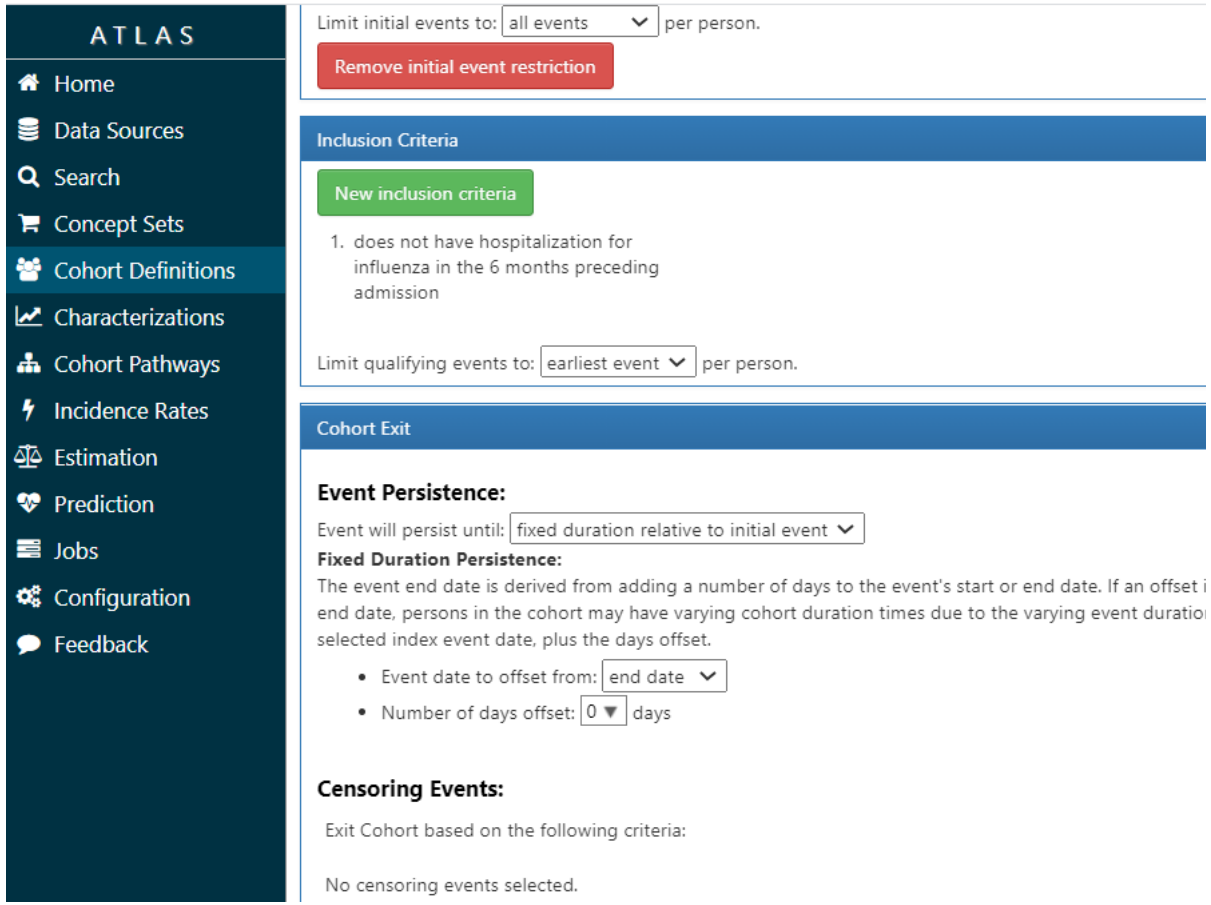
```sql
SELECT covariate_id, covariate_name, concept_id, sum_value, average_value FROM (

        -- Custom analysis producing same results as Feature Extraction's "One covariate per drug in
        -- the drug_era table overlapping with any time prior to index."
        -- Available variables:
            -- @cdm_database_schema
            -- @cohort_table
            -- @cohort_id
            -- @analysis_id
            -- all variables specified in Cohort Characterization parameters
        SELECT
          CAST(drug_concept_id AS BIGINT) * 1000 + @analysis_id                    AS covariate_id,
          c.concept_name                                                           AS covariate_name,
          drug_concept_id                                                          AS concept_id,
          COUNT(*)                                                                 AS sum_value,
          COUNT(*) * 1.0 / stat.total_cnt * 1.0                                    AS average_value
        FROM (
              SELECT DISTINCT
                drug_concept_id,
                cohort.subject_id,
                cohort.cohort_start_date
              FROM @cohort_table cohort
                INNER JOIN @cdm_database_schema.drug_era ON cohort.subject_id = drug_era.person_id
              WHERE drug_era_start_date <= cohort.cohort_start_date
                    AND drug_concept_id != 0
                    AND cohort.cohort_definition_id = @cohort_id
            ) drug_entries
          JOIN @cdm_database_schema.concept c ON drug_entries.drug_concept_id = c.concept_id
          CROSS JOIN (SELECT COUNT(*) total_cnt
                      FROM @cohort_table
                      WHERE cohort_definition_id = @cohort_id) stat
        GROUP BY drug_concept_id, c.concept_name, stat.total_cnt
)
```

Paste the SQL code in your editor of preference and update the code highlighted in gray accordingly.

ATLAS Characterization – Customized Features – Demo

Customized features using SQL

Length of Visit



- Make sure the **index event end date** is set to 0 days from **end date**.
- This way the patients will **exit the cohort** at the end of the hospital visit.

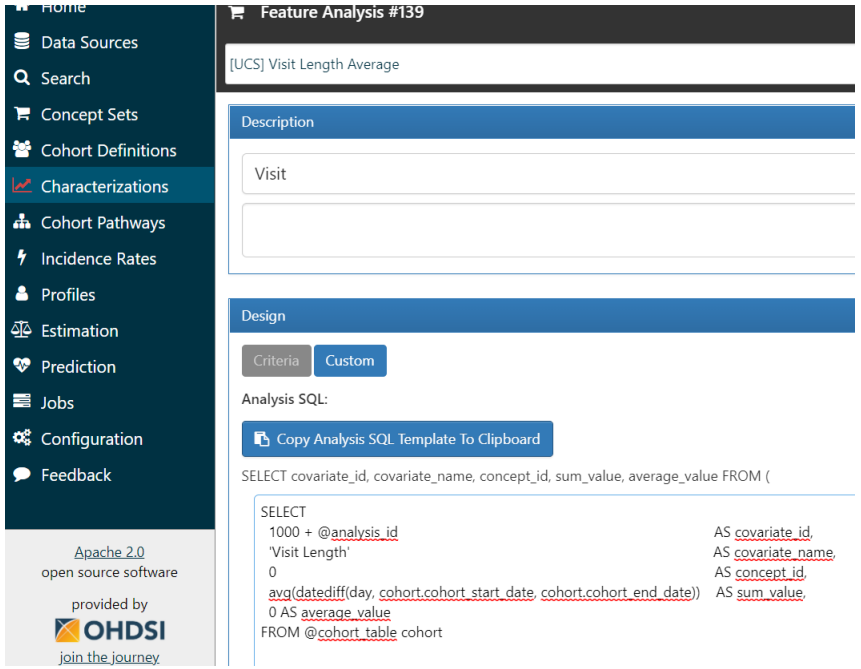
ATLAS Characterization – Customized Features – Demo

Customized features using SQL

Length of Visit

Visit Length.sql

```sql
SELECT
  1000 + @analysis_id                                                    AS covariate_id,
  'Visit Length'                                                         AS covariate_name,
  0                                                                      AS concept_id,
  avg(datediff(day, cohort.cohort_start_date, cohort.cohort_end_date))   AS sum_value,
  0                                                                      AS average_value
FROM @cohort_table cohort
```



Create a new feature analysis, paste the code above and save with a new name.

- Simple code to extract the **length of the visit** from our influenza cohort.
- Since our **index event** is the hospital stay, the **start** and **end date** of the cohort will match the **start** and **end** date of the **hospital stay**.
- Hence the **length of the stay** is just the difference between the **two dates**.

BREAK

10 mins

ATLAS Characterization – Customized Features – Exercise

Customized features using SQL

Length of Visit

From the list of the **RD2D consortium pending** questions :

- **Among adults hospitalized with influenza what is the length of stay in hospital for patients with (a) Diabetes, (b) Lung Disease, (c) Cancer, (d) Immunodeficiency, (e) Heart Disease, (f) Hypertension, (g) Asthma, (h) Kidney Disease (1) Overall and (2) per subgroup >= 65 and < 65?**

  Influenza Cohort

  - It has already been defined in the previous exercises

  Inclusion Criteria

  - Create a copy of this influenza cohort and rename as '[UCS] Covid-19 cohort and diabetes'. Add the 'diabetes' condition as a new inclusion criteria any time prior to the index date. Use the answers from the Session #1 Exercise to build the concept set for 'diabetes'
  - Repeat this process for all conditions in the list above (8 in total)

  Characterization 1

  - Create a new characterization
  - Import all your new influenza cohorts (8)
  - Create a customised new feature analysis for the length of the visit and import this new feature into the characterization
  - Execute and check the results

  Characterization 2

  - Make a copy of **Characterization 1** and rename it
  - Create the subgroups for >= 65 and < 65 years old
  - Execute and check the results

ATLAS Characterization – Customized Features – Homework

Customized features using SQL

Top Drugs

- **Among adults hospitalized with influenza what are the top drugs taken during the hospital stay?**

  Influenza Cohort

  - As already defined during this session

  Characterization

  - Create a new characterization
  - Import your influenza cohort
  - Create a customised new feature analysis for the drugs below taken during the hospital stay as shown in the slide and import this new feature into the characterization
  - Execute and check the results

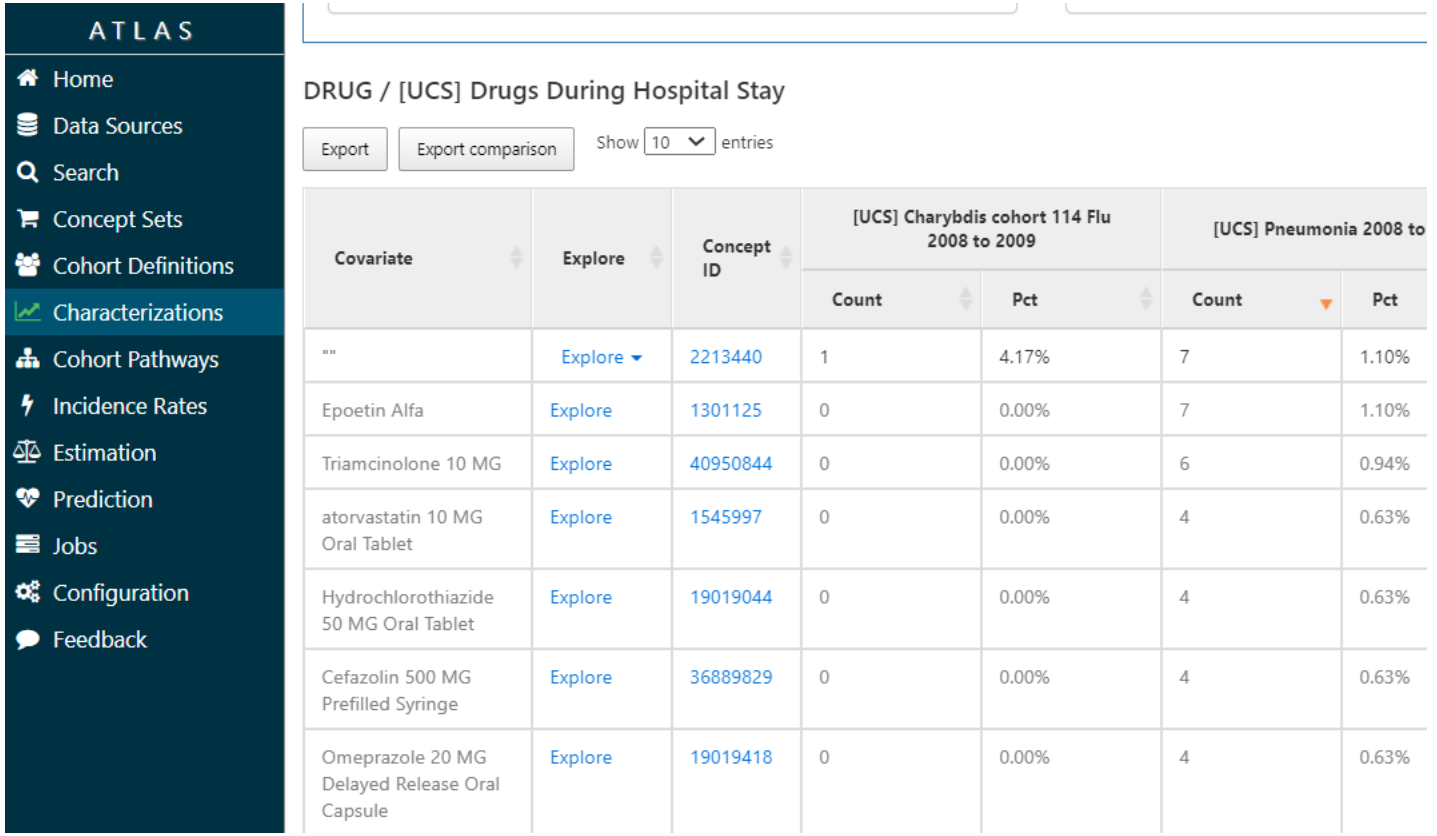
[UCS] Drugs During Hospital Stay.sql

```sql
SELECT
  CAST(drug_concept_id AS BIGINT) * 1000 + @analysis_id                    AS covariate_id,
  c.concept_name                                                           AS covariate_name,
  drug_concept_id                                                          AS concept_id,
  COUNT(*)                                                                 AS sum_value,
  COUNT(*) * 1.0 / stat.total_cnt * 1.0                                    AS average_value
FROM (
      SELECT DISTINCT
        drug_concept_id,
        cohort.subject_id,
        cohort.cohort_start_date
      FROM @cohort_table cohort
        INNER JOIN @cdm_database_schema.drug_exposure ON cohort.subject_id = drug_exposure.person_id
      WHERE drug_exposure_start_date >= cohort.cohort_start_date
            AND drug_exposure_start_date <= cohort.cohort_end_date
            AND drug_concept_id != 0
            AND cohort.cohort_definition_id = @cohort_id
    ) drug_entries
  JOIN @cdm_database_schema.concept c ON drug_entries.drug_concept_id = c.concept_id
  CROSS JOIN (SELECT COUNT(*) total_cnt
              FROM @cohort_table
              WHERE cohort_definition_id = @cohort_id) stat
GROUP BY drug_concept_id, c.concept_name, stat.total_cnt
```

ATLAS Characterization – Customized Features – Homework Answer

Customized features using SQL

Top Drugs



Covariate	Explore	Concept ID	[UCS] Charybdis cohort 114 Flu 2008 to 2009		[UCS] Pneumonia 2008 to	
			Count	Pct	Count	Pct
""	Explore	2213440	1	4.17%	7	1.10%
Epoetin Alfa	Explore	1301125	0	0.00%	7	1.10%
Triamcinolone 10 MG	Explore	40950844	0	0.00%	6	0.94%
atorvastatin 10 MG Oral Tablet	Explore	1545997	0	0.00%	4	0.63%
Hydrochlorothiazide 50 MG Oral Tablet	Explore	19019044	0	0.00%	4	0.63%
Cefazolin 500 MG Prefilled Syringe	Explore	36889829	0	0.00%	4	0.63%
Omeprazole 20 MG Delayed Release Oral Capsule	Explore	19019418	0	0.00%	4	0.63%

Discussion & Homework

Homework

Training series plan

+ Session 1 : Course Introduction
  - OMOP CDM and vocabulary overview, examples of previous research and use cases, introducing ATLAS and OHDSI tools

+ Session 2: Common Data Model
  - Data source profiling, building concept sets, building cohorts, exercises and discussion

+ Session 3: Leveraging the OHDSI ecosystem as a developer
  - Concept sets, cohort definitions and their application to analytical use cases
  - Study design and development in ATLAS

+ Session 4: Leveraging the OHDSI ecosystem to run Network Studies
  - Characterization and treatment pathways, in ATLAS, SQL and R

Thank you