

TriNetX Clinical Query Tool

Patricia Kovatch, Dean

Sharon Nirenberg, MD, Lead Physician Informaticist

Naomi So MD, Physician Informaticist

Scientific Computing and Data

Icahn School of Medicine at Mount Sinai

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Icahn
School of
Medicine at
**Mount
Sinai**

Agenda

1. The Mount Sinai Data Warehouse
2. Introduction to TriNetX Cohort Query Tool
3. Building a Query in TriNetX
4. MSDW Custom Data Set Request

Mount Sinai Data Warehouse

Scientific Computing FAIR Principles for Data

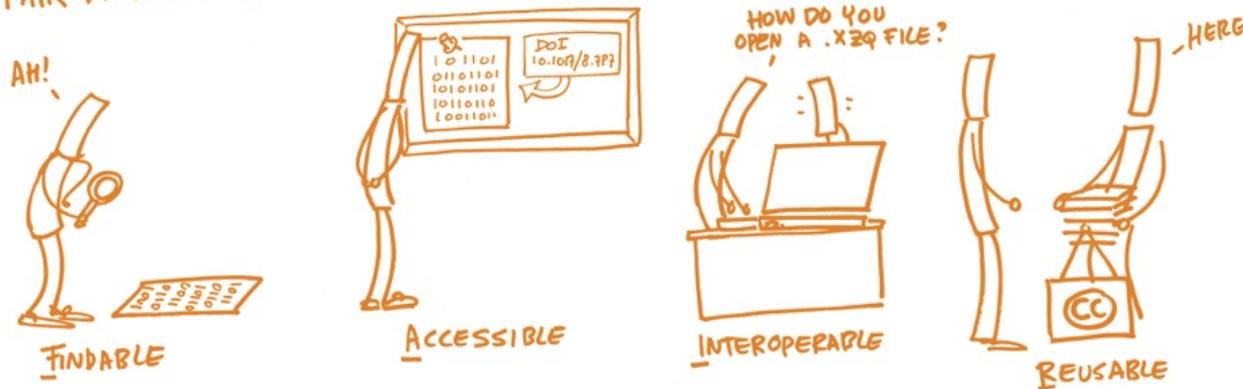
Findable

Accessible

Interoperable

Reusable /
Reproducible

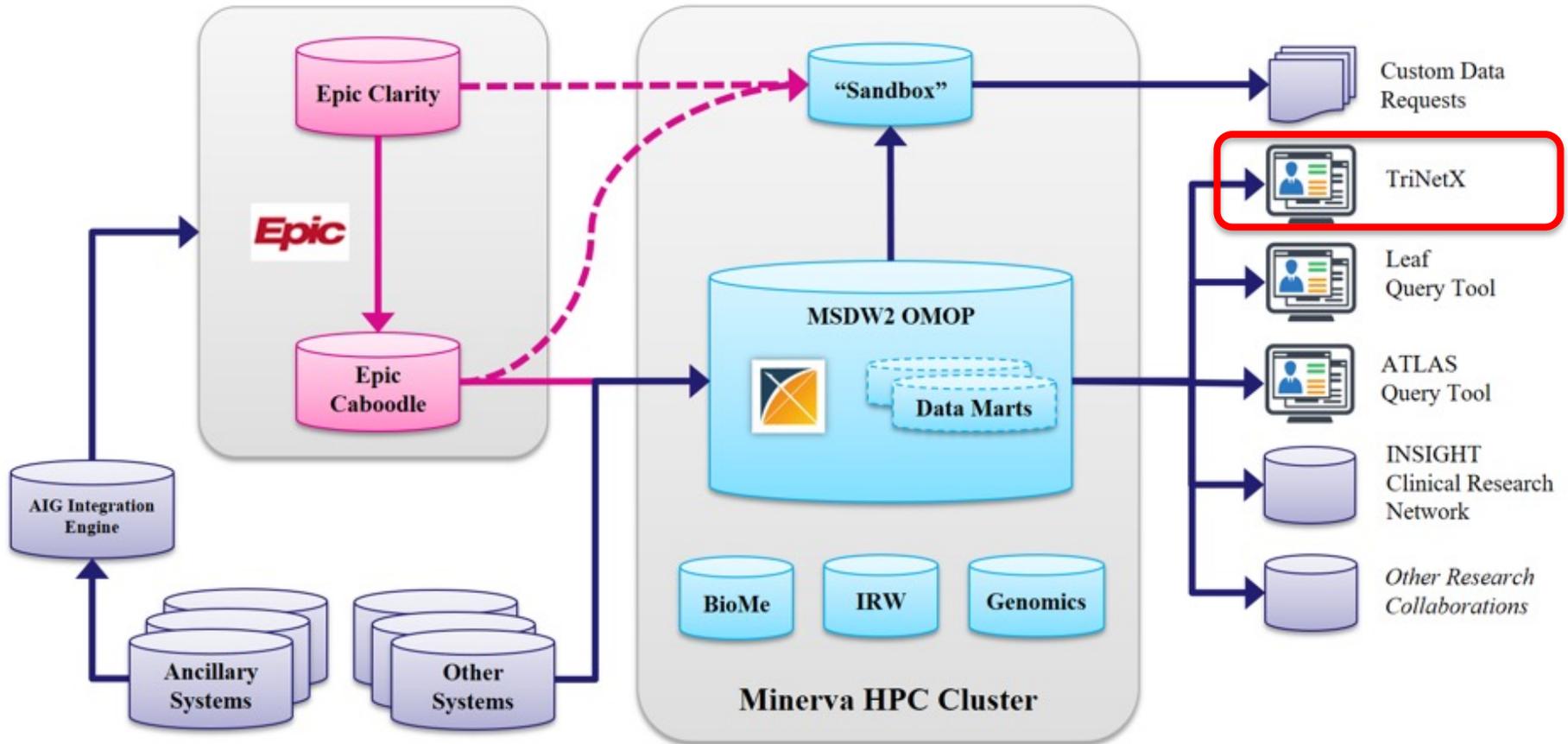
FAIR DATA PRINCIPLES



Source: NIH's Big Data to Knowledge (BD2K) Initiative (<https://commonfund.nih.gov/bd2k>)

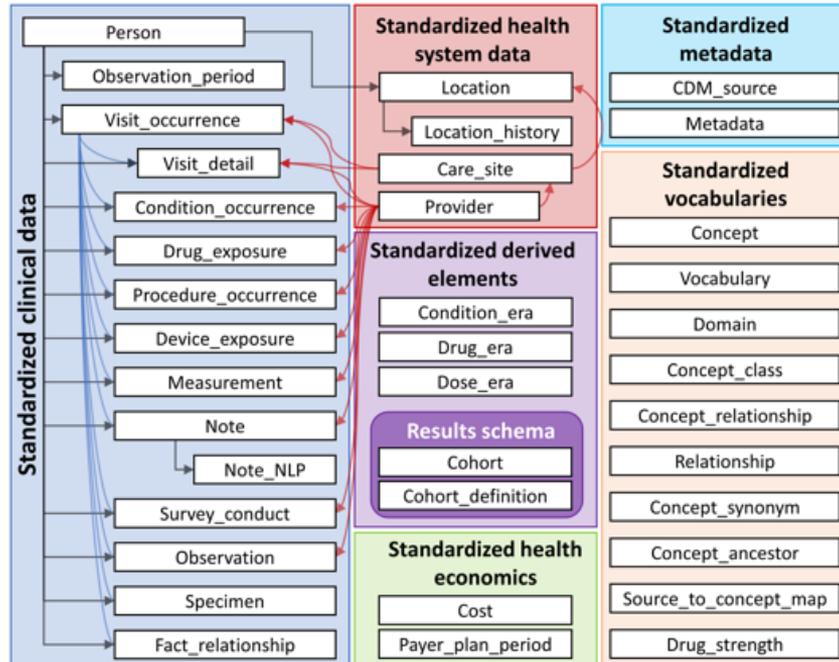
Image Source: <https://book.fosteropenscience.eu/>

Mount Sinai Data Warehouse Ecosystem



OMOP Common Data Model Requirements

1. Standardize **data structure** via common format



2. Standardize **data content** via mapping EHR codes to standard healthcare vocabularies

OMOP Domain	Standard Vocabularies	Non-standard Vocabularies
Condition	SNOMED-CT	ICD-10-CM, ICD-9-CM
Drug	RxNorm, CVX	ATC, NDC, Multum
Measurement	LOINC	SNOMED-CT, Nebraska Lexicon
Procedure	CPT4, HCPCS, ICD-10-PCS	ICD-9-Proc
Observation	SNOMED-CT, LOINC	ICD-10-CM, ICD-9-CM
Race, Ethnicity	OMOP Race, OMOP Ethnicity	SNOMED-CT, Nebraska Lexicon
Provider (Specialty)	NUCC, Medicare Specialty	SNOMED-CT, Nebraska Lexicon
Route	SNOMED-CT	Nebraska Lexicon
Unit	UCUM	SNOMED-CT, Nebraska Lexicon

MSDW Data Contents (*examples as of May 2023*)

OMOP Table	Record Type	Distinct Patients	Record Count
person	Patient Demographics	11,359,705	11,359,705
death	Patient Date of Death	45,954	45,957
visit_occurrence	Mobile Unit Encounter	68,743	111,327
visit_occurrence	Inpatient Hospitalization from ED Visit	277,736	525,105
visit_occurrence	Hospital Outpatient Visit	894,661	2,472,103
visit_occurrence	Urgent Care Visit	190	296
visit_occurrence	ED Visit	1,131,817	2,732,247
visit_occurrence	Inpatient Hospitalization	609,075	919,758
visit_occurrence	Outpatient Visit	4,061,760	73,545,946
visit_occurrence	Telehealth Visit	660,939	2,706,066
visit_occurrence	Chart Documentation Event	5,434,697	87,301,399
condition_occurrence	Hospital Problem	847,633	3,136,818
condition_occurrence	Encounter Diagnosis	3,856,726	103,437,716
condition_occurrence	Billing Diagnosis	2,204,779	44,863,750
condition_occurrence	Problem List	2,258,485	11,899,865
measurement	Vital Signs	3,424,374	566,300,804
measurement	Flowsheet Measurement	1,631,208	181,917,868
measurement	Lab Component Result	3,848,811	954,973,027

See MSDW website for the complete list: <https://labs.icahn.mssm.edu/msdw/data-sources/>

Introduction: TriNetX Cohort Query Tool

Clinical Query Tools - Overview

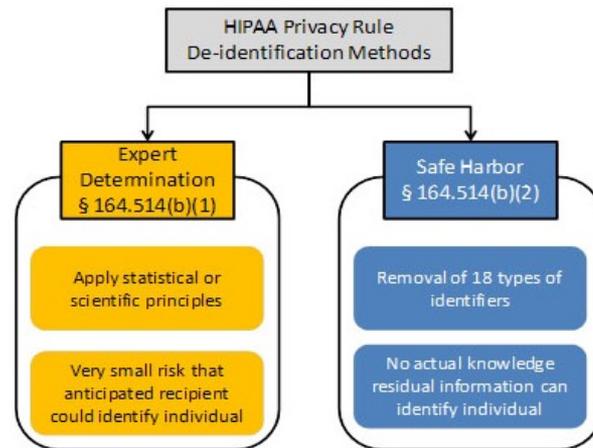
	Leaf	ATLAS	TriNetX
Description	Web-based, lightweight drag-and-drop cohort query tool that quickly analyzes population demographics	A web-based cohort query tool for database exploration, standardized vocabulary browsing, cohort definition, and patient cohort-level analysis	A web-based cohort query tool
Access	Use your Mount Sinai network username/password to login.	Use your Mount Sinai network username/password to login	Request access here . Log in to the TriNetX system using your email address and password.
Training	Written Tutorial ; PEAK Tutorial	Written Tutorial ; PEAK Tutorial ; Videos	PEAK Tutorial
Data Types	Patient demographics, diagnoses, procedures, medications, labs, orders, vitals, institutional patient cohorts (BioMe, IRW, etc.)	Patient demographics, diagnoses, procedures, medications, labs, orders, vitals	Patient demographics, diagnoses, procedures, medications, labs, orders, vitals
PHI	No	Yes, if IRB Approved	De-identified data only
Cost	No charge	No charge	No charge
Advantages	Can visualize demographic details of cohorts, drag-and-drop query feature; download de-identified patient cohort list	Utilizes common data model and queries	Offers a polished, commercially developed user interface

See more details at <https://labs.icahn.mssm.edu/msdw/services/>

What is PHI? What is De-identification?

“**PHI** (Protected Health Information) is information (demographic, financial, social, clinical) relating to an individual’s past, present, or future health history, treatment, or payment for health care services that is held or transmitted by a CE or its BA that identifies the individual or **for which there is a reason to believe it can be used to identify the individual.**”

De-identification is the process by which PHI is rendered not individually identifiable. The HIPAA Privacy Rule establishes two methods to de-identify PHI:



Types of Identifiers

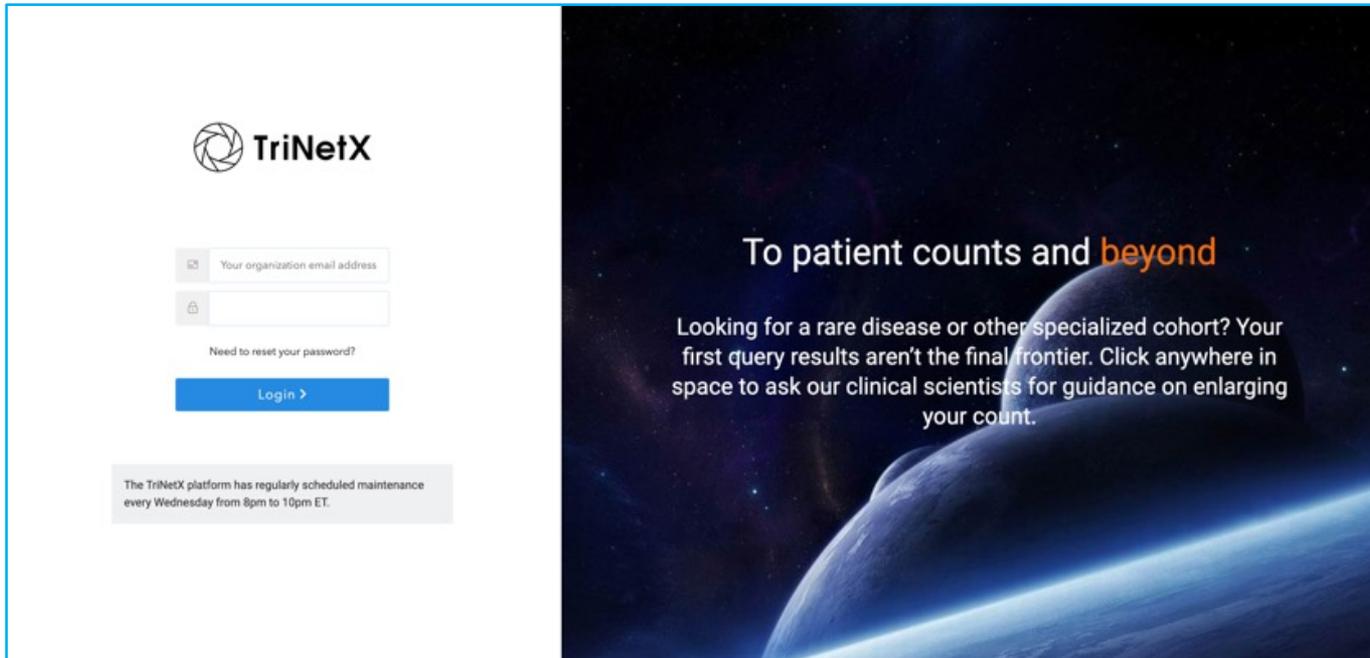
- Name
- Street Address, city, county, zip code (the first three digits of the zip code may be used if there are more than 20,000 people in the zip code)
- All element of dates (except year), including dates of birth, admission, discharge or death
- All ages over 89
- All telephone/fax numbers
- Fax number
- E-mail addresses
- Social Security Number (SSN)
- Medical Record Number (MRN)
- Health plan beneficiary number
- Account numbers (health plan IDs, credit card, bank, invoice #s)
- Certificate/License numbers
- Vehicle identifiers, including license plate numbers
- Device identification and/or serial number
- Uniform Resource Locator (URL)
- Internet Protocol (IP) address
- Biometric identifiers (finger, voiceprints, etc)
- Full face photographic images and other comparable images
- Any other unique identifying number, characteristic, or code

TriNetX Query Tool

- QI and Research users can use **TriNetX** to query the MSDW
- Access **De-identified** data across the following domains:
 - Diagnoses using ICD-10-CM
 - Visit (encounter) locations
 - Lab results using LOINC
 - Medications using ATC
 - Procedures using CPT4
 - Demographics
 - Vitals
- Additional Features:
 - Simulate patient populations based on inclusion and exclusion criteria
 - Explore patient cohort to learn about any comorbid conditions, etc.
 - Predict number of newly eligible patients for your study
- Maintained by a third party private company

Accessing TriNetX

- All Mount Sinai Faculty, staff or student can access TriNetX at <https://live.trinetx.com>
- Google Chrome is the preferred browser
- Requires VPN access and use of your Mount Sinai Login credentials



The image shows a screenshot of the TriNetX login interface on the left and a promotional banner on the right. The login page features the TriNetX logo at the top, followed by two input fields for email and password, a 'Need to reset your password?' link, and a blue 'Login >' button. A maintenance notice at the bottom states: 'The TriNetX platform has regularly scheduled maintenance every Wednesday from 8pm to 10pm ET.' The banner on the right has a space-themed background with a planet and text that reads: 'To patient counts and beyond' followed by a paragraph: 'Looking for a rare disease or other specialized cohort? Your first query results aren't the final frontier. Click anywhere in space to ask our clinical scientists for guidance on enlarging your count.'

TriNetX Interface

The screenshot displays the TriNetX web interface. At the top, the navigation bar includes the TriNetX logo and menu items: Studies, Connect, Trial Connect, LEGACY, Browse Network, and Discover. Below the navigation bar, the 'My Studies' section features a search bar and a filter dropdown set to 'All Studies'. A red arrow points to a blue 'Create New Study' button in the top right corner. The main content area is divided into two sections: 'Open Studies' and 'Other Studies'. Under 'Open Studies', there is a card for 'COPD Study NS' with 370 total patients and buttons for 'Delete' and 'Duplicate'. Under 'Other Studies', there are three cards: 'Pediatric Population' (8,710 total patients, 'Delete' and 'Duplicate' buttons), 'Oncology Templates_Colorectal Cancer' (marked as 'ONCOLOGY TEMPLATE - READ ONLY', with 'Duplicate', 'Delete', and 'Create study from template' buttons), and 'Active Systemic Lupus Erythematosus (SLE)' (marked as '--', with 'Delete' and 'Duplicate' buttons).

Duplicate a Study from My Studies

TriNetX Studies - Connect Trial Connect LIBRARY Browse Network Discover -

My Studies Search Filter By: All Studies Create New Study

Open Studies

▼ COPD Study - NS
160
Total Patients

Other Studies

Delete Duplicate

Duplicate

Duplicate Study

Study Name*

Enter a descriptive name for the study.

Study Name*

Duplicate Study Name

Copy the following to new study

Current Study Results History

Query History Attached Documents

Analytics inputs

Lucid inputs

Research Purpose* ⓘ

Please select at least one option below.*

Clinical Trial Research

Design clinical trial

Assess feasibility of clinical trial

Identify clinical trial sites

Recruit trial subjects

Other Scientific Research

Conduct health economics and outcomes research (HEOR)

Explore patient populations

Conduct other secondary research

Sample Study:

How many adult patients with a diagnosis of COPD and on triple therapy for fluticasone + umeclidinium + vilanterol, had an ED or Inpatient visit at least once in the last year?

TriNetX – Create New Study

The screenshot shows the TriNetX web interface. The browser address bar displays `live.trinetx.com/trnx/studies`. The navigation bar includes 'TriNetX', 'Studies', 'Connect', 'Trial Connect', 'LEGACY', 'Browse Network', and 'Discover'. Below the navigation bar, there is a search bar and a filter dropdown set to 'All Studies'. A red arrow points to a blue button labeled 'Create New Study' which is enclosed in a red rectangular box. The main content area is divided into two sections: 'Open Studies' and 'Other Studies'. Under 'Open Studies', there is a card for 'COPD Study NS' with 370 total patients and 'Delete' and 'Duplicate' buttons. Under 'Other Studies', there are three cards: 'Pediatric Population' (8,710 patients), 'Oncology Templates_Colorectal Cancer' (marked as 'ONCOLOGY TEMPLATE - READ ONLY' with 'Duplicate', 'Delete', and 'Create study from template' buttons), and 'Active Systemic Lupus Erythematosus (SLE)' (with 'Delete' and 'Duplicate' buttons).

TriNetX – Create New Study

The screenshot shows the 'Create New Study' form in the TriNetX interface. A pink arrow points to the 'Create New Study' header. Three red callout boxes with arrows point to specific fields: 'Study Name', 'Research Purpose', and 'Target Population'. The form includes a search bar, navigation tabs, and various input fields for study details.

Study Name* → **Study Name**

Research Purpose* → **Research Purpose**

Target Population* → **Target Population**

Other Scientific Research

- Conduct health economics and outcomes research (HEOR)
- Explore patient populations
- Conduct other secondary research

Study Identifying Information

Summary

Sponsor Name

Study Status Select study status

Study Identifier **NCT Number** **EuroCT Number**

Target Population*

Indication **Primary Therapeutic Area*** **Secondary Therapeutic Area**

Create New Study – Query Builder

The screenshot displays the TriNetX Query Builder interface. The top navigation bar includes 'TriNetX', 'Studies', 'Connect', 'Trial Connect', 'LEGACY', 'Browse Network', and 'Discover'. The main header shows 'My Studies > COPD Outcomes - NS > Query Builder' and 'Mount Sinai Health System' with '1 of 1 HCOs online'. A notification states 'There was an error loading available countries'. The right side shows filters for 'Any age / Any sex' and '4,433,940 patients on network'. The interface features two search boxes: 'MUST HAVE Inclusion Criteria' and 'CANNOT HAVE Exclusion Criteria', both with 'Search Term...' input fields. A 'Hierarchy Tree' button is located between these boxes. Below the search boxes is a 'Build a new query' section with a hammer icon, instructions to use search boxes or the 'Import Query' button, and an 'Import Query' button. A filter for 'Age/Sex' is visible on the right. A sidebar on the left contains navigation options: 'Query Builder', 'Healthcare Organizations (HCOs)', 'Explore Cohort', 'Analyze Criteria', 'Rate of Arrival', 'Analytics', 'Trial Connect LEGACY', 'Connect NEW', 'Study Management', and 'Design Assistance'. Annotations include a pink arrow pointing to the 'Query Builder' sidebar item, a blue arrow pointing to the 'Hierarchy Tree' button, and red boxes and arrows highlighting the 'Inclusion Criteria', 'Exclusion Criteria', 'Import Query', and 'Age/Sex' elements.

TriNetX Studies Connect Trial Connect LEGACY Browse Network Discover

My Studies > COPD Outcomes - NS > Query Builder

Mount Sinai Health System
1 of 1 HCOs online

There was an error loading available countries

Any age / Any sex
4,433,940 patients on network

MUST HAVE **Inclusion Criteria**
Search Term...

CANNOT HAVE **Exclusion Criteria**
Search Term...

Hierarchy Tree

Build a new query
Use the search boxes above to add new terms, or the button below to import a query
Import Query

Import Query

Age/Sex

Hierarchy Tree – Search from Clinical Domains

Mount Sinai Health System
1 of 1 HCDs online

Any country
1 country in the network

Any age / Any sex
4,433,960 patients on network

MUST HAVE
Diagnoses: ICD-10

CANNOT HAVE
Search Term...

All Demographics **Dx Diagnoses** Oncology Procedures Medications Labs Genomics Visits

Organized by ICD-10

ICD-10-CM	Diagnoses: ICD-10	Patients
> <input type="checkbox"/> ICD-10-CM	A00-B99 Certain infectious and parasitic diseases	3,304,780
> <input type="checkbox"/> ICD-10-CM	C00-D49 Neoplasms	452,900
> <input type="checkbox"/> ICD-10-CM	E50-D89 Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	419,900
> <input type="checkbox"/> ICD-10-CM	E90-E99 Endocrine, nutritional and metabolic diseases	238,950
> <input type="checkbox"/> ICD-10-CM	F01-F99 Mental, Behavioral and Neurodevelopmental disorders	864,060
> <input type="checkbox"/> ICD-10-CM	G00-G99 Diseases of the nervous system	400,610
> <input type="checkbox"/> ICD-10-CM	H00-H59 Diseases of the eye and adnexa	508,620
> <input type="checkbox"/> ICD-10-CM	H60-H95 Diseases of the ear and mastoid process	277,580
> <input type="checkbox"/> ICD-10-CM	I00-I99 Diseases of the circulatory system	229,130
> <input type="checkbox"/> ICD-10-CM	J00-J99 Diseases of the respiratory system	736,230
> <input type="checkbox"/> ICD-10-CM	K00-K99 Diseases of the digestive system	659,940
> <input type="checkbox"/> ICD-10-CM	L00-L99 Diseases of the skin and subcutaneous tissue	227,190

Show Terms with Zero Patients Show Deprecated

Add To Query Cancel

Adding a term to the Query Builder:

Search for terms using the search box. For a given search result, click on the hierarchy tree to view parent and child terms

The screenshot displays a query builder interface for Mount Sinai Health System. At the top, there are filters for 'Any country' and 'Any age / Any sex'. Below these are 'MUST HAVE' and 'CANNOT HAVE' sections. A search box contains 'COPD', with a red arrow pointing to it from the label 'Search "COPD"'. Below the search box are tabs for 'All', 'D Demographics', 'Dx Diagnoses', 'O Oncology', 'P Procedures', 'M Medications', 'L Labs', 'G Genomics', and 'V Visits'. The main table lists search results with columns for 'Code', 'Term Description', and 'Patients'. The first row is selected, with a pink arrow pointing to its 'Code' column. A red arrow points from the 'Patient Count' label to the '34,071' value in the 'Patients' column. Another red arrow points from the 'Hierarchy Tree' label to the 'hierarchy tree' icon in the 'Patients' column. At the bottom, a red arrow points from the 'Add to Query' label to the 'Add To Query' button.

Code	Term Description	Patients
<input checked="" type="checkbox"/> ICD-10-CM J44	<input type="checkbox"/> Dx Other chronic obstructive pulmonary disease Copl	34,071 <input type="button" value="hierarchy tree"/>
<input type="checkbox"/> ICD-10-CM J44.1	<input type="checkbox"/> Dx Chronic obstructive pulmonary disease with (acute) exacerbation Copl w acute exacerbation	10,511 <input type="button" value="hierarchy tree"/>
<input type="checkbox"/> ICD-10-CM J44.0	<input type="checkbox"/> Dx Chronic obstructive pulmonary disease with (acute) lower respiratory infection Copl w acute bronchitis	790 <input type="button" value="hierarchy tree"/>

Adding Additional Terms

Next search for medications under **MUST HAVE** and add all three meds to Query

MUST HAVE **CANNOT HAVE**

Q Fluticasone Search Term...

All D Demographics Dx Diagnoses Oncology P Procedures M Medications L Labs G Genomics V Visits

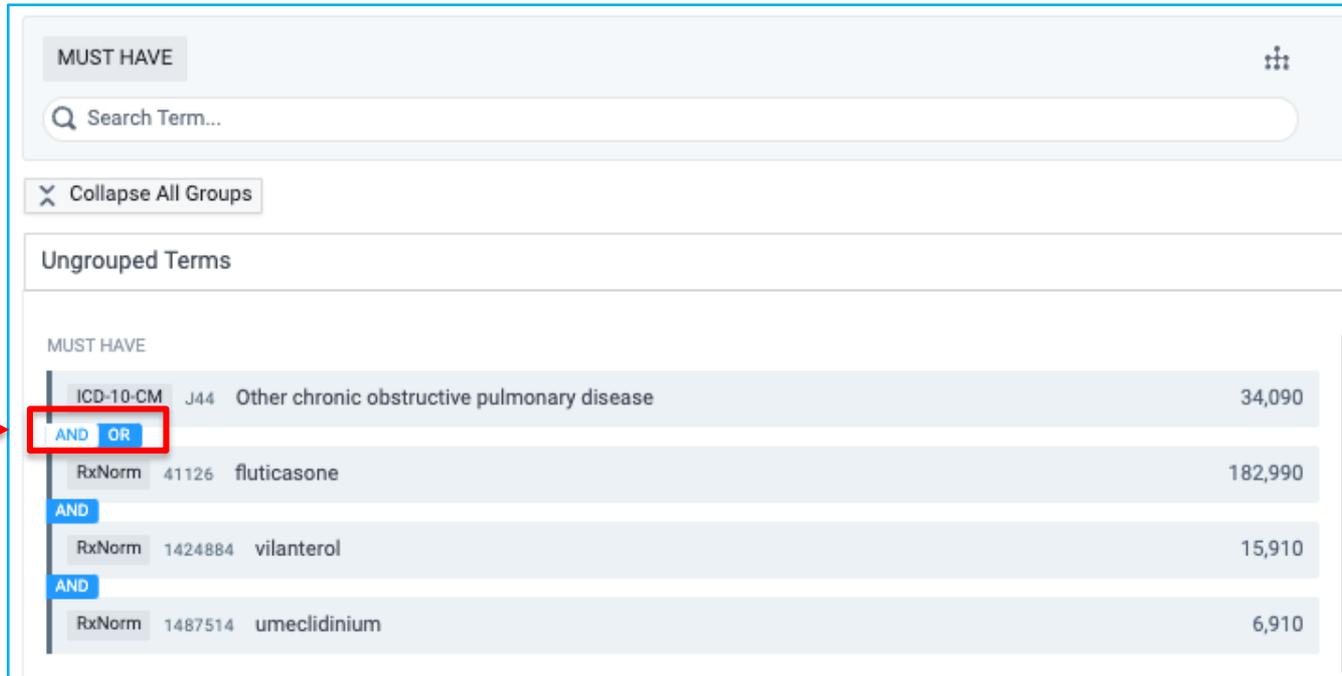
Code	Term Description	Patients
<input checked="" type="checkbox"/> RxNorm 41126	M Fluticasone	182,990
<input type="checkbox"/> ICD-10-CM T36.0X5A	Dx Adverse effect of penicillins, initial encounter Fluticasone adverse reaction	610
<input type="checkbox"/> ICD-10-CM T50.995A	Dx Adverse effect of other drugs, medicaments and biological substances, initial encounter Fluticasone allergy	210

Show Terms with Zero Patients Show Deprecated

Add to Query Add To Query Cancel

Adding Additional Terms

Click on the operator to switch between 'AND' & 'OR'



The screenshot shows a search interface with a search bar, a 'Collapse All Groups' button, and a list of 'Ungrouped Terms'. The first term is 'Other chronic obstructive pulmonary disease' with 34,090 results. A red arrow points to the operator selection menu for this term, which currently shows 'AND' selected and 'OR' as an option.

ICD-10-CM	J44	Other chronic obstructive pulmonary disease	34,090
RxNorm	41126	fluticasone	182,990
RxNorm	1424884	vilanterol	15,910
RxNorm	1487514	umeclidinium	6,910

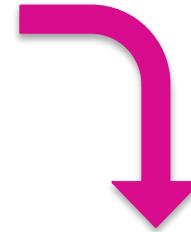
Medications

Hover over a medication term and click on the blue funnel to add details (i.e. Route, Brand, Strength)

MUST HAVE

ICD-10-CM	J44	Other chronic obstructive pulmonary disease		
AND	RxNorm	41126	fluticasone	
AND	RxNorm	1424884	vilanterol	15,910
AND	RxNorm	1487514	umeclidinium	6,910

Add term filters



Medication Details Clear Filter

Route	Brand	Strength
<input type="checkbox"/> Unknown route 10,720	<input type="checkbox"/> Unknown brand 10,720	<input type="checkbox"/> Unknown strength 10,720
<input type="checkbox"/> Inhalant product 176,640	<input type="checkbox"/> Advair 5,470	<input type="checkbox"/> 0.0275 mg/actuat 2,590
<input type="checkbox"/> Topical product 3,480	<input type="checkbox"/> Aller-flo 133,920	<input type="checkbox"/> 0.044 mg/actuat 6,780
	<input type="checkbox"/> Arnuity 2,150	<input type="checkbox"/> 0.045 mg/actuat 410
	<input type="checkbox"/> Beser 190	<input type="checkbox"/> 0.05 mg/actuat 137,480
	<input type="checkbox"/> Breo 12,920	<input type="checkbox"/> 0.1 mg/actuat 15,800
	<input type="checkbox"/> Cutivate 3,320	<input type="checkbox"/> 0.11 mg/actuat 10,630

Visits

Add the terms for Emergency (ED) and Inpatient visit under MUST HAVE

The screenshot displays a clinical data interface with two main sections: 'MUST HAVE' and 'CANNOT HAVE'. The 'MUST HAVE' section has a search bar containing 'Visits' and a navigation menu with tabs for 'All', 'D Demographics', 'Dx Diagnoses', 'O Oncology', 'P Procedures', 'M Medications', 'L Labs', and 'G Genomics'. The 'O Oncology' tab is active, and a sub-tab 'V Visits' is highlighted with a red box. Below the navigation, a list of visit types is shown under the heading 'Visits'. The 'Visit: Emergency' and 'Visit: Inpatient Encounter' options are checked and highlighted with a red box. The 'Visit: Ambulatory' option is unchecked. The 'Visit: Unknown' and 'Visit: Virtual' options are also unchecked. To the right of the list, the number of patients for each visit type is displayed. At the bottom right, a red arrow points to the 'Add To Query' button, with a 'Cancel' button next to it.

Visit Type	Patients
Visit	4,433,790
Visit: Ambulatory	3,118,220
Visit: Emergency	893,940
Visit: Inpatient Encounter	520,440
Visit: Unknown	4,430,500
Visit: Virtual	1,643,820

Create Groups of Terms

Once terms of interest have been added, click **Create a New Group** to group terms of interest

- Example: Group medications: *fluticasone*, *vilanterol*, *umeclidinium*

The screenshot displays a search interface with two columns: 'MUST HAVE' and 'CANNOT HAVE'. The 'MUST HAVE' column contains a list of terms with their respective counts:

Term	Count
ICD-10-CM J44 Other chronic obstructive pulmonary disease	34,090
RxNorm: 41126 fluticasone	182,990
RxNorm: 1424884 vilanterol	15,910
RxNorm: 1487514 umeclidinium	6,910
Visit: Inpatient Encounter	520,440
Visit: Emergency	893,940

A pink arrow points from the 'Create a New Group' button at the bottom left to a callout box containing the text '1. Added MUST HAVE terms'. Another pink arrow points to the 'Create a New Group' button.

2. Create a New Group

Groups of Terms

3. Click **Add terms** of interest → 4. Select terms (i.e. fluticasone, vilanterol, umeclidinium) for newly created Group

The top part of the screenshot shows a table of search results with columns for RxCN, RxCN description, and a numerical value. The results are:

RxCN	RxCN description	Value
41126	fluticasone	182,990
1424884	vilanterol	15,910
1487514	umeclidinium	6,910
	Visit: Inpatient Encounter	520,440
	Visit: Emergency	893,940

The bottom part of the screenshot shows a group creation interface. A red box highlights the text "Group 1" in the group name field. Below it, a pink box with the text "3. Add terms" has a red arrow pointing to a blue button labeled "+ Add terms".



The screenshot shows the group configuration interface. The group name is "Group 1". Under the heading "Terms not included in the group", there are two columns: "ADD TO MUST HAVE" and "ADD TO CANNOT HAVE".

In the "ADD TO MUST HAVE" column, the following terms are selected with blue checkmarks:

- RxCN: 41126 fluticasone
- RxCN: 1424884 vilanterol
- RxCN: 1487514 umeclidinium

A pink box with the text "4. Select terms for Group 1" has a pink arrow pointing to these selected terms. At the bottom right, a pink arrow points to a blue "Save" button.

Define Temporal Relationship between two Clinical Events

Related Group - Can indicate that Group B occurred before, on or after Group A

- Example: Patient must be on medications before ED or Inpatient Visit
- 1. Click **Related Group** from Group 1 (*Meds*) → 2. Click **Add terms** to Group B

Group 1
Meds

MUST HAVE	CANNOT HAVE
<input type="checkbox"/> Bupropion 41124 182,990	
<input type="checkbox"/> Venlafaxine 1424884 15,910	
<input type="checkbox"/> Zolpidem 1487514 6,910	

+ Related Group Number of Instances + Terms + Time Constraint

1. Related Group



Group 1A
1A Meds

MUST HAVE	CANNOT HAVE
<input type="checkbox"/> Bupropion 41124 182,990	
<input type="checkbox"/> Venlafaxine 1424884 15,910	
<input type="checkbox"/> Zolpidem 1487514 6,910	

Set a relationship between groups before running the query Set Relationship

1B Unnamed Group Group 1B

+ Add terms

2. Add terms

Define Temporal Relationship between two Clinical Events

3. Click **Set Relationship** between Group A and Group B

The screenshot displays a configuration interface for defining temporal relationships between two groups of clinical events. Group 1A, titled '1A Meds', includes three items under the 'MUST HAVE' section: Rulicason (Rulicason, 182,990), vilanteril (vilanteril, 15,910), and umeclidinium (umeclidinium, 6,910). Group 1B, titled 'Unnamed Group', includes items under 'Terms not included in the group': ICD-10-CM J44 Other chronic obstructive pulmonary disease, Visit: Inpatient Encounter, and Visit: Emergency. A red box highlights the 'Set Relationship' button, with an arrow pointing to it from a text box labeled '3. Set Relationship'.

Group	Item	Value
1A Meds	Rulicason	182,990
	vilanteril	15,910
	umeclidinium	6,910
Unnamed Group	ICD-10-CM J44 Other chronic obstructive pulmonary disease	
	Visit: Inpatient Encounter	
	Visit: Emergency	

Define Temporal Relationship between two Clinical Events

4. Define temporal relationship between Group A and Group B.

The screenshot displays a configuration interface for defining a temporal relationship between two clinical event groups. The top section, titled "1A Meds", lists three medications with their respective counts: Budesonide (182,990), Vilanterol (15,910), and Umeclidinium (6,910). The bottom section, titled "1B ED or Inpatient Visit", lists two visit types: Inpatient Encounter (520,440) and Emergency (893,940). A central configuration panel, highlighted with a red border, is titled "Set a Relationship between 1A (Meds) and 1B (ED or Inpatient Visit)". It contains the text: "Any instance of ED or Inpatient Visit occurred at least 1 day after any instance of Meds". Below this text is a timeline visualization with various time intervals (Anytime Before, 1yr, 3yr, 1yr, 6mo, 3mo, 1mo, 1day, Same Day, 1day, 1mo, 3mo, 6mo, 1yr, 3yr, Anytime After). A red arrow points to the "Same Day" interval, which is selected. Below the timeline, the relationship is further defined as "From 1 Days After To 0 Years after".

1A Meds

RefName	Count
41124 Budesonide	182,990
1424884 vilanterol	15,910
1447614 umeclidinium	6,910

1B ED or Inpatient Visit

RefName	Count
Visit: Inpatient Encounter	520,440
Visit: Emergency	893,940

Set a Relationship between 1A (Meds) and 1B (ED or Inpatient Visit)
Any instance of ED or Inpatient Visit occurred at least 1 day after any instance of Meds

Group 1A: Any instance | Most recent instance | First instance

Timeline: Anytime Before | 1yr | 3yr | 1yr | 6mo | 3mo | 1mo | 1day | **Same Day** | 1day | 1mo | 3mo | 6mo | 1yr | 3yr | Anytime After

From: 1 Days After To: 0 Years after

Group 1B: Any instance | Most recent instance | First instance

Buttons: Save, Cancel

Copy a Group and Paste

1. Copy Group 1B, and click **Paste Logic** to create **Group 2** (Example: COPD patients on meds who had an ED or Inpatient visit in the [past year](#))
2. Click **Time Constraint** for Group 2

Group 1

1A Meds

MUST HAVE	CANNOT HAVE
RefNum: 41124 Rubicon	
RefNum: 142484 vladant	
RefNum: 142714 umedibrium	

Relationship: Any instance of ED or Inpatient Visit occurred at least 1 day after any instance of Meds

1B ED or Inpatient Visit **Group 1B**

MUST HAVE	CANNOT HAVE
Visit: Inpatient Encounter	
Visit: Emergency	

+ Create a New Group

Paste Logic

Copy 1B (ED or Inpatient Visit)

Group 2 **Group 2**

ED or Inpatient Visit

MUST HAVE	CANNOT HAVE
Visit: Inpatient Encounter	
Visit: Emergency	

Time Constraint

Adding Time Constraints

- Set time constraint for Group 2

Group 2

ED or Inpatient Visit

Time Constraint for Group 2

Relative Time | Specific Dates

Anytime 1yr 2yr 3yr 4yr 5yr 6yr 7yr 8yr 9yr 10yr Today

From 1 Years 8 To 0 Months 8

Save Cancel

MUST HAVE

Visit: Inpatient Encounter	520,440
Visit: Emergency	893,940

CANNOT HAVE

Adding Number of Instances

Example: COPD patients on meds who had an ED or Inpatient visit at least once in the past year

The screenshot shows a configuration interface for a clinical group. At the top, there is a dropdown menu for '+ Number of Instances' with the value '1' selected. Below this, the group is defined as 'ED or Inpatient Visit' with a filter 'This group occurred since 1 year ago'. Under the 'MUST HAVE' section, there are two options: 'Visit: Inpatient Encounter' with a count of 520,440, and 'Visit: Emergency' with a count of 893,940, separated by an 'OR' operator. A red box highlights the '+ Number of Instances' dropdown, and another red box below it contains the text 'Number of Instances'.



The screenshot shows the configuration screen for 'Number of Instances for Group 2'. The dropdown menu is set to 'Greater than or equal to a' and the value '1' is entered in the adjacent input field. A red box highlights this configuration. The 'Save' and 'Cancel' buttons are visible at the bottom right. The group name 'ED or Inpatient Visit' and the filter 'This group occurred since 1 year ago' are visible at the bottom of the screen.

Restrict by Current Age

Example: COPD **adult** patients on meds who had an ED or inpatient visit at least once in the past year

The image shows a two-step process for filtering patient data. The top screenshot shows a search interface for Mount Sinai Health System with filters for 'MUST HAVE' (COPD) and 'CANNOT HAVE'. A red box highlights the 'Select Age/Sex' dropdown menu, which is currently set to 'Any age / Any sex' with 6,633,063 patients on network. A pink arrow points from this menu to the bottom screenshot.

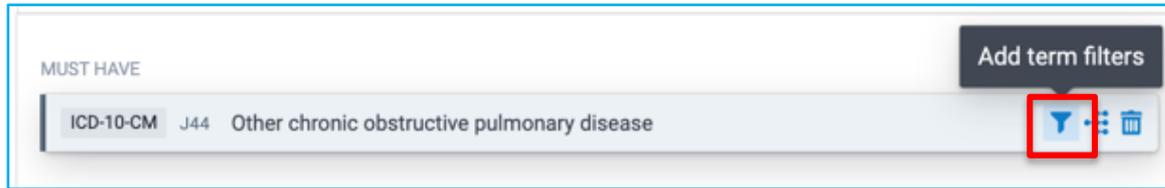
The bottom screenshot shows a population pyramid chart for Mount Sinai Health System. The x-axis is 'Age in years' (0 to 90+) and the y-axis is 'Number of Patients' (0 to 60,000). The chart is stacked by sex: Male (blue) and Female (orange). A red box highlights the 'Select Age Range' filter, which is set to 'Greater than or equal to 18 years' and 'Less than or equal to' (blank). Another red box highlights the word 'Age' in the filter area. The 'Select Sex' filter is set to 'Any Sex'.

Age

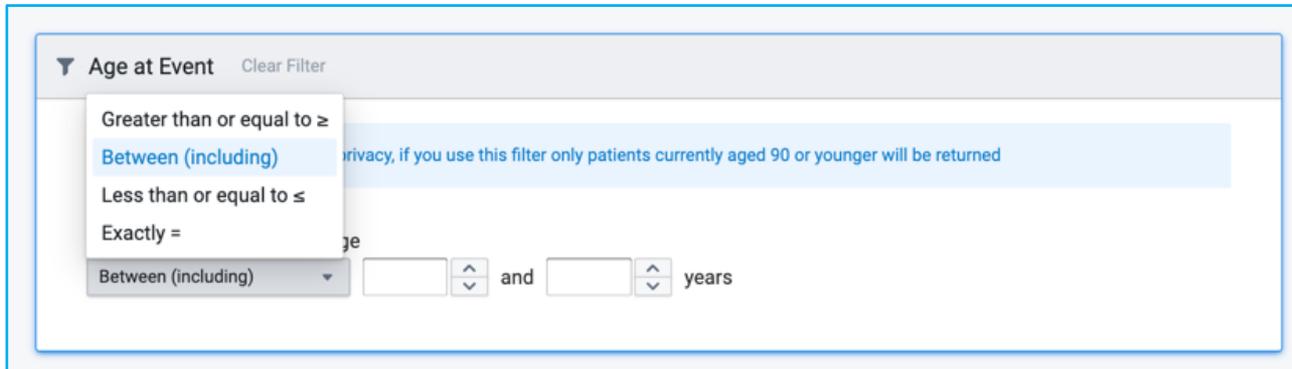
Save Criteria Cancel

Restrict by Age at Event

Hover mouse over the term in Query Builder and click on **Blue Funnel**:



Indicate age or age range for when patient had the term documented:



Exclude Deceased Patients

Found under Demographics

The screenshot shows a patient search interface with a 'MUST HAVE' and 'CANNOT HAVE' filter bar. The 'CANNOT HAVE' filter is highlighted with a red box and contains the search term 'Deceased'. Below the filter bar, there is a search bar and a category navigation bar with tabs for 'All', 'D Demographics', 'Dx Diagnoses', 'P Procedures', 'M Medications', 'L Labs', 'G Genomics', and 'V Visits'. The 'D Demographics' tab is selected. Below the navigation bar, there is a table with columns for 'Code', 'Term Description', and 'Patients'. The table contains one entry: a checkbox, a blue 'D' icon, 'Deceased', and '31,280' with a plus icon. At the bottom left, there is a checkbox labeled 'Show Terms with Zero Patients'. At the bottom right, there are two buttons: 'Add To Query' and 'Cancel'.

Code	Term Description	Patients
<input type="checkbox"/>	D Deceased	31,280

Count Patients

Once query has been built, click **Count Patients** to generate cohort

The screenshot displays a query interface for a cohort of 370 patients. The interface includes a search bar, filters for 'MUST HAVE' and 'CANNOT HAVE' terms, and a list of grouped terms. A red box highlights the 'Count Patients' button, and a pink arrow points to the patient count '370'.

Query Summary:

- Organization: Mount Sinai Health System (1 of 1 HDSs active)
- Country: Any country (1 country in the network)
- Age: > 18 years, Any sex (4,581,734 patients in network)
- Patients: 370
- HCNs: 1

Group 1: 1A. Meds

MUST HAVE	CANNOT HAVE
ICD10: J41.901 Subacute	
ICD10: J41.902 Subacute	
ICD10: J41.903 Subacute	
ICD10: J41.904 Subacute	
ICD10: J41.905 Subacute	
ICD10: J41.906 Subacute	
ICD10: J41.907 Subacute	
ICD10: J41.908 Subacute	
ICD10: J41.909 Subacute	
ICD10: J41.910 Subacute	
ICD10: J41.911 Subacute	
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ICD10: J41.918 Subacute	
ICD10: J41.919 Subacute	
ICD10: J41.920 Subacute	
ICD10: J41.921 Subacute	
ICD10: J41.922 Subacute	
ICD10: J41.923 Subacute	
ICD10: J41.924 Subacute	
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ICD10: J41.999 Subacute	
ICD10: J41.000 Subacute	

Group 2: ED or Inpatient Visit

MUST HAVE	CANNOT HAVE
Visit: Inpatient Encounter	
Visit: Emergency	

Explore Cohort - Demographics

The screenshot shows the TriNetX interface for the 'Explore Cohort - Demographics' page. The left sidebar contains a navigation menu with 'Explore Cohort' highlighted in a red box and a pink arrow pointing to it. The main content area displays a bar chart of patient counts by age, a summary table with 370 total patients, and horizontal bar charts for sex and race.

Demographics Summary Table:

Total Patients	Minimum Age	Maximum Age	Mean Age	Standard Deviation
370	36	90	74	11

Sex Distribution:

Sex	Percentage
Female	62%
Male	40%
Unknown	0%

Race Distribution:

Race	Percentage
Other Race	35%
Black or African American	32%
White	29%
Asian	2%
Unknown Race	2%
American Indian or Alaska Nati...	0%
Native Hawaiian or Other Paci...	0%

Ethnicity Distribution:

Ethnicity	Percentage
Unknown Ethnicity	92%
Not Hispanic or Latino	5%
Hispanic or Latino	3%

Explore Cohort - Diagnoses

The screenshot shows the 'Explore Cohort - Diagnoses' interface. A sidebar on the left contains navigation options: Query Builder, Healthcare Organizations (HCOs), Explore Cohort (highlighted with a red box and a pink arrow), Demographics, Diagnoses (highlighted with a pink arrow), Oncology, Procedures, Medications, Labs, Genomics, Analyze Criteria, Rate of Arrival, Analytics, Trial Connect (LEGACY), Connect (NEW), Study Management, and Design Assistance.

At the top, the study is identified as 'Unnamed' with a star icon, dated 'Oct 13, 2023 at 12:33 pm by Naomi Se'. It shows 370 Patients and 1 HCOs, with a 'Run' button and a 'View History' link.

The 'Diagnoses' section features a filter for 'Diagnoses within' with options: 3M, 6M, 12M, 24M, Anytime (selected), All, Acute, and Chronic. A search box contains '1/7 emphysema' (highlighted with a red box and labeled 'Search for diagnosis').

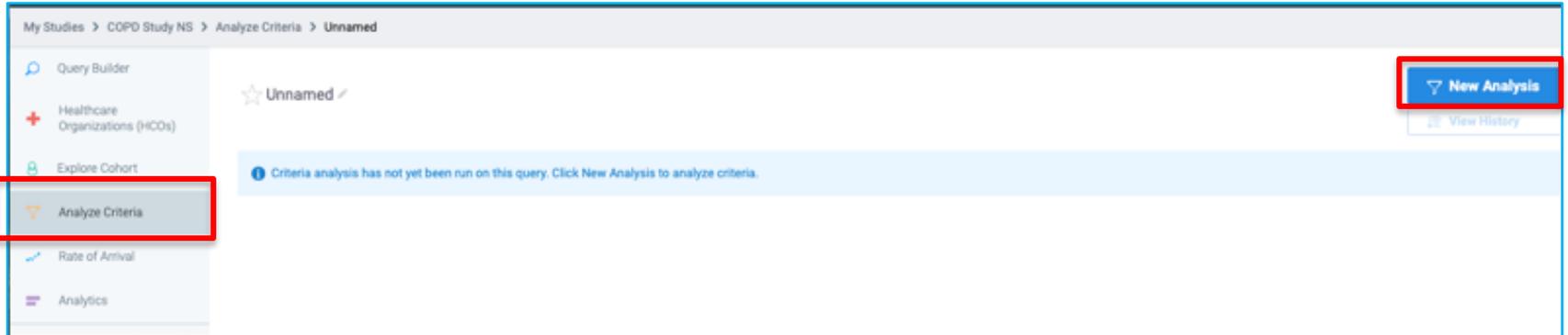
Below the filters is a table of diagnoses with columns for ICD-10-CM code, description, Patients, and % of Cohort. The 'Emphysema' row (ICD-10-CM J43) is highlighted in blue. A red box labeled 'Option to add terms to query' points to '+ Add to Must Have' and '+ Add to Cannot Have' buttons above the table.

ICD-10-CM	Description	Patients	% of Cohort
J00-J99	Diseases of the respiratory system	370	100%
J40-J47	Chronic lower respiratory diseases	370	100%
J44	Other chronic obstructive pulmonary disease	370	100%
J43	Emphysema	200	54%
J45	Asthma	200	54%
J41	Simple and mucopurulent chronic bronchitis	90	24%
J42	Unspecified chronic bronchitis	80	22%
J40	Bronchitis, not specified as acute or chronic	60	16%
J47	Bronchiectasis	50	14%
J56-J99	Other diseases of the respiratory system	220	59%
J09-J18	Influenza and pneumonia	190	51%
J30-J39	Other diseases of upper respiratory tract	140	38%
J00-J06	Acute upper respiratory infections	130	35%
J20-J22	Other acute lower respiratory infections	80	22%
J80-J84	Other respiratory diseases principally affecting the interstitium	80	22%
J90-J94	Other diseases of the pleura	50	14%
J60-J70	Lung diseases due to external agents	30	8%

Analyze Criteria

View the impact each criteria has on the total patient count

1. Click **New Analysis**



Analyze Criteria

2. Select Baseline Criteria to define base population (i.e. patients with COPD)
3. Select Terms for Analysis
4. Click Run

The screenshot displays the 'New Criteria Analysis' workflow in a software interface. The interface is divided into two main panels. The left panel, titled 'New Criteria Analysis', shows the 'Select Baseline Criteria' step. A red box highlights the 'Select Baseline Criteria' button, and a red arrow points from a red box labeled 'Selected criteria' to the 'ICD-10-CM .J44 Other chronic obstructive pulmonary disease' term in the 'Ungrouped Terms' list. The right panel, also titled 'New Criteria Analysis', shows the 'Select Terms for Analysis' step. A red box highlights the 'Select Terms for Analysis' button. Below this, the analysis criteria are defined in two groups. Group 1, '1A Meds', includes three medication terms: 'Rituximab 41126 Rituximab', 'Vilanterol 1424894 vilanterol', and 'Umeclidinium 1487514 umeclidinium'. A red arrow points to the 'AND' operator between the first and second terms. Group 2, '2A ED or Inpatient Visit', includes two visit terms: 'Visit: Inpatient Encounter' and 'Visit: Emergency'. A red arrow points to the 'AND' operator between the two groups. At the bottom right of the right panel, a red box highlights the 'Run' button, with a red arrow pointing to it from a larger red box labeled 'Run'.

Analyze Criteria

- View the impact each criteria has on the total patient count
- The % decrease is from the criteria above

The screenshot displays the 'Analyze Criteria' interface for a study named 'Unnamed'. The left sidebar contains navigation options: Query Builder, Healthcare Organizations (HCOs), Explore Cohort, **Analyze Criteria** (highlighted with a red box), Rate of Arrival, Analytics, Trial Connect (LEGACY), Connect (NEW), Study Management, and Design Assistance. The main content area shows a table of criteria with columns for Patients and HCOs. The table data is as follows:

	Patients		HCOs
Network	4,433,960		1
Base Population	34,090	(-99%)	1
Population ≥ 18 years, Any sex	34,060	(0%)	1
Group 1A: Meets The terms in this group occurred at any time Must Have: RxNorm: 41125 Fluticasone [AND] RxNorm: 1424884 Vilanterol [AND] RxNorm: 1487514 Umeclidinium Group 1B: ED or Inpatient Visit Any instance of ED or Inpatient Visit	950	(-97%)	1
Group 2A: ED or Inpatient Visit This group occurred since 1 year ago (Greater than or equal to 1 instance) Must Have: Visit inpatient encounter [OR] Visit emergency	370	(-61%)	1
	370 Patients		1 HCOs

Analyze Criteria

Option to **Hide** criteria to see how it impacts patient count

The screenshot displays the 'Analyze Criteria' interface for an unnamed analysis. It shows a table of criteria and their impact on patient and HCO counts. A red box highlights a 'HIDE' button next to a criterion, and another red box highlights a message: 'Adjusting your criteria increases your cohort by 716% or 2,650 patients'.

Criteria	Patients	HCOs
Network	4,433,960	1
Base Population	34,090 (-99%)	1
Population ≥ 18 years, Any sex	34,090 (0%)	1
Group 2A: ED or Inpatient Visit This group occurred since 1 year ago (Greater than or equal to 1 instance) Must Have: Visit: inpatient encounter OR Visit: emergency	3,020 (-91%)	1
Total	3,020 Patients	1 HCOs

Adjusting your criteria increases your cohort by 716% or 2,650 patients

Hidden Terms: 1

Group 1A: Meds The terms in this group occurred at any time Must Have: RxNorm: 41125 Fluticasone AND RxNorm: 1424884 Vlanterol AND RxNorm: 1487514 Umeclidinium Group 1B: ED or Inpatient Visit Any

Rate of Arrival

View how many patients who meet query criteria enter patient cohort each month

The screenshot displays a software interface for analyzing patient arrival rates. The main header shows 'Patients: 370' and 'HCOs: 1'. A 'Run' button is highlighted with a red box. The table below shows the following data:

Healthcare Organization (HCO)	Historic Arrivals (Monthly Avg Over Past 3 Yrs.)	Predicted Arrivals (Monthly Avg Over Next 1 Yr.)	Trend
Mount Sinai Health System	17.1	11.5	

Study Management

- **Properties** → Edit Study Properties
- **Team** → Share Study
- **Documents** → Upload relevant study documents

The screenshot displays the 'Study Properties' page within a web application. The breadcrumb trail at the top reads 'My Studies > COPO Study NS > Study Management > Properties'. The left sidebar contains a navigation menu with the following items: Query Builder, Healthcare Organizations (HCOs), Explore Cohort, Analyze Criteria, Rate of Arrival, Analytics, Trial Connect (LEGACY), Connect (NEW), Study Management, Properties (highlighted with a red box and a pink arrow), Team, Documents, and Design Assistance. The main content area is titled 'Study Properties' and contains several sections: 'Study Name*' with a text input field containing 'COPO Study NS'; 'Research Purpose*' with a dropdown menu showing 'Clinical Trial Research' (selected) and 'Other Scientific Research'; 'Study Identifying Information'; and 'Summary' with a 'Sponsor Name' field and a 'Study Status' field. In the top right corner, there is a blue button labeled 'Edit Study Properties', which is highlighted with a red box and a red arrow pointing to it from the text 'Edit Study Properties' also enclosed in a red box.

Demo of Example Query in TriNetX

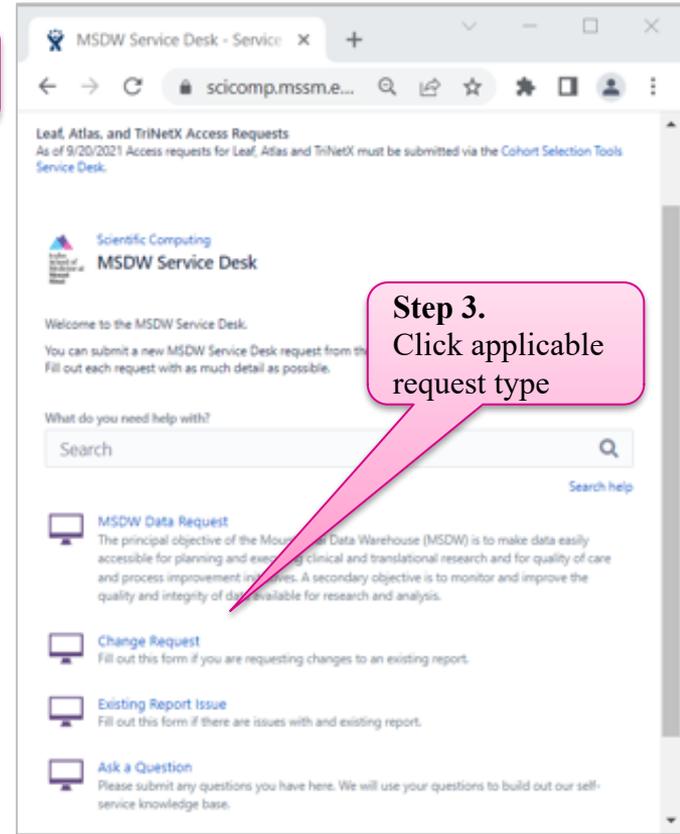
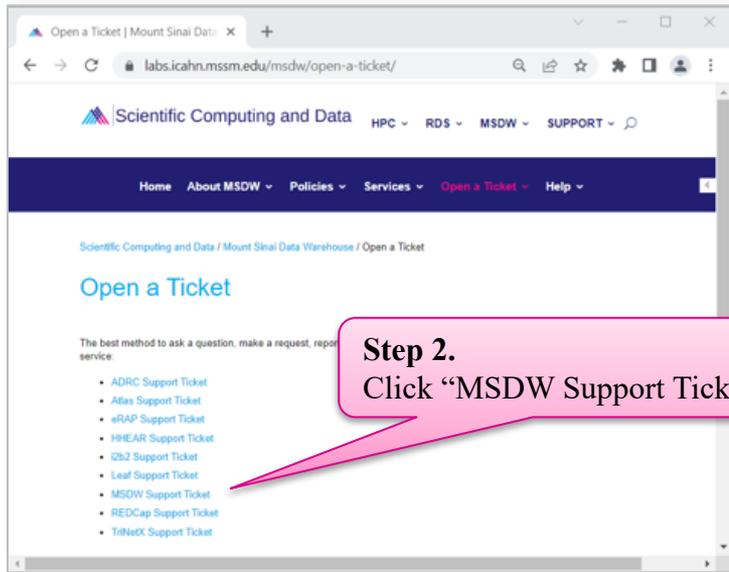
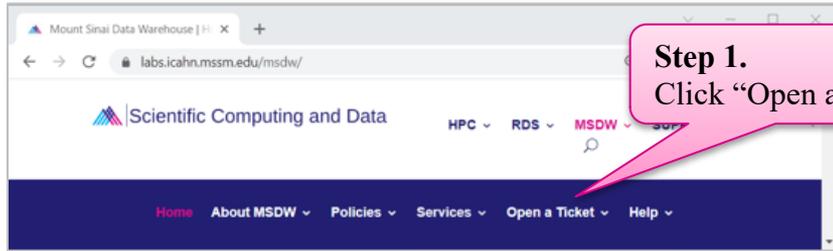
MSDW Custom Data Request

When You Need Custom Data

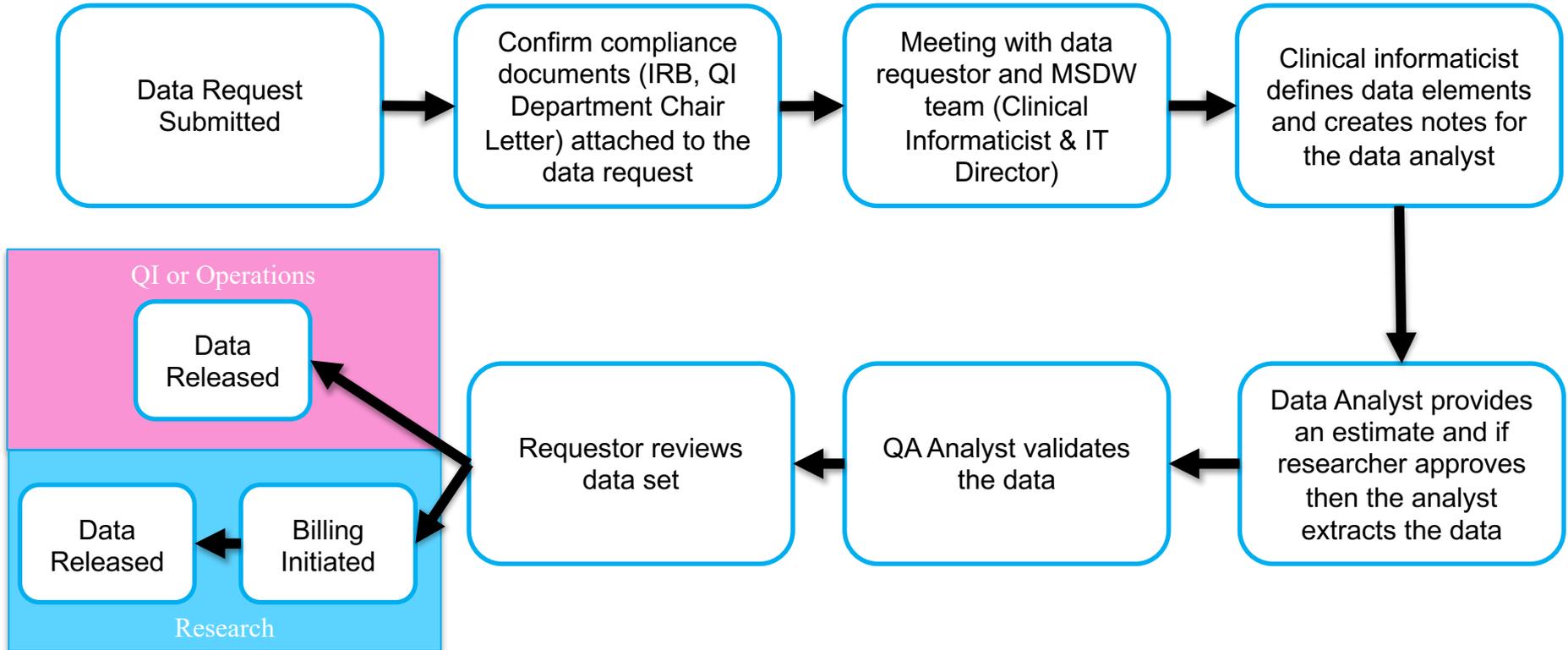
- ▶ Complex question that cannot be answered with one of the self-service query tools
- ▶ Need additional data that is not included in a de-identified data set
- ▶ Need PHI data for your analysis

<https://scicomp.mssm.edu/jira/servicedesk/customer/portal/4>

How to Open an MSDW Request Ticket



Workflow Once Data Request Submitted



JIRA ticketing system used to monitor the status of data requests

Acknowledgements

Encourage MSDW Users to Acknowledge CTSA

Mount Sinai Data Warehouse | S: x +

https://labs.icaahn.mssm.edu... A 🔍 ★ ☆ ⌚ ⬇️ ❤️ 🏠

Sign in [Profile Icon] ... [Language Icon]

Home About MSDW ▾ Policies ▾ Services ▾ Open a Ticket ▾ Help ▾

Acknowledge Mount Sinai in Your Work

All publications must include the following language in the acknowledgments section: "This work was supported in part through the Mount Sinai Data Warehouse (MSDW) resources and staff expertise provided by Scientific Computing and Data at the Icahn School of Medicine at Mount Sinai."

SEE DATA USE AGREEMENT

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Acknowledge CTSA

- ▶ HPC team now requiring current & new Minerva users to agree annually to acknowledge Mount Sinai's CTSA grant
 - Users failing to agree risk having their access revoked
- ▶ REDCap team will put this policy into place
- ▶ MSDW team could enact the same policy
 - Direct database access users
 - Customers receiving custom data sets

CTSA Clinical & Translational[®]
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Your Publications

Report publications to Scientific Computing and Data:

All publications that resulted from Scientific Computing and Data resources and services, including TriNetX, should be reported annually.

To report your publications, submit them here:

<https://redcap.mountsinai.org/redcap/surveys/?s=HPEMDCYLNTXF3E3E>

For 20 or more publications, email Maria at marajulia.castro@mssm.edu

Learn more about MSDW and Clinical Query tools from the links below:

<https://labs.icahn.mssm.edu/msdw/>

<https://labs.icahn.mssm.edu/msdw/services/>

<https://labs.icahn.mssm.edu/msdw/data-sources/>

“Walk-in” Digital Concierge service hosted by the MSDW

- Every Wednesday from 3:30 PM to 4:30 PM



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Thank you!

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Please take a minute to complete a short survey to provide your feedback and help improve our services:



<https://redcap.link/hyzm6it3>