

TriNetX Clinical Query Tool

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Scientific Computing and Data

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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

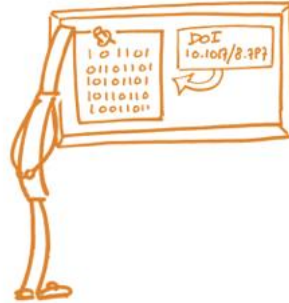
Reusable /
Reproducible

FAIR DATA PRINCIPLES

AH!



FINDABLE



ACCESSIBLE

HOW DO YOU
OPEN A .X2Q FILE?



INTEROPERABLE

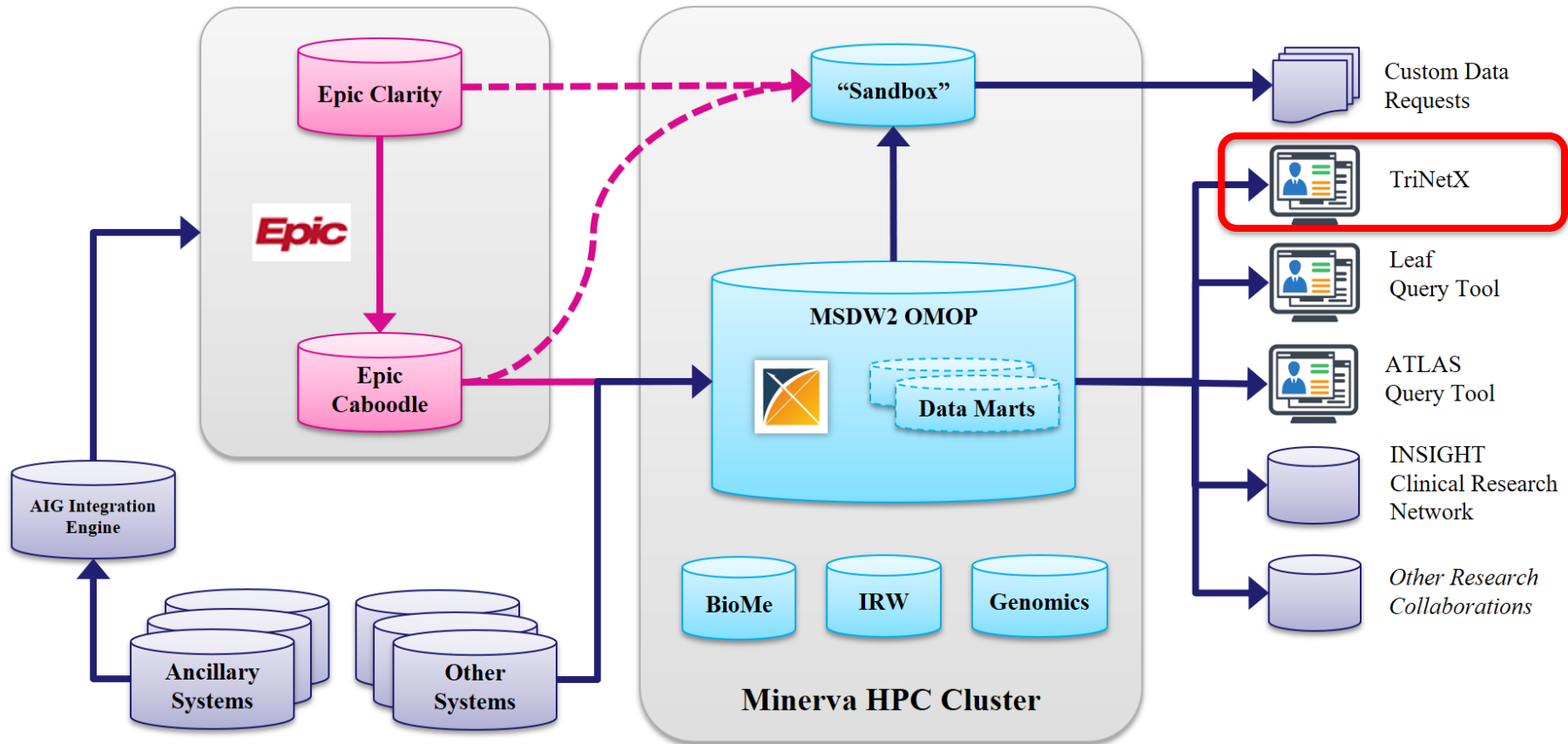


REUSABLE

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

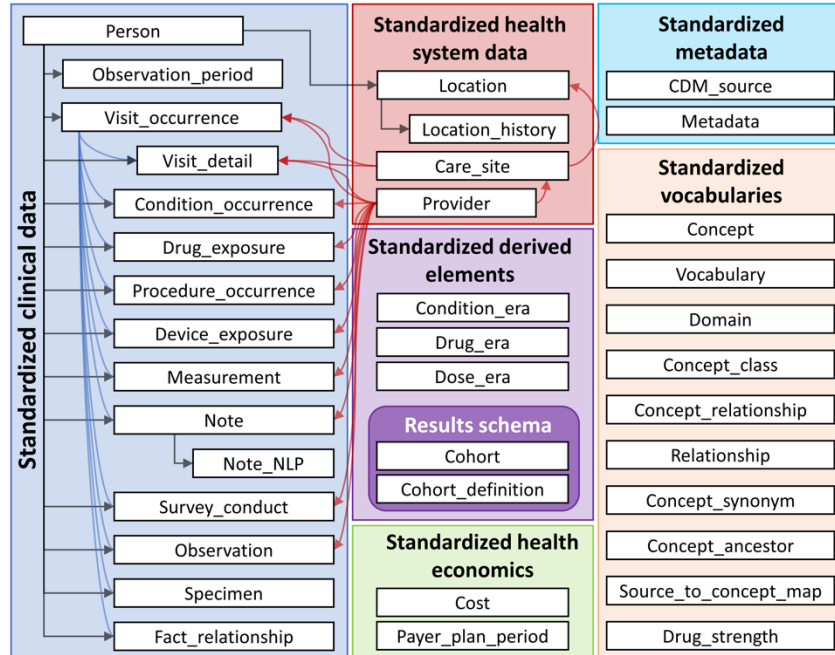
Image Source: <https://book.fosteropenscience.eu/>

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 July 2024*)

OMOP Table	Record Type	Distinct Patients	Record Count
person	Patient Demographics	11,907,714	11,907,714
death	Patient Date of Death	51,578	51,578
visit_occurrence	Chart Documentation Event	5,916,518	101,871,186
visit_occurrence	ED Visit	1,264,805	3,123,540
visit_occurrence	Hospital Outpatient Visit	976,262	2,784,853
visit_occurrence	Inpatient Hospitalization	649,474	972,623
visit_occurrence	Inpatient Hospitalization from ED Visit	312,887	602,899
visit_occurrence	Mobile Unit Encounter	87,221	145,630
visit_occurrence	Outpatient Visit	4,477,479	85,285,020
visit_occurrence	Telehealth Visit	715,881	3,178,310
visit_occurrence	Urgent Care Visit	7,079	7,604
condition_occurrence	Billing Diagnosis	2,617,770	60,472,990
condition_occurrence	Encounter Diagnosis	4,237,020	119,783,046
condition_occurrence	Hospital Problem	922,623	3,593,212
condition_occurrence	Problem List	2,444,954	13,455,224
measurement	Flowsheet Measurement	1,820,482	226,459,093
measurement	Lab Component Result	4,136,901	1,065,127,536
measurement	Vital Signs	3,766,375	649,758,358
drug_exposure	Immunization Administration	1,439,713	8,789,505
drug_exposure	Immunization from Medication Order	217,360	280,661
drug_exposure	Immunization from Procedure Order	793,602	3,599,282

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

Introduction: TriNetX Cohort Query Tool

Clinical Query Tools - Overview

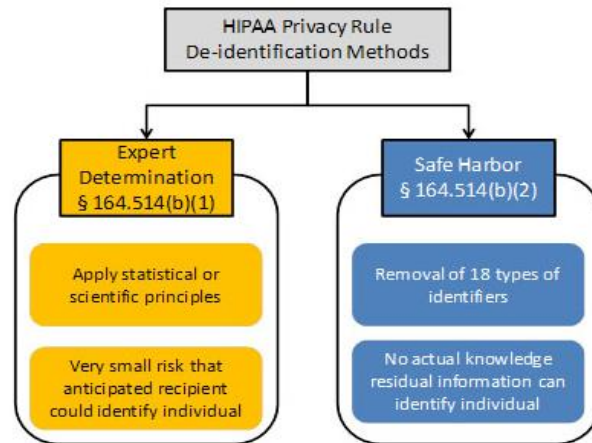
	Leaf	ATLAS	TriNetX
Description	Web-based, lightweight drag-and-drop cohort query tool that quickly analyzes population demographics	A web-based cohort query tool for database exploration, standardized vocabulary browsing, cohort definition, and patient cohort-level analysis	A web-based cohort query tool
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	No	De-identified data only
Cost	No charge	No charge	No charge
Application Status	Leaf Status and Roadmap	ATLAS Status and Roadmap	
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.ica hn.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

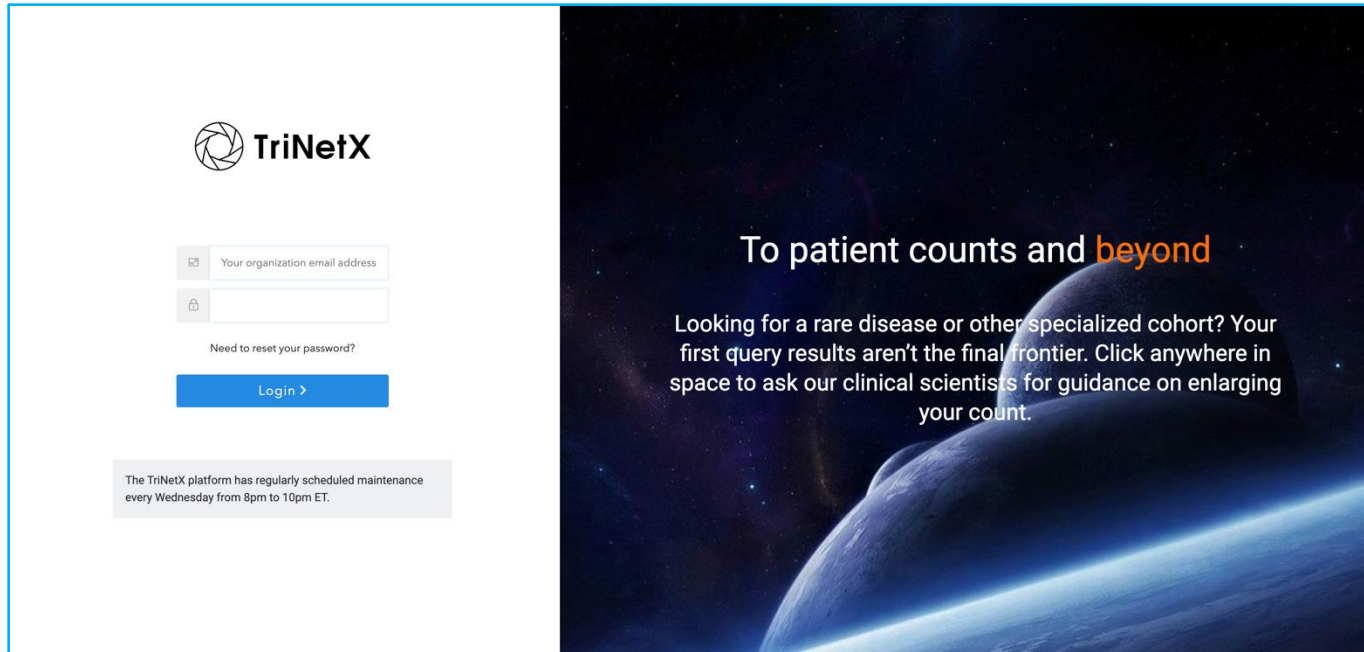
- Name
- Street Address, city, county, zip code (the first three digits of the zip code may be used if there are more than 20,000 people in the zip code)
- All element of dates (except year), including dates of birth, admission, discharge or death
- All ages over 89
- All telephone/fax numbers
- Fax 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

- TriNetx can be used to query the MSDW for QI and Research purposes
- Access **De-identified** data across the following domains:
 - Diagnoses using ICD-10-CM
 - Encounters
 - Lab results using LOINC
 - Medications using ATC, RxNorm Ingredient
 - 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, a text input field for the organization email address, a password input field, a link for password reset, and a blue 'Login >' button. A maintenance notice is displayed at the bottom of the login page. The banner on the right has a space-themed background with a planet and text that reads: 'To patient counts and beyond. 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 for managing studies. The browser address bar shows `live.trinetx.com/tnx/studies`. The navigation bar includes the TriNetX logo, a 'Studies' dropdown menu, and links for 'Connect', 'Trial Connect', 'LEGACY', 'Browse Network', and 'Discover'. On the right side of the navigation bar, there are notification, help, and user profile icons.

Below the navigation bar, a horizontal menu contains several tabs: 'All studies' (highlighted with a pink arrow), 'Favorites', 'Created by me', 'Shared with me', 'Template studies', and 'Oncology template studies'. Below this menu is a search bar and a 'Sort by' dropdown menu currently set to 'Last Updated'. A red arrow points to a blue 'Create new study' button, which is also enclosed in a red rectangular box.

The main content area is divided into two sections: 'Open studies' and 'Other studies'. Under 'Open studies', a single study titled 'COPD NS test 2' is visible. Under 'Other studies', there is a placeholder box that says 'Please select a study'.

Duplicate a Study from My Studies

The screenshot shows the TriNetX interface. At the top, there are navigation tabs: 'Studies', 'Connect', 'Trial Connect', 'LEGACY', 'Browse Network', and 'Discover'. Below this, there are filters for 'All studies', 'Favorites', 'Created by me', 'Shared with me', 'Template studies', and 'Oncology template studies'. A search bar and a 'Sort by' dropdown (set to 'Last Updated') are visible. The main content area is divided into 'Open studies' and 'Other studies'. Under 'Open studies', there is a card for 'COPD NS test 2'. Under 'Other studies', there are cards for 'Multiple Myeloma Test', 'Multiple Myeloma', and 'COPD NS'. On the right side, a detailed view for 'COPD NS test 2' is shown, including the creator 'Naomi So' and the date 'Dec 28, 2023'. At the bottom of this view, there are buttons for 'Delete' and 'Duplicate'. A red box highlights the 'Duplicate' button, with a red arrow pointing to it from a larger red box containing the word 'Duplicate'.

The 'Duplicate Study' form is displayed. It has a title 'Duplicate Study' and a 'Study Name*' field. Below this, there is a prompt: 'Enter a descriptive name for the study.' The 'Study Name*' field contains the text 'Duplicate Study Name|'. Underneath, there is a section 'Copy the following to new study' with two columns of checkboxes. The first column includes 'Current Study' (checked) and 'Query History'. The second column includes 'Results History', 'Attached Documents', 'Analytics Inputs', and 'Lucid Inputs'. Below this is a 'Research Purpose*' field with a help icon. At the bottom, there is a prompt: 'Please select at least one option below.*'. There are two sections: 'Clinical Trial Research' and 'Other Scientific Research'. Under 'Clinical Trial Research', 'Design clinical trial' and 'Assess feasibility of clinical trial' are checked. Under 'Other Scientific Research', there are three unchecked options: 'Conduct health economics and outcomes research (HEOR)', 'Explore patient populations', and 'Conduct other secondary research'. A pink arrow points from the 'Duplicate' button in the previous screenshot to the 'Study Name*' field in this form.

Sample Study:

How many adult patients with a diagnosis of COPD and on 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 for managing studies. The browser address bar displays `live.trinetx.com/tnx/studies`. The navigation bar includes the TriNetX logo, a 'Studies' dropdown menu, and links for 'Connect', 'Trial Connect', 'LEGACY', 'Browse Network', and 'Discover'. On the right side of the navigation bar, there are notification and user profile icons.

Below the navigation bar, there are filter tabs: 'All studies', 'Favorites', 'Created by me', 'Shared with me', 'Template studies', and 'Oncology template studies'. A search bar and a 'Sort by' dropdown menu (set to 'Last Updated') are also present.

The main content area is divided into two sections: 'Open studies' and 'Other studies'. Under 'Open studies', a single study titled 'COPD NS test 2' is listed. Under 'Other studies', there is a placeholder box that says 'Please select a study'. A red arrow points to a blue 'Create new study' button located in the top right corner of the main content area.

TriNetX – Create New Study

The screenshot shows the 'Create New Study' page in the TriNetX interface. The page has a dark blue header with navigation links: 'Studies', 'Connect', 'Trial Connect', 'LEGACY', 'Browse Network', and 'Discover'. Below the header is a search bar and a filter dropdown set to 'All Studies'. A pink arrow points to the 'Create New Study' heading. The form contains several sections:

- Study Name***: A text input field with a red callout box labeled 'Study Name' and an arrow pointing to it.
- Research Purpose***: A text input field with a red callout box labeled 'Research Purpose' and an arrow pointing to it. Below this field are two columns of checkboxes:
 - 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
- Study Identifying Information**: A section with a 'Summary' text area.
- Sponsor Name**: A text input field.
- Study Status**: A dropdown menu with 'Select study status'.
- Study Identifier**: A text input field.
- NCT Number**: A text input field with a 'Validate' button.
- EudraCT Number**: A text input field with a 'Validate' button.
- Target Population***: A text input field with a red callout box labeled 'Target Population' and an arrow pointing to it.
- Indication**: A text input field.
- Primary Therapeutic Area***: A dropdown menu with 'Select therapeutic area'.
- Secondary Therapeutic Area**: A dropdown menu with 'Select therapeutic area'.

Create New Study – Query Builder

The screenshot shows the TriNetX Query Builder interface. The top navigation bar includes the TriNetX logo and menu items: Studies, Connect, Browse Network, and What's New. The main header displays 'My Studies / COPD TEST NS / Query Builder'. A left sidebar contains navigation options: Query Builder (highlighted with a pink arrow), Healthcare Organizations (HCOs), Explore Cohort, Analyze Criteria, Rate of Arrival, Analytics, Connect, Study Management, and Design Assistance. The main workspace shows a query named 'Unnamed' for 'Mount Sinai Health System' (1 of 1 HCOs online) and 'Any country' (1 country in the network). The query is currently set to 'Any age / Any sex' with 4,973,230 patients on network. Two red boxes highlight the 'MUST HAVE Inclusion Criteria' and 'CANNOT HAVE Exclusion Criteria' sections, each with a search box. A blue box labeled 'Hierarchy Tree' points to a grid icon in the inclusion criteria section. A red box labeled 'Age/Sex' points to a dropdown menu in the exclusion criteria section. A central panel titled 'Build a new query' contains instructions and an 'Import Query' button, which is highlighted with a red box labeled 'Import Query'.

TriNetX Studies Connect Browse Network What's New

My Studies / COPD TEST NS / Query Builder

Query Builder

Healthcare Organizations (HCOs)

Explore Cohort

Analyze Criteria

Rate of Arrival

Analytics

Connect

Study Management

Design Assistance

☆ Unnamed

Mount Sinai Health System
1 of 1 HCOs online

Any country
1 country in the network

Any age / Any sex
4,973,230 patients on network

Count Patients

MUST HAVE **Inclusion Criteria**

Search Term...

CANNOT HAVE **Exclusion Criteria**

Search Term...

Hierarchy Tree

Age/Sex

Import Query

Build a new query

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

Import Query

Hierarchy Tree – Search from Clinical Domains

☆ Unnamed Count Patients ...

Mount Sinai Health System Any country
1 country in the network Any age / Any sex
4,973,230 patients on network

MUST HAVE CANNOT HAVE

Diagnoses: ICD-10 Search Term...

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

Organized by ICD-10 Show ICD-9 terms

<input type="checkbox"/>	ICD-10-CM	Diagnoses: ICD-10		Patients
>	<input type="checkbox"/>	ICD-10-CM	A00-B99 Certain infectious and parasitic diseases	3,816,070
>	<input type="checkbox"/>	ICD-10-CM	C00-D49 Neoplasms	549,950
>	<input type="checkbox"/>	ICD-10-CM	D50-D89 Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	495,730
>	<input type="checkbox"/>	ICD-10-CM	E00-E89 Endocrine, nutritional and metabolic diseases	300,360
>	<input type="checkbox"/>	ICD-10-CM	F01-F99 Mental, Behavioral and Neurodevelopmental disorders	1,047,430
>	<input type="checkbox"/>	ICD-10-CM	G00-G99 Diseases of the nervous system	576,570
>	<input type="checkbox"/>	ICD-10-CM	H00-H59 Diseases of the eye and adnexa	584,430
>	<input type="checkbox"/>	ICD-10-CM	H60-H95 Diseases of the ear and mastoid process	343,880
>	<input type="checkbox"/>	ICD-10-CM	I00-I99 Diseases of the circulatory system	281,380
>	<input type="checkbox"/>	ICD-10-CM	J00-J99 Diseases of the respiratory system	862,510
				788,180

Show Terms with Zero Patients Show Depreciated Add To Query Cancel

Patients

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

Mount Sinai Health System
1 of 1 HCOs online

Any country
1 country in the network

Any age / Any sex
4,973,230 patients on network

MUST HAVE

Search "COPD"

CANNOT HAVE

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"/> ICD-10-CM J44	<input type="checkbox"/> Dx Other chronic obstructive pulmonary disease <i>Copd</i>	42,200
<input type="checkbox"/> ICD-10-CM J44.1	<input type="checkbox"/> Dx Chronic obstructive pulmonary disease with (acute) exacerbation <i>Copd w acute exacerbation</i>	12,850
<input type="checkbox"/> ICD-10-CM J44.0	<input type="checkbox"/> Dx Chronic obstructive pulmonary disease with (acute) lower respiratory infection <i>Copd w acute bronchitis</i>	1,200

Show Terms with Zero Patients Show Deprecated

Add to Query Add To Query Cancel

Patient Count → 42,200

Hierarchy Tree → [Icon]

Adding Additional Terms

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

Mount Sinai Health System
1 of 1 HCOs online

Any country
1 country in the network

Any age / Any sex
4,973,230 patients on network

MUST HAVE

Fluticasone

CANNOT HAVE

Search Term...

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

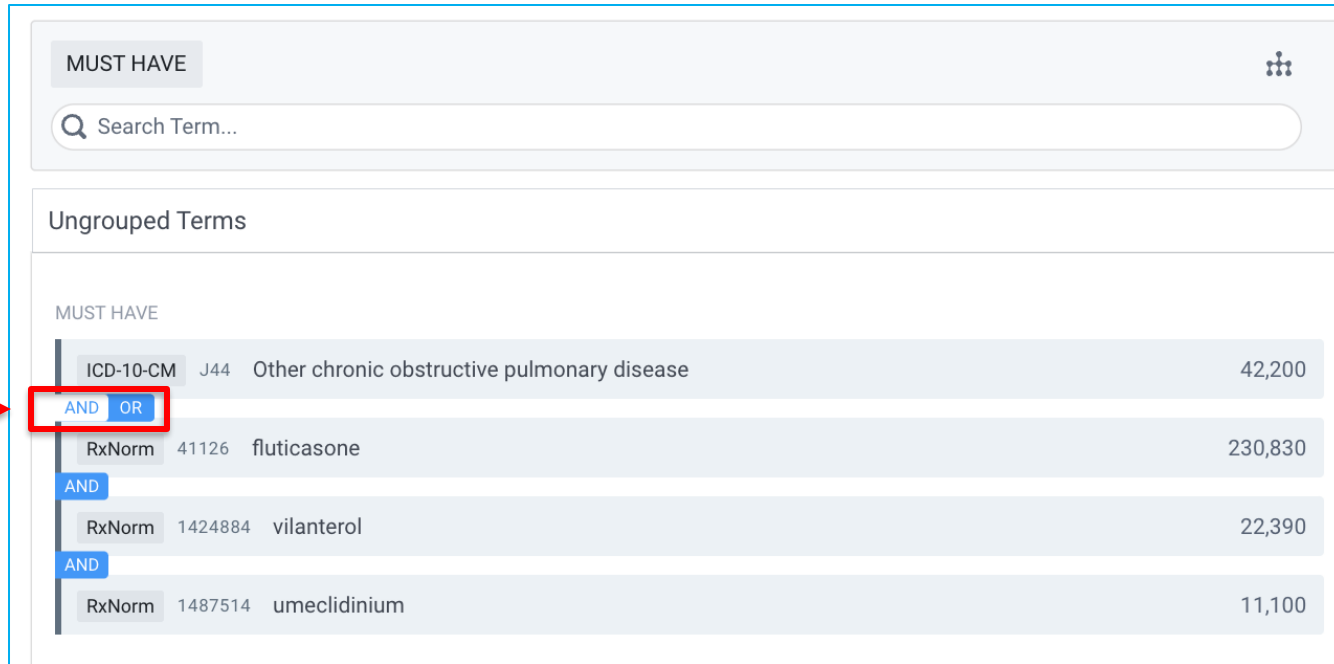
Code	Term Description	Patients
<input checked="" type="checkbox"/> RxNorm 41126	M Fluticasone	230,830
<input type="checkbox"/> ICD-10-CM T36.0X5A	Dx Adverse effect of penicillins, initial encounter Fluticasone adverse reaction	900
<input type="checkbox"/> ICD-10-CM T50.995A	Dx Adverse effect of other drugs, medicaments and biological substances, initial encounter Fluticasone allergy	310

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 at the top containing the text "Search Term...". Below the search bar is a section titled "Ungrouped Terms". Under this section, there is a sub-section labeled "MUST HAVE". The main content is a list of terms, each with a code, a description, and a count. The first term is "ICD-10-CM J44 Other chronic obstructive pulmonary disease" with a count of 42,200. Below this term, there is a small menu with two options: "AND" and "OR". A red arrow points to this menu. The second term is "RxNorm 41126 fluticasone" with a count of 230,830. Below this term, there is a small menu with the option "AND". The third term is "RxNorm 1424884 vilanterol" with a count of 22,390. Below this term, there is a small menu with the option "AND". The fourth term is "RxNorm 1487514 umeclidinium" with a count of 11,100.

Code	Term	Count
ICD-10-CM J44	Other chronic obstructive pulmonary disease	42,200
RxNorm 41126	fluticasone	230,830
RxNorm 1424884	vilanterol	22,390
RxNorm 1487514	umeclidinium	11,100

Term Filters

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

A screenshot of a search results interface. It shows three search results, each with a blue 'AND' label on the left. The first result is 'RxNorm 41126 fluticasone', the second is 'RxNorm 1424884 vilanterol', and the third is 'RxNorm 1487514 umeclidinium'. A total count of '11,100' is shown on the right. A dark grey tooltip with the text 'Add term filters' is positioned over the second result. A red arrow points from the tooltip to a blue funnel icon in the bottom right corner of the result bar. A large pink arrow points from the funnel icon down to the 'Medication Details' panel below.

The 'Medication Details' panel is shown, featuring a 'Clear Filter' button. It is divided into three columns: Route, Brand, and Strength. Each column has a search box and a list of filter options with their respective counts.

Route	Brand	Strength
<input type="checkbox"/> Unknown route 19,660	<input type="checkbox"/> Unknown brand 19,900	<input type="checkbox"/> Unknown strength 19,660
<input type="checkbox"/> Inhalant product 7,200	<input type="checkbox"/> Anoro 2,110	<input type="checkbox"/> 0.025 mg/actuat 7,200
	<input type="checkbox"/> Trelegy 4,200	

Visits

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

The screenshot shows a web interface for filtering clinical data. At the top, there are two tabs: 'MUST HAVE' and 'CANNOT HAVE'. Below these are search bars. A horizontal menu contains various categories: All, D Demographics, Dx Diagnoses, Oncology, P Procedures, M Medications, L Labs, G Genomics, and V Visits. The 'V Visits' button is highlighted with a red box. Under the 'Visits' section, a list of options is shown with checkboxes. 'Visit: Emergency' and 'Visit: Inpatient Encounter' are checked and highlighted with a red box. To the right of the list is a column labeled 'Patients' with corresponding counts. At the bottom right, a red arrow points to the 'Add To Query' button.

Visit Type	Patients
<input type="checkbox"/> Visit	4,972,780
<input type="checkbox"/> Visit: Ambulatory	3,598,290
<input checked="" type="checkbox"/> Visit: Emergency	1,105,710
<input checked="" type="checkbox"/> Visit: Inpatient Encounter	607,200
<input type="checkbox"/> Visit: Unknown	4,703,210
<input type="checkbox"/> Visit: Virtual	577,090

Show Terms with Zero Patients

[Add To Query](#) [Cancel](#)

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 main sections: 'MUST HAVE' and 'CANNOT HAVE'. Each section has a search bar. Below the search bars, there is a table of terms. The 'MUST HAVE' section contains a list of terms with their respective counts, connected by 'AND' operators. A pink arrow points from this list to a callout box labeled '1. Added MUST HAVE terms'. At the bottom of the interface, there is a button labeled '+ Create a New Group', which is highlighted with a red box and a pink arrow. A callout box labeled '2. Create a New Group' points to this button.

MUST HAVE	CANNOT HAVE
ICD-10-CM J44 Other chronic obstructive pulmonary disease 42,200	
AND	
RxNorm 41126 fluticasone 230,830	
AND	
RxNorm 1424884 vilanterol 22,390	
AND	
RxNorm 1487514 umeclidinium 11,100	
AND	
Visit: Emergency 1,105,710	
AND	
Visit: Inpatient Encounter 607,200	

1. Added MUST HAVE terms

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 1

Ungrouped Terms

SELECT HAVE

ICD-10-CM J44 Other chronic obstructive pulmonary disease	42,200
RxNorm 41126 fluticasone	230,830
RxNorm 1424884 vilanterol	22,390
RxNorm 1487514 umeclidinium	11,100
Visit: Emergency	1,105,710
Visit: Inpatient Encounter	607,200

CANNOT HAVE

Group 1

3. Add terms → + Add terms or drag and drop terms here

Group 1

Terms not included in the group

ADD TO MUST HAVE

<input type="checkbox"/>	ICD-10-CM J44 Other chronic obstructive pulmonary disease
<input checked="" type="checkbox"/>	RxNorm 41126 fluticasone
<input checked="" type="checkbox"/>	RxNorm 1424884 vilanterol
<input checked="" type="checkbox"/>	RxNorm 1487514 umeclidinium
<input type="checkbox"/>	Visit: Emergency
<input type="checkbox"/>	Visit: Inpatient Encounter

ADD TO CANNOT HAVE

4. Select terms for Group 1

Save Cancel

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
- 1a. Click **Group Rules** from Group 1 (*Meds*) → 1b. Select **Add Related Group** → 2. Click **Add terms** to Group B

AND

Group 1

Meds **Group 1**

MUST HAVE

RxNorm	41126	fluticasone	230,830
AND			
RxNorm	1424884	vilanterol	22,390
AND			
RxNorm	1487514	umeclidinium	11,100

CANNOT HAVE

1a. Group Rules

Group Rules

Add number of instances

Add number of unique instances

1b. Add Related Group

Add related group

Add time constraint

AND

Group 1

Group Rules

1A Meds **Group 1A**

+ Terms

MUST HAVE

RxNorm	41126	fluticasone	230,830
AND			
RxNorm	1424884	vilanterol	22,390
AND			
RxNorm	1487514	umeclidinium	11,100

CANNOT HAVE

Set a relationship between groups before running the query

Set Relationship

1B Unnamed Group **Group 1B**

+ Terms

+ 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 clinical data management interface. At the top, a header bar shows 'AND' and 'Group 1'. Below this, a section titled '1A Meds' contains a table of medications. The table is divided into 'MUST HAVE' and 'CANNOT HAVE' columns. The 'MUST HAVE' column lists three medications: fluticasone (RxNorm 41126, 230,830), vilanterol (RxNorm 1424884, 22,390), and umeclidinium (RxNorm 1487514, 11,100). Each medication entry is preceded by a blue 'AND' label. The 'CANNOT HAVE' column is currently empty. Below the medication list, a message reads 'Set a relationship between groups before running the query'. A red box highlights the 'Set Relationship' button, with a red arrow pointing to it from a larger red box containing the text '3. Set Relationship'. Below this, a section titled '1B Unnamed Group' contains a table of clinical events. The table is divided into 'ADD TO MUST HAVE' and 'ADD TO CANNOT HAVE' columns. The 'ADD TO MUST HAVE' column lists three events: 'ICD-10-CM J44 Other chronic obstructive pulmonary disease' (unchecked), 'Visit: Emergency' (checked), and 'Visit: Inpatient Encounter' (checked). The 'ADD TO CANNOT HAVE' column is currently empty. At the bottom right of the interface, there are 'Save' and 'Cancel' buttons.

MUST HAVE	CANNOT HAVE
RxNorm 41126 fluticasone 230,830	
AND RxNorm 1424884 vilanterol 22,390	
AND RxNorm 1487514 umeclidinium 11,100	

Set a relationship between groups before running the query **Set Relationship** ← **3. Set Relationship**

ADD TO MUST HAVE	ADD TO CANNOT HAVE
<input type="checkbox"/> ICD-10-CM J44 Other chronic obstructive pulmonary disease	
<input checked="" type="checkbox"/> Visit: Emergency	
<input checked="" type="checkbox"/> Visit: Inpatient Encounter	

Save Cancel

Define Temporal Relationship between two Clinical Events

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

AND

Group 1

Group Rules ↑ ↓ 🗑️

1A Meds + Terms 🗑️

MUST HAVE

RxNorm	41126	fluticasone	230,830
AND			
RxNorm	1424884	vilanterol	22,390
AND			
RxNorm	1487514	umeclidinium	11,100

CANNOT HAVE

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

Anytime Before 5yr 3yr 1yr 6mo 3mo 1mo 1day Same Day 1day 1mo 3mo 6mo 1yr 3yr 5yr Anytime After

From 1 Days After To ∞ Years After

Group 1B: Any instance Most recent instance First instance

Save Cancel

1B Ed or Inpatient Visit + Terms 🗑️

MUST HAVE

Visit: Emergency	1,105,710
OR	
Visit: Inpatient Encounter	607,200

CANNOT HAVE

Copy 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 **Group Rules** for Group 2 → Select **Add Time Constraint**

Group 1

1A Meds

MUST HAVE	CANNOT HAVE
RxNorm: 41126 fluticasone 230,830	
RxNorm: 1424884 vilanterol 22,390	
RxNorm: 1487514 umeclidinium 11,100	

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: Emergency 1,105,710	
Visit: Inpatient Encounter 607,200	

+ Create a New Group or **Paste Logic**

Group 2 **Group 2**

Ed or Inpatient Visit

MUST HAVE	CANNOT HAVE
Visit: Emergency 1,105,710	
Visit: Inpatient Encounter 607,200	

Group Rules

- Add number of instances
- Add number of unique instances
- Add related group
- Add time constraint**

Adding Time Constraints

- Set time constraint for Group 2

AND

^ Group 2 Group Rules ↑ ↓ 📄 🗑️

Ed or Inpatient Visit ✎ + Terms

Time Constraint for Group 2 ? Relative Time Specific Dates

Anytime 5yr 3yr 1yr 6mo 3mo 1mo 1day Today

From 1 ↑ ↓ Years ↕ To 0 ↑ ↓ Months ↕

Save Cancel

MUST HAVE

Visit: Emergency	1,105,710
OR Visit: Inpatient Encounter	607,200

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

Group Rules

Add Number of Instances

Group Rules

- Add number of instances
- Add number of unique instances
- Add related group
- Edit time constraint

AND

Group 2

Ed or Inpatient Visit This group occurred since 1 year ago

MUST HAVE

Visit: Emergency	1,105,710
OR	
Visit: Inpatient Encounter	607,200

CANNOT HAVE

AND

Group 2

Ed or Inpatient Visit This group occurred since 1 year ago

Define number of instances for the terms in this group

A patient must have **Greater than or equal to >=** **1** instances of these terms to be counted.

Remove Save Cancel

MUST HAVE

Visit: Emergency	1,105,710
OR	
Visit: Inpatient Encounter	607,200

CANNOT HAVE

Restrict by Current Age

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

Mount Sinai Health System
1 of 1 HCOs online

Any country
1 country in the network

Select Age/Sex
Any age / Any sex
4,973,230 patients on network

MUST HAVE
Search Term...

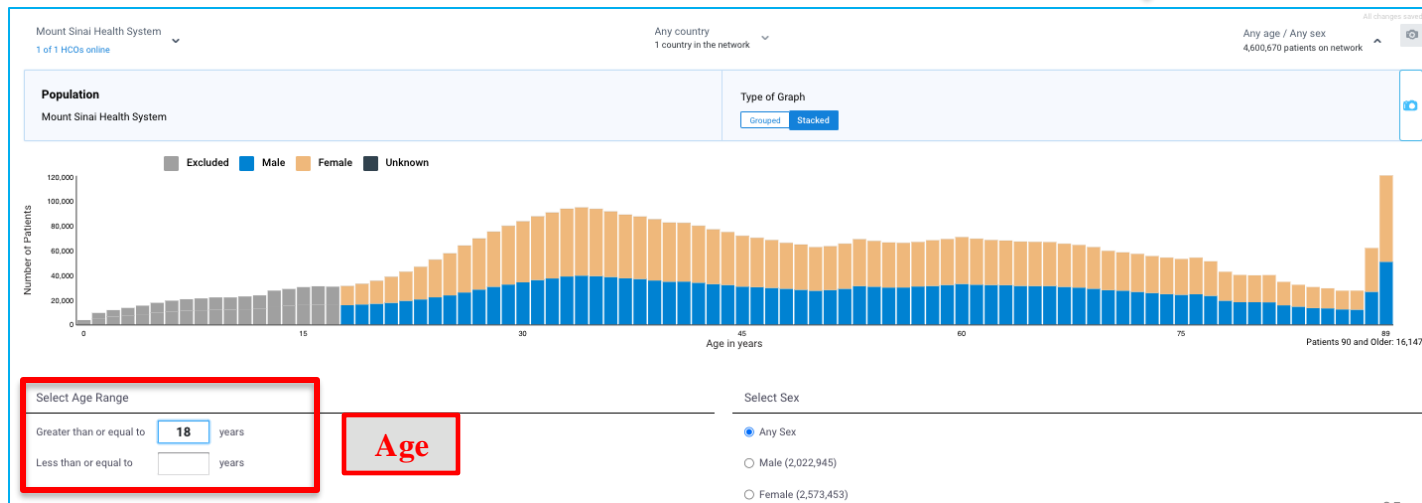
CANNOT HAVE
Search Term...

Collapse All Groups

Ungrouped Terms

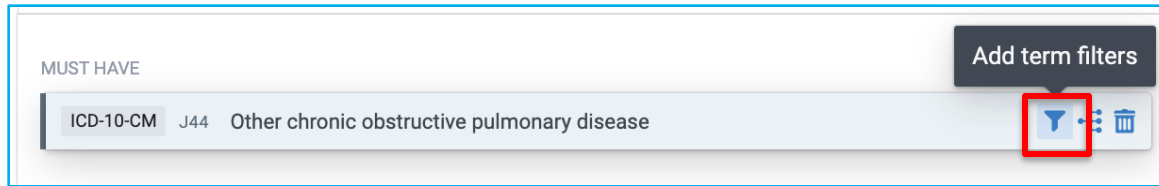
MUST HAVE
ICD-10-CM J44 Other chronic obstructive pulmonary disease 42,200

CANNOT HAVE

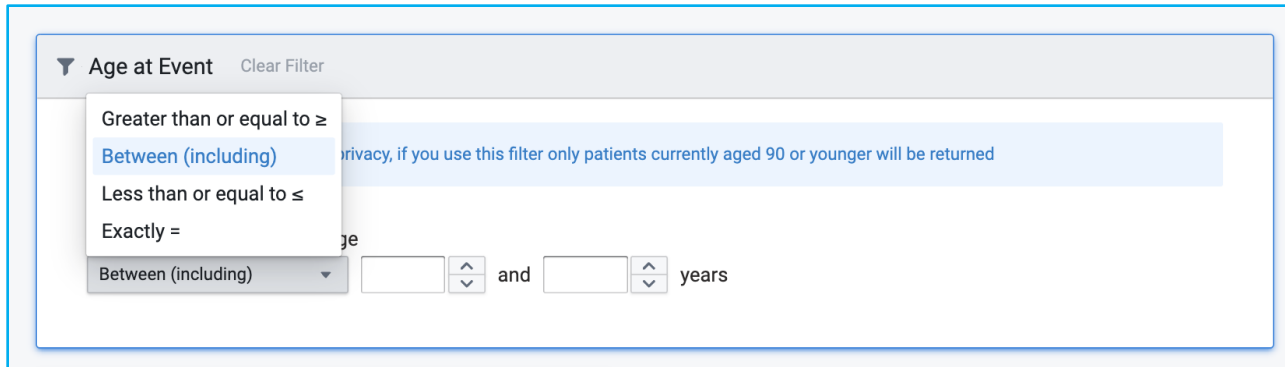


Restrict by Age at Event

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

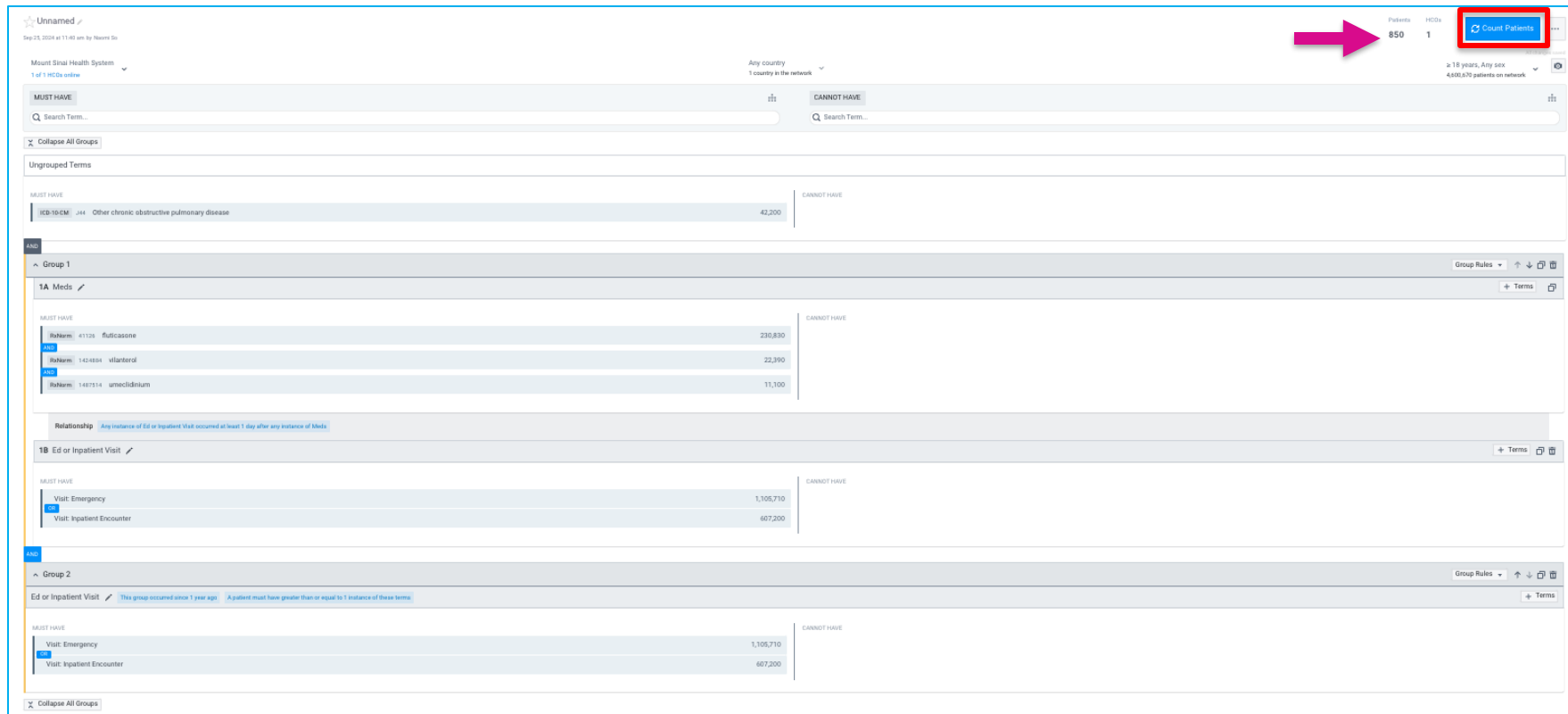
Found under Demographics

The screenshot displays a search interface with two main filter sections: 'MUST HAVE' and 'CANNOT HAVE'. The 'CANNOT HAVE' section is highlighted with a red box and contains a search input field with the text 'Deceased'. Below the filters, a navigation bar includes tabs for 'All', 'D Demographics', 'Dx Diagnoses', 'O Oncology', 'P Procedures', 'M Medications', 'L Labs', 'G Genomics', and 'V Visits'. The 'Demographics' tab is selected. A table below the navigation bar shows search results with columns for 'Code', 'Term Description', and 'Patients'. A single result is shown: 'D Deceased' with 38,080 patients. At the bottom left, there is a checkbox labeled 'Show Terms with Zero Patients'. At the bottom right, there are buttons for 'Add To Query' and 'Cancel'.

Code	Term Description	Patients
<input checked="" type="checkbox"/>	D Deceased	38,080

Count Patients

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



The screenshot displays a clinical data query interface. At the top right, the number of patients is shown as 850, with a red box highlighting the 'Count Patients' button. A pink arrow points to this button. The interface shows a query for 'Mount Sinai Health System' with filters for 'Any country' and '≥ 18 years, Any sex'. The query includes several criteria:

- MUST HAVE:** Search Term...
- CANNOT HAVE:** Search Term...
- Ungrouped Terms:**
- MUST HAVE:** ICD-10-CM J44 Other chronic obstructive pulmonary disease (42,200)
- AND:**
- Group 1:** 1A Meds
 - MUST HAVE:**
 - RxNorm: 41728 fluticasone (230,830)
 - RxNorm: 1424804 vilanterol (22,390)
 - RxNorm: 1487214 umecclidium (11,100)
 - CANNOT HAVE:**
 - Relationship:** Any instance of Ed or Inpatient Visit occurred at least 1 day after any instance of Meds.
- 1B Ed or Inpatient Visit:**
 - MUST HAVE:**
 - Visit: Emergency (1,105,710)
 - Visit: Inpatient Encounter (687,200)
 - CANNOT HAVE:**
- AND:**
- Group 2:** Ed or Inpatient Visit
 - MUST HAVE:**
 - Visit: Emergency (1,105,710)
 - Visit: Inpatient Encounter (687,200)
 - CANNOT HAVE:**

At the bottom left, there is a 'Collapse All Groups' button.

Explore Cohort - Demographics

TriNetX Studies Connect Browse Network What's New 10

My Studies / COPD TEST NS / Explore Cohort / Demographics

Query Builder

Healthcare Organizations (HCOs)

Explore Cohort

Demographics

Diagnoses

Oncology

Procedures

Medications

Labs

Genomics

Analyze Criteria

Rate of Arrival

Analytics

Connect

Study Management

Design Assistance

Unnamed

Sep 25, 2024 at 11:42 am by Naamri So

Patients 850 HCOs 1

Run

View History

Demographics

Grouped Stacked

Number of Patients

Age in years

Patients 90 and Older: 3

Total Patients	Minimum Age	Maximum Age	Mean Age	Standard Deviation
850	41	90	72	10

Sex

Female	56.47%
Male	43.53%
Unknown	0.00%

Ethnicity

Unknown Ethnicity	100.00%
Hispanic or Latino	0.00%
Not Hispanic or Latino	0.00%

Race

Other Race	35.29%
White	31.76%
Black or African American	29.41%
Asian	2.35%
Unknown Race	2.35%
Native Hawaiian or Other Pacific Islander	1.17%
American Indian or Alaska Native	0.00%

Explore Cohort - Diagnoses

TriNetX Studies Connect Browse Network What's New

My Studies / COPD TEST NS / Explore Cohort / Diagnoses

Query Builder

Healthcare Organizations (HCOs)

Explore Cohort

Demographics

Diagnoses

Oncology

Procedures

Medications

Labs

Genomics

Analyze Criteria

Rate of Arrival

Analytics

Connect

Study Management

Design Assistance

★ Unnamed
Sep 25, 2024 at 11:42 am by Naomi So

Patients: 850 HCOs: 1

Run View History

Diagnoses within 3M 6M 12M 24M Anytime All Acute Chronic

Search for diagnosis 1/13 emphysema

Diagnoses	Patients	% of Cohort
ICD-10-CM J00-J99 Diseases of the respiratory system	850	100%
ICD-10-CM J40-J4A Chronic lower respiratory diseases	850	100%
ICD-10-CM J44 Other chronic obstructive pulmonary disease	850	100%
ICD-10-CM J43 Emphysema	490	58%
ICD-10-CM J45 Asthma	480	56%
ICD-10-CM J41 Simple and mucopurulent chronic bronchitis	200	24%
ICD-10-CM J42 Unspecified chronic bronchitis	160	19%
ICD-10-CM J40 Bronchitis, not specified as acute or chronic	100	12%
ICD-10-CM J47 Bronchiectasis	100	12%
ICD-10-CM J96-J99 Other diseases of the respiratory system	530	62%
ICD-10-CM J09-J18 Influenza and pneumonia	430	51%
ICD-10-CM J30-J39 Other diseases of upper respiratory tract	330	39%
ICD-10-CM J00-J06 Acute upper respiratory infections	290	34%
ICD-10-CM J20-J22 Other acute lower respiratory infections	190	22%
ICD-10-CM J80-J84 Other respiratory diseases principally affecting the interstitium	170	20%
ICD-10-CM J90-J94 Other diseases of the pleura	110	13%
ICD-10-CM J60-J70 Lung diseases due to external agents	70	8%

+ Add to Must Have + Add to Cannot Have

Analyze Criteria

View the impact each criteria has on the total patient count

1. Click **New Analysis**

My Studies / COPD TEST NS / Analyze Criteria / Unnamed

Query Builder

Healthcare Organizations (HCOs)

Explore Cohort

Analyze Criteria

Rate of Arrival

Analytics

Connect

Study Management

Design Assistance

☆ Unnamed

Criteria analysis has not yet been run on this query. Click New Analysis to analyze criteria.

New Analysis

View History

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 shows the 'Ungrouped Terms' section with a 'MUST HAVE' filter. A red box highlights the '1. Select Baseline Criteria' step, and a red arrow points to the 'ICD-10-CM J44 Other chronic obstructive pulmonary disease' term. A larger red box labeled '2. Select Baseline Criteria' is positioned below this panel. The right panel shows the 'New Criteria Analysis' section with a 'MUST HAVE' filter. A red box highlights the '3. Select Terms for Analysis' step, and a red arrow points to the 'ICD-10-CM J44 Other chronic obstructive pulmonary disease' term. A larger red box labeled '3. Select Terms for Analysis' is positioned above this panel. A red box labeled '4. Run' is positioned to the right of the 'Run' button. A red arrow points to the 'Run' button. The interface also includes a 'Query Builder' sidebar on the left and a 'Next' button on the right.

My Studies / COPD TEST NS / Analyze Criteria / Unnamed

Query Builder

Healthcare Organizations (HCOs)

Explore Cohort

Analyze Criteria

Rate of Arrival

1. Select Baseline Criteria

2. Select Baseline Criteria

Ungrouped Terms

MUST HAVE

ICD-10-CM J44 Other chronic obstructive pulmonary disease

My Studies / COPD TEST NS / Analyze Criteria / Unnamed

Query Builder

Healthcare Organizations (HCOs)

Explore Cohort

Analyze Criteria

Rate of Arrival

Analytics

Study Management

Design Assistance

3. Select Terms for Analysis

3. Select Terms for Analysis

Ungrouped Terms

MUST HAVE

ICD-10-CM J44 Other chronic obstructive pulmonary disease

CANNOT HAVE

Job

Group 1

1A Meds

MUST HAVE

Rxterm: 41126 folicosone

Rxterm: 142484 vilanterol

Rxterm: 148714 umeclidinium

CANNOT HAVE

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

1B Ed or Inpatient Visit

MUST HAVE

Visit: Emergency

Visit: Inpatient Encounter

CANNOT HAVE

Job

Group 2

Ed or Inpatient Visit This group occurred since 1 year ago. A patient must have greater than or equal to 1 instance of these terms.

MUST HAVE

Visit: Emergency

Visit: Inpatient Encounter

CANNOT HAVE

Next

Cancel

Select All

Run

4. 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. On the left, a navigation menu includes 'Query Builder', 'Healthcare Organizations (HCOs)', 'Explore Cohort', 'Analyze Criteria' (highlighted with a red box), 'Rate of Arrival', 'Analytics', 'Connect', 'Study Management', and 'Design Assistance'. The main area shows a funnel chart and a table of criteria. The funnel chart starts with a total of 850 Patients and 1 HCO. The criteria are as follows:

Criteria	Patients	% Change	HCOs	% Change
Network	4,973,230		1	
Base Population	42,200	(-99%)	1	(0%)
Population ≥ 18 years, Any sex	42,170	(0%)	1	(0%)
Group 1A: Meds - The terms in this group occurred at any time. Must Have: RxNorm 41126 Fluticasone AND RxNorm 1424884 Vilanterol AND RxNorm 1487514 Umeclidinium	1,900	(-95%)	1	(0%)
Group 1B: Ed or Inpatient Visit - Any instance of Ed or Inpatient Visit occurred at least 1 day after any instance of Meds. Must Have: Visit: emergency OR Visit: inpatient encounter	850	(-55%)	1	(0%)
Total	850		1	

Analyze Criteria

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

Unnamed
Sep 26, 2024 at 9:27 am by Naomi So

Patients: 850 HCOs: 1

New Analysis
View History

Analyze Criteria

View

Network

Base Population

Population ≥ 18 years, Any sex

- Group 1A: Meds - The terms in this group occurred at any time. Must Have: RxNorm: 41126 Fluticasone AND RxNorm: 1487514 Umeclidinium
- Group 1B: Ed or Inpatient Visit - Any instance of Ed or Inpatient Visit occurred at least 1 day after any instance of Meds. Must Have: Visit: emergency OR Visit: inpatient encounter
- Group 2: Ed or Inpatient Visit - This group occurred since 1 year ago. A patient must have greater than or equal to 1 instance of these terms. Must Have: Visit: emergency OR Visit: inpatient encounter

HIDE

Unnamed
Sep 26, 2024 at 9:27 am by Naomi So

Patients: 850 HCOs: 1

New Analysis
View History

Analyze Criteria

View

	Patients		HCOs	
Network	4,973,230		1	
Base Population	42,200	(-99%)	1	(0%)
Population ≥ 18 years, Any sex	42,170	(0%)	1	(0%)
Group 2: Ed or Inpatient Visit - This group occurred since 1 year ago. A patient must have greater than or equal to 1 instance of these terms. Must Have: Visit: emergency OR Visit: inpatient encounter	5,150	(-88%)	1	(0%)
Adjusting your criteria increases your cohort by 506% or 4,300 patients	5,150		1	
Hidden Terms 1	Patients		HCOs	
Group 1A: Meds - The terms in this group occurred at any time. Must Have: RxNorm: 41126 Fluticasone AND RxNorm: 1424884 Vilanterol AND RxNorm: 1487514 Umeclidinium				
Group 1B: Ed or Inpatient Visit - Any instance of Ed or Inpatient Visit occurred at least 1 day after any instance of Meds. Must Have: Visit: emergency OR Visit: inpatient encounter				

Impact of hidden term

Rate of Arrival

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

My Studies / COPD TEST NS / Rate of Arrival

Query Builder

Healthcare Organizations (HCOs) ★ Unnamed
Sep 26, 2024 at 9:31 am by Naomi So

Patients: 850 HCOs: 1

[Run](#)
[View History](#)

Analyze Criteria

Rate of Arrival

Analytics

Connect

Study Management

Design Assistance

Patient Arrival Rate Show graph

Healthcare Organization (HCO)	Historic Arrivals (Monthly Avg Over Past 3 Yrs.)	Predicted Arrivals (Monthly Avg Over Next 1 Yr.)	Trend
Mount Sinai Health System	34.2	51.5	

Study Management

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

The screenshot shows the 'Study Properties' page in a web application. The breadcrumb trail at the top reads 'My Studies / COPD TEST NS / Study Management / Properties'. On the left sidebar, the 'Study Management' menu is highlighted with a red box, and the 'Properties' sub-item is also highlighted with a red box and a pink arrow pointing to it. In the main content area, the 'Study Name' field contains 'COPD TEST NS'. Below it, the 'Research Purpose' field has two radio buttons: 'Clinical Trial Research' (selected) and 'Other Scientific Research'. The 'Study Identifying Information' field is empty. At the top right of the main content area, there is a red box containing the text 'Edit Study Properties' with a red arrow pointing to a blue button labeled 'Edit Study Properties'.

Demo of Example Query in TriNetX

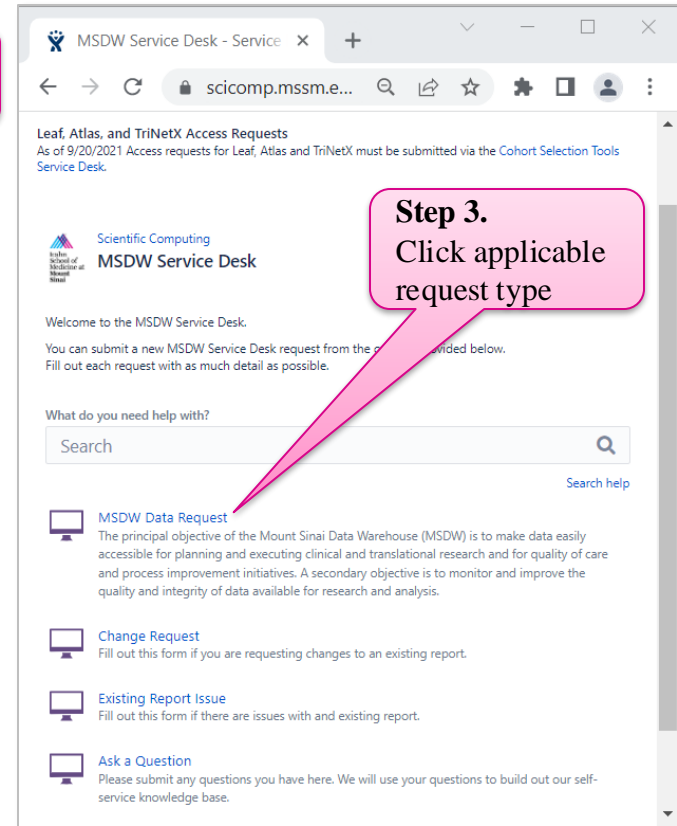
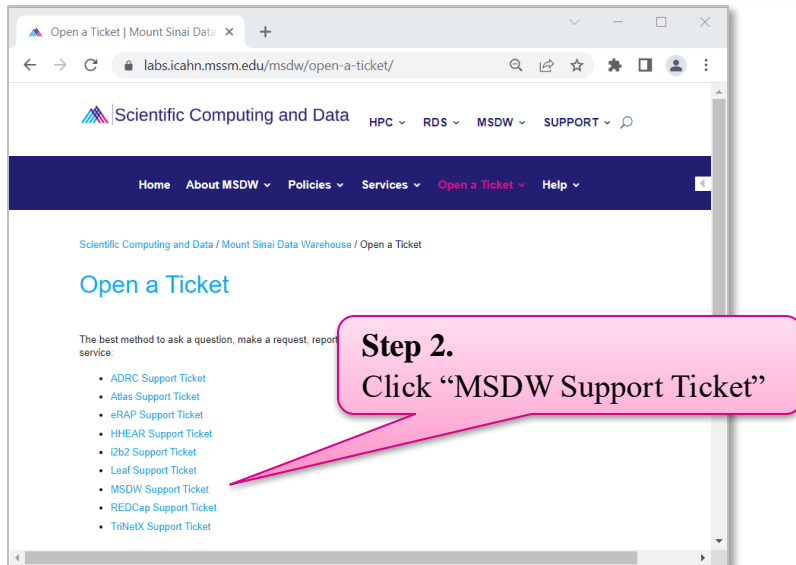
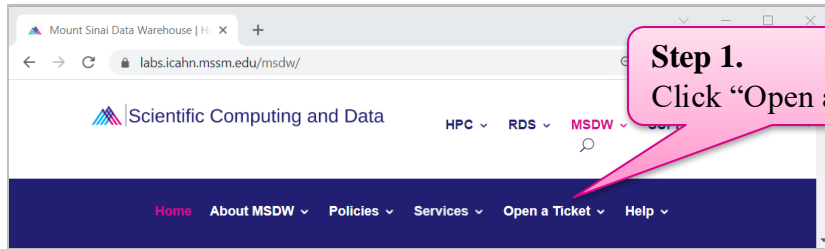
MSDW Custom Data Request

When You Need Custom Data

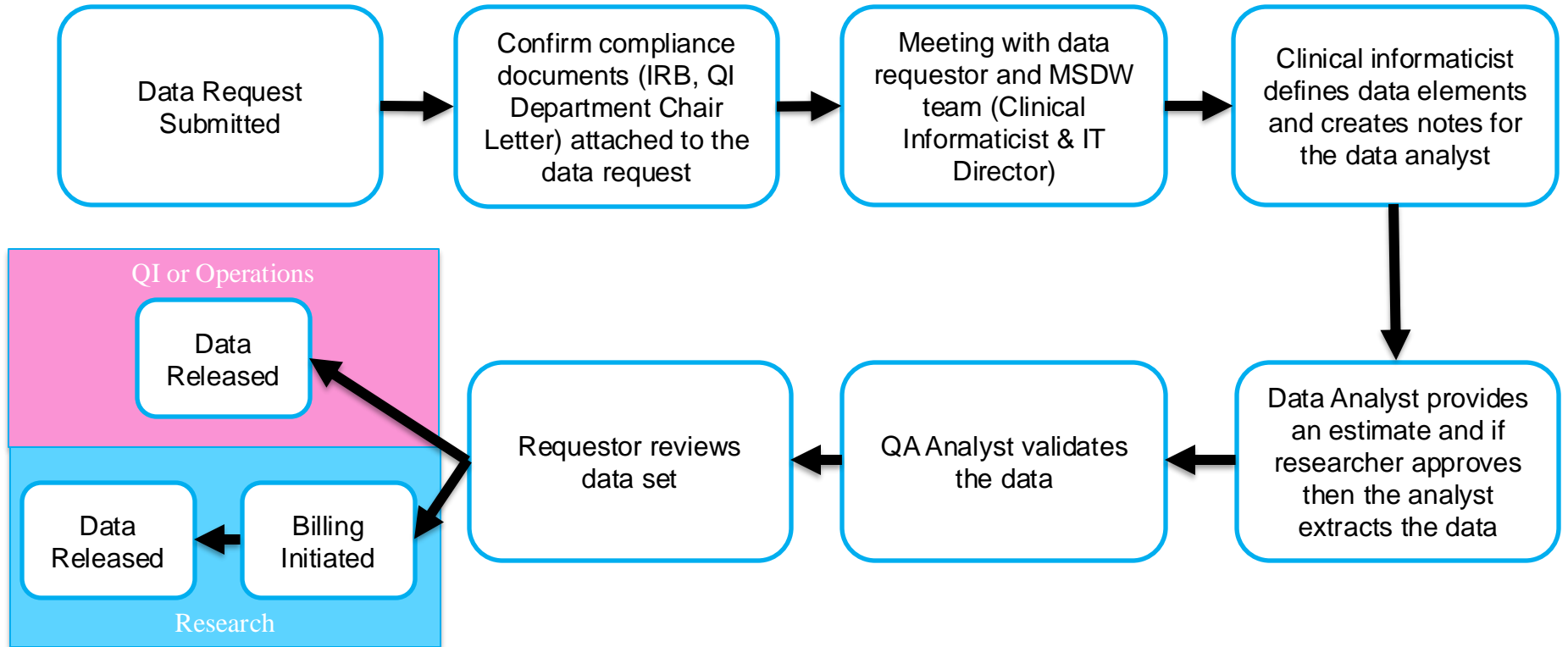
- ▶ Complex question that cannot be answered with one of the self-service query tools
- ▶ Need additional data that is not included in a de-identified data set
- ▶ Need PHI data for your analysis

<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

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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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