Replication of OHDSI study: Phenotyping

Seng Chan You
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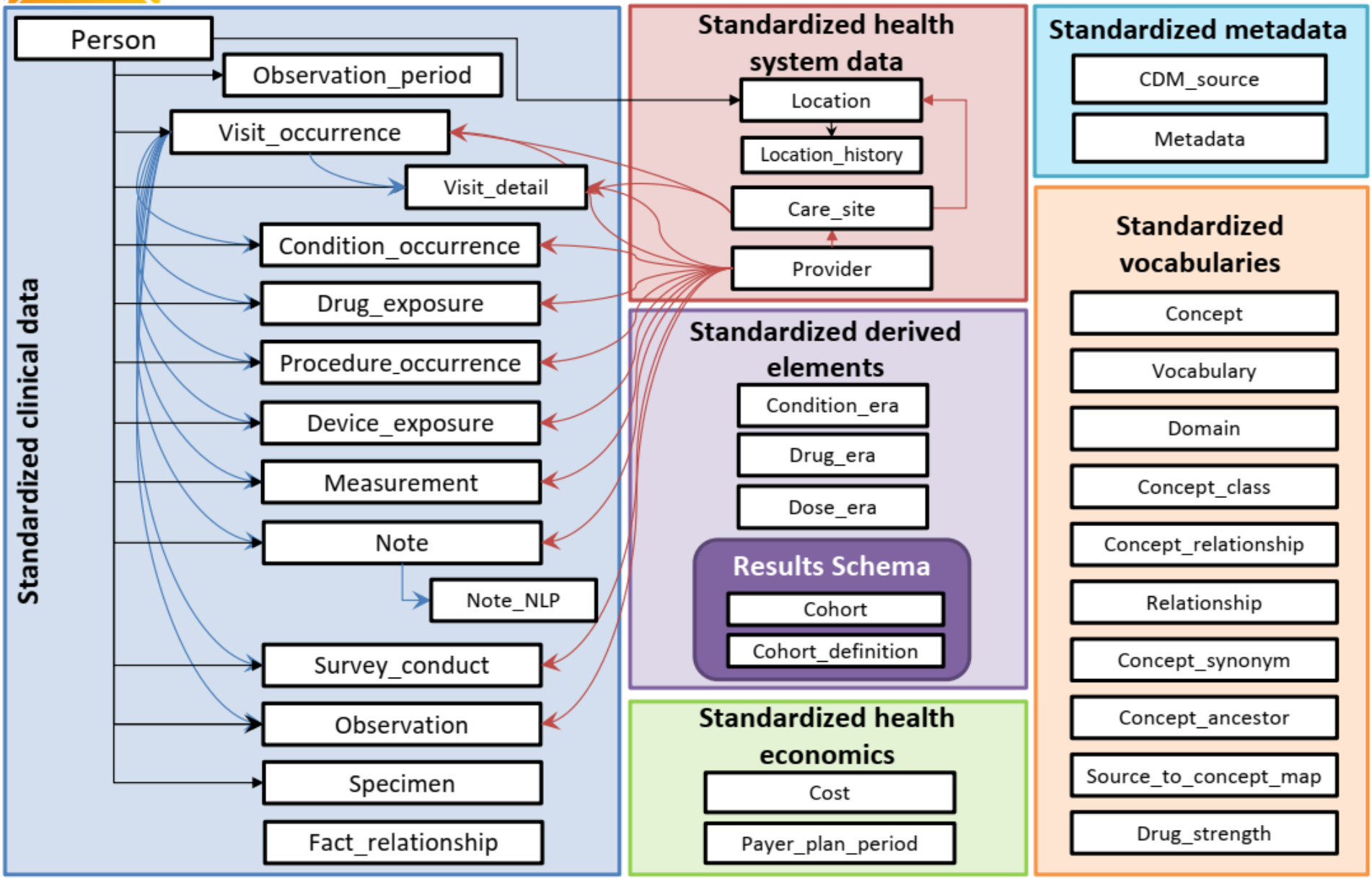
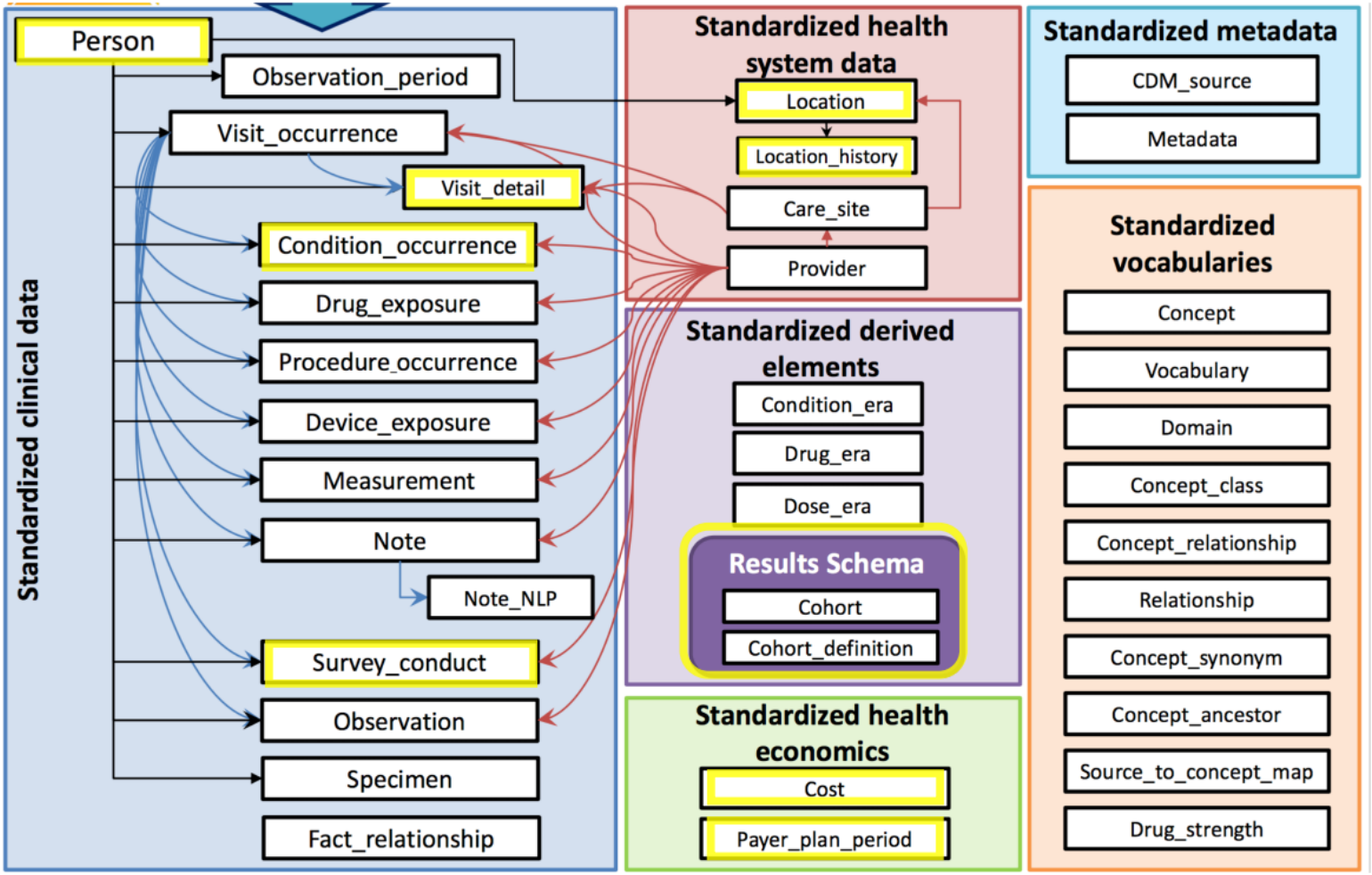
CDM Version 6 Key Domains



OMOP CDM Principles

- Patient centric
- Vocabulary and Data Model are blended
- Domain-oriented concepts
- Accommodates data from various sources
- Preserves data provenance
- Extendable & Evolving
- Database Platform Independent

OMOP Version 6 Key Domains

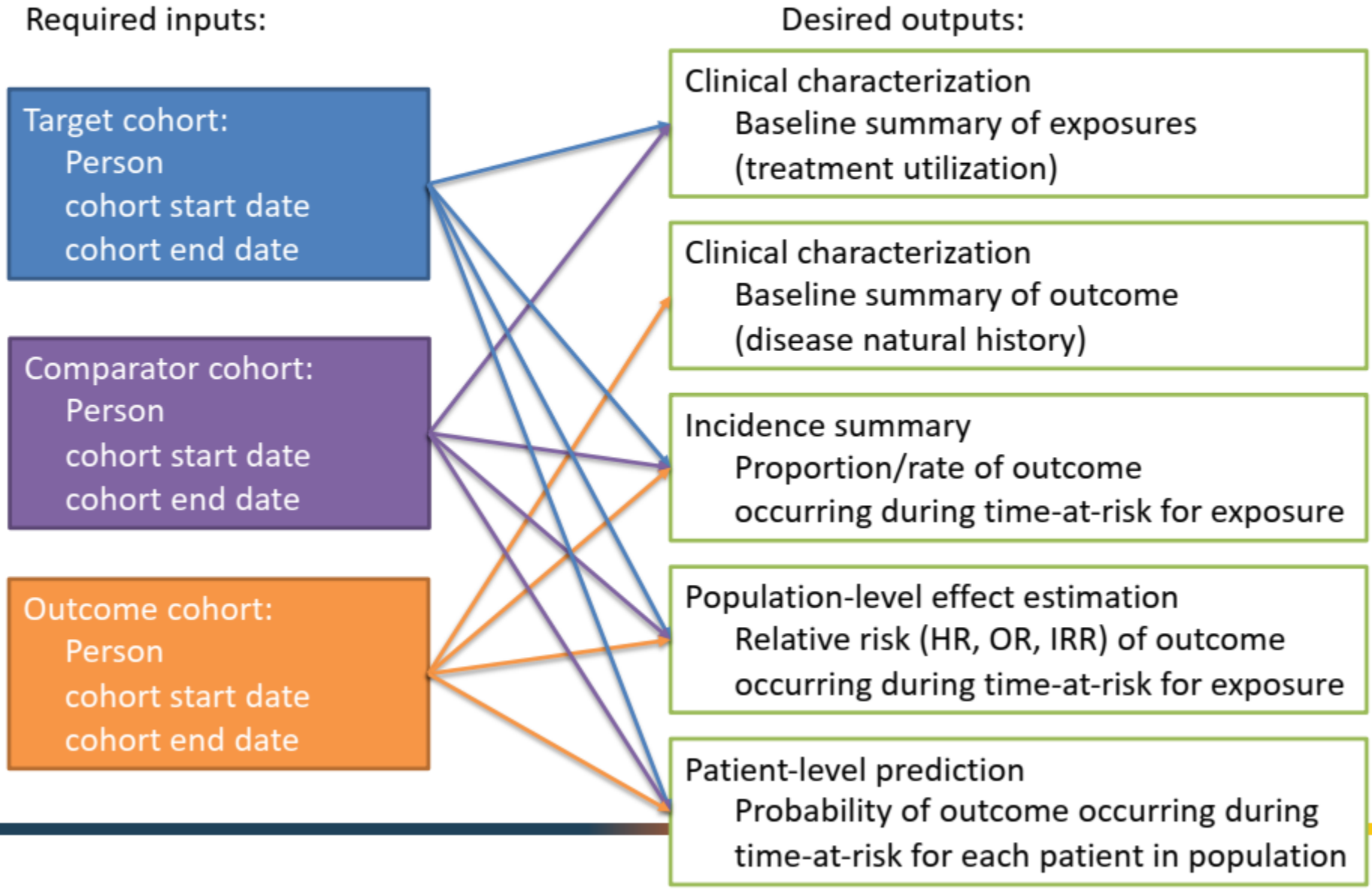


분당서울대 유수영 교수님 Slide

Explore the OMOP Vocabulary

http://athena.ohdsi.org/

The common building block of all observational analysis: cohorts



OHDSI's definition of 'cohort'

Cohort = a set of persons who satisfy one or more inclusion criteria for a duration of time

Objective consequences based on this cohort definition:

- One person may belong to multiple cohorts
- One person may belong to the same cohort at multiple different time periods
- One person may not belong to the same cohort multiple times during the same period of time
- One cohort may have zero or more members
- A codeset is NOT a cohort…

  …logic for how to use the codeset in a criteria is required

Exercise: Define target and outcome cohort for Lactic acidosis in metformin users

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

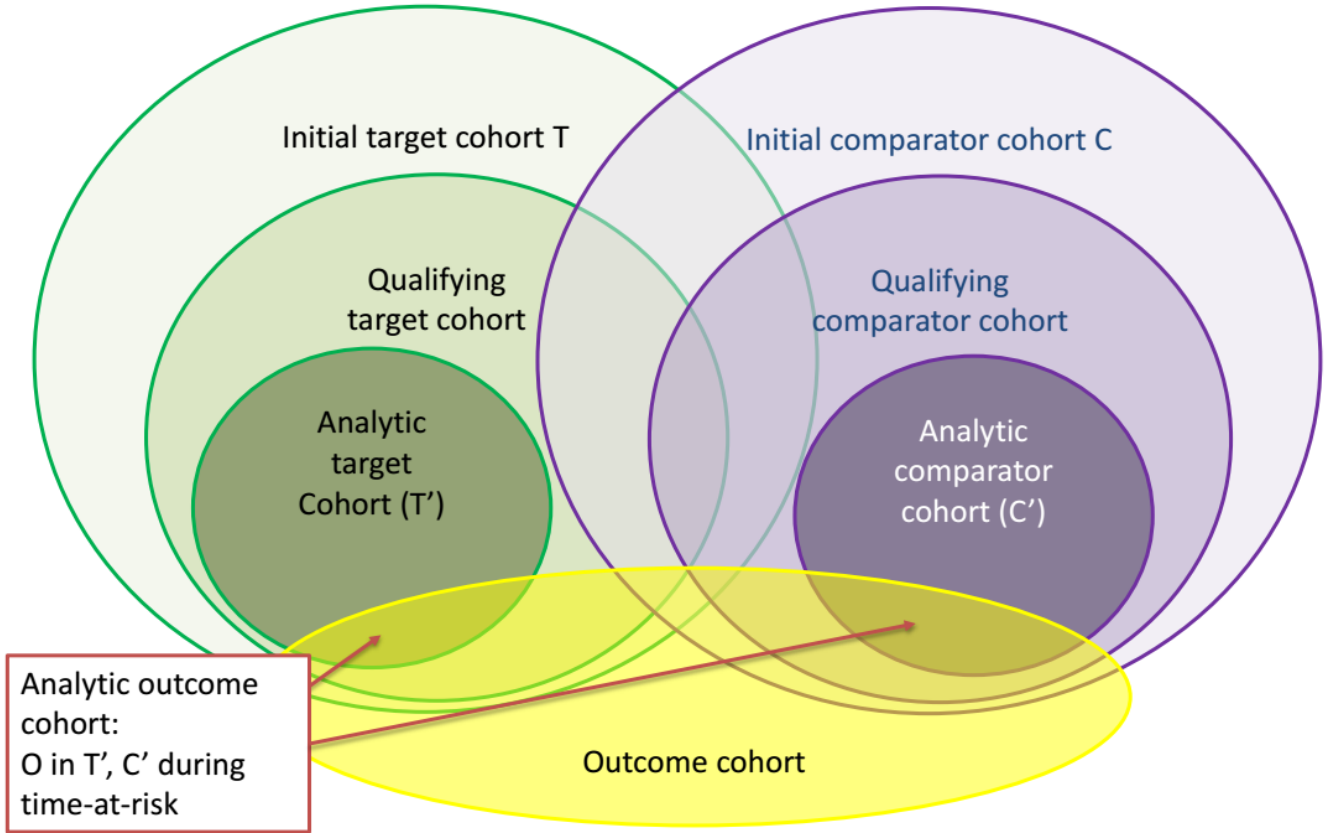
- OHDSI Cohort must have:

Start Date & **End Date**

Demo: Defining cohort using ATLAS

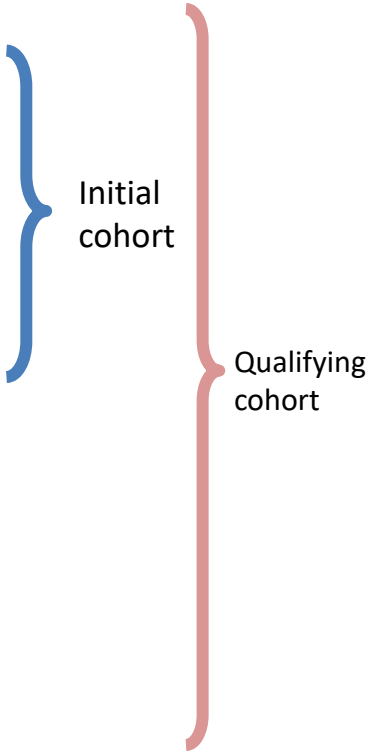
- Follow along at: http://ohdsi.org/web/ATLAS

Define cohort: A database is full of cohorts, some of which may represent valid comparisons



Define cohort: Process flow for formally defining a cohort in ATLAS

- **Cohort entry criteria**
  - **Initial events**
    - Events are recorded time-stamped observations for the persons, such as drug exposures, conditions, procedures, measurements and visits
    - All events have a start date and end date, though some events may have a start date and end date with the same value (such as procedures or measurements).
  - **Initial event inclusion criteria**
  - **Additional qualifying inclusion criteria**
    - The qualifying cohort will be defined as all persons who have an initial event, satisfy the initial event inclusion criteria, and fulfill all additional qualifying inclusion criteria
    - Each qualifying inclusion criteria will be evaluated to determine the impact of the criteria on the attrition of persons from the initial cohort
- **Cohort exit criteria**



JAMA | Original Investigation

Association of Ticagrelor vs Clopidogrel With Net Adverse Clinical Events in Patients With Acute Coronary Syndrome Undergoing Percutaneous Coronary Intervention

Seng Chan You, MD, MS; Yeunsook Rho, PhD; Behnood Bikdeli, MD, MS; Jiwoo Kim, MS; Anastasios Siapos, MSc; James Weaver, MSc; Ajit Londhe, MPH; Jaehyeong Cho, BS; Jimyung Park, BS; Martijn Schuemie, PhD; Marc A. Suchard, MD, PhD; David Madigan, PhD; George Hripcsak, MD, MS; Aakriti Gupta, MD, MS; Christian G. Reich, MD; Patrick B. Ryan, PhD; Rae Woong Park, MD, PhD; Harlan M. Krumholz, MD, SM

IMPORTANCE Current guidelines recommend ticagrelor as the preferred P2Y12 platelet inhibitor for patients with acute coronary syndrome (ACS), primarily based on a single large randomized clinical trial. The benefits and risks associated with ticagrelor vs clopidogrel in routine practice merits attention.

OBJECTIVE To determine the association of ticagrelor vs clopidogrel with ischemic and hemorrhagic events in patients undergoing percutaneous coronary intervention (PCI) for ACS in clinical practice.

Editorial page 1

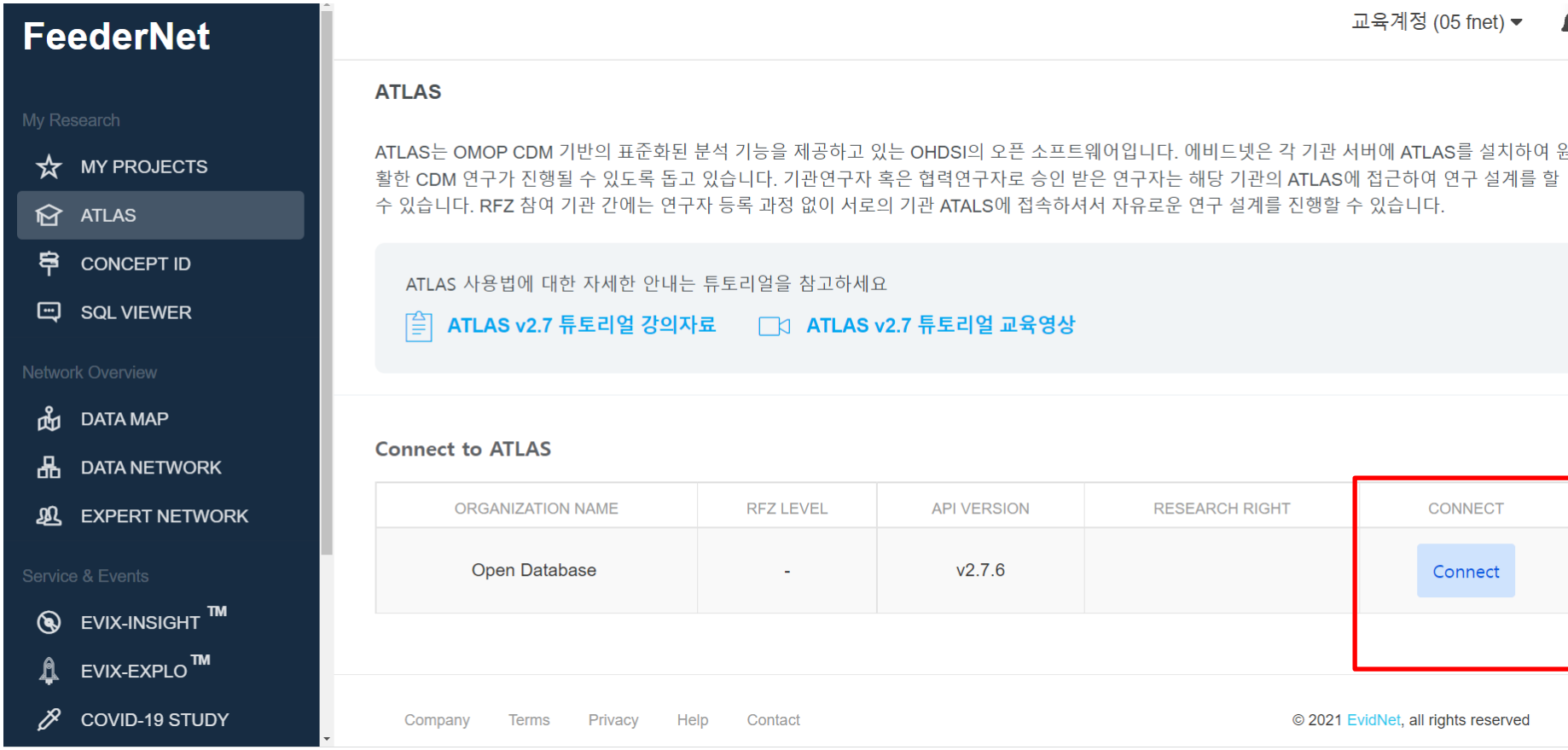
JAMA Patient Page page 1

Audio and Supplemental content

CME Quiz at jamacmelookup.com and CME Questions page 0

Seng Chan You[1]; Yeunsook Rho[2]; Jiwoo Kim2; Anastasios Siapos[3]; Ajit Londhe[4]; Jaehyeong Cho[5]; Jimyung Park[5]; Martijn Schuemie[4]; Marc A Suchard, MD, PhD[6,7]; David Madigan PhD8; George Hripcsak MD[9]; Christian G. Reich3; Patrick B. Ryan[4]; Rae Woong Park, MD, PhD[1,5]; Harlan M. Krumholz, MD[10]

[1]Department of Biomedical Informatics, Ajou University School of Medicine, Suwon, Korea; [2]Health Insurance Review and Assessment Service, Wonju, Korea; [3]IQVIA, Durham, USA; [4]Janssen Research and Development, Titusville, USA; [5]Department of Biomedical Sciences, Ajou University Graduate School of Medicine, Suwon, Korea; [6]Department of Biostatistics, Fielding School of Public Health, University of California, Los Angeles, CA, USA; [7]Department of Biomathematics, David Geffen School of Medicine at UCLA, University of California, Los Angeles, CA, USA; [8]Department of Statistics, Columbia University, New York, NY, USA; [9]Medical Informatics Services, New York-Presbyterian Hospital, New York, NY, USA; [10]Yale University School of Medicine, USA


FeederNet
My Research
MY PROJECTS
ATLAS
CONCEPT ID
SQL VIEWER
Network Overview
DATA MAP
DATA NETWORK
EXPERT NETWORK
Service & Events
EVIX-INSIGHT ™
EVIX-EXPLO ™
COVID-19 STUDY
교육계정 (05 fnet)
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ATLAS
ATLAS는 OMOP CDM 기반의 표준화된 분석 기능을 제공하고 있는 OHDSI의 오픈 소프트웨어입니다. 에비드넷은 각 기관 서버에 ATLAS를 설치하여 원활한 CDM 연구가 진행될 수 있도록 돕고 있습니다. 기관연구자 혹은 협력연구자로 승인 받은 연구자는 해당 기관의 ATLAS에 접근하여 연구 설계를 할 수 있습니다. RFZ 참여 기관 간에는 연구자 등록 과정 없이 서로의 기관 ATALS에 접속하셔서 자유로운 연구 설계를 진행할 수 있습니다.
ATLAS 사용법에 대한 자세한 안내는 튜토리얼을 참고하세요
ATLAS v2.7 튜토리얼 강의자료
ATLAS v2.7 튜토리얼 교육영상
Connect to ATLAS
ORGANIZATION NAME
RFZ LEVEL
API VERSION
RESEARCH RIGHT
CONNECT
Open Database
-
v2.7.6
Connect
Company
Terms
Privacy
Help
Contact
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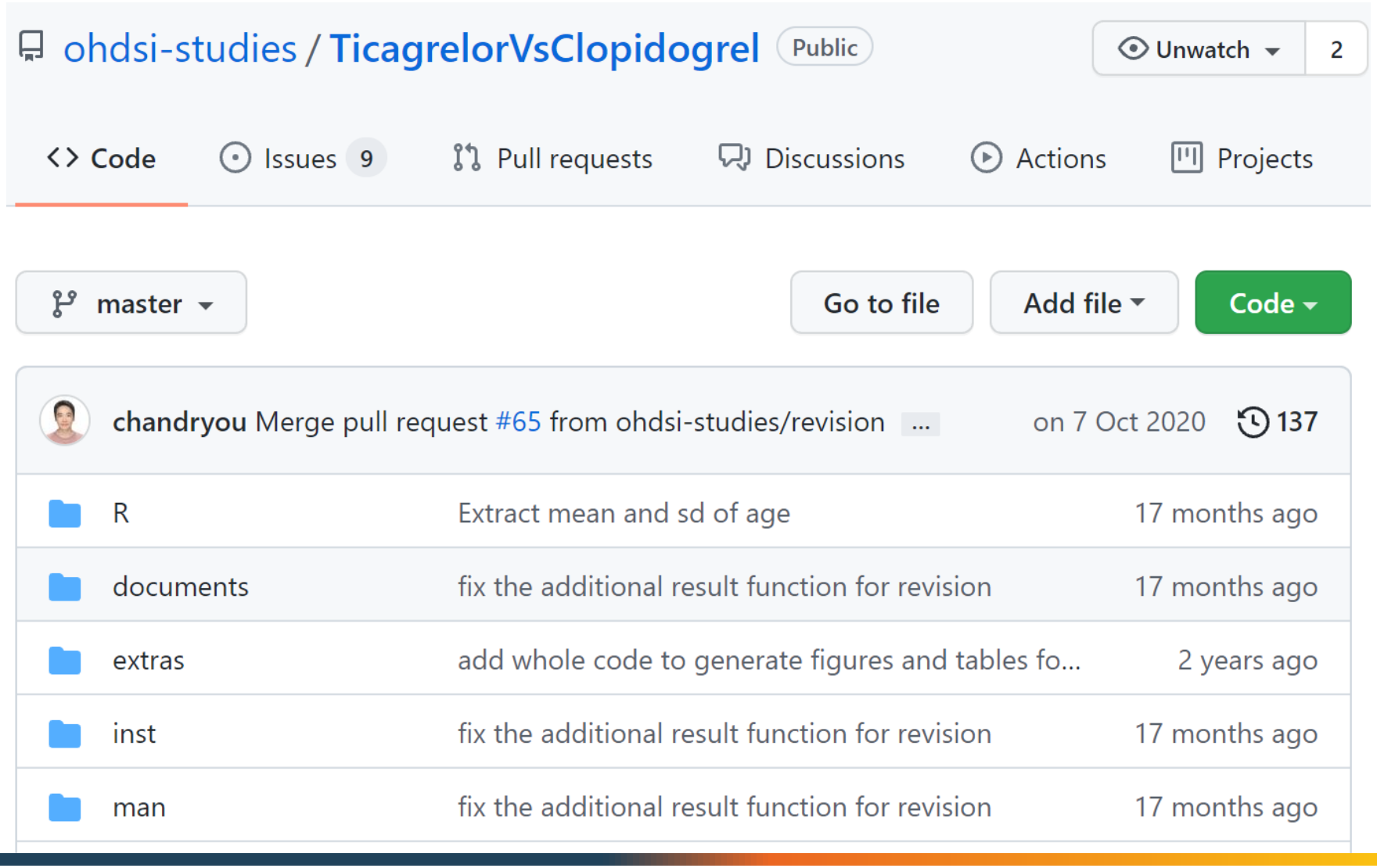
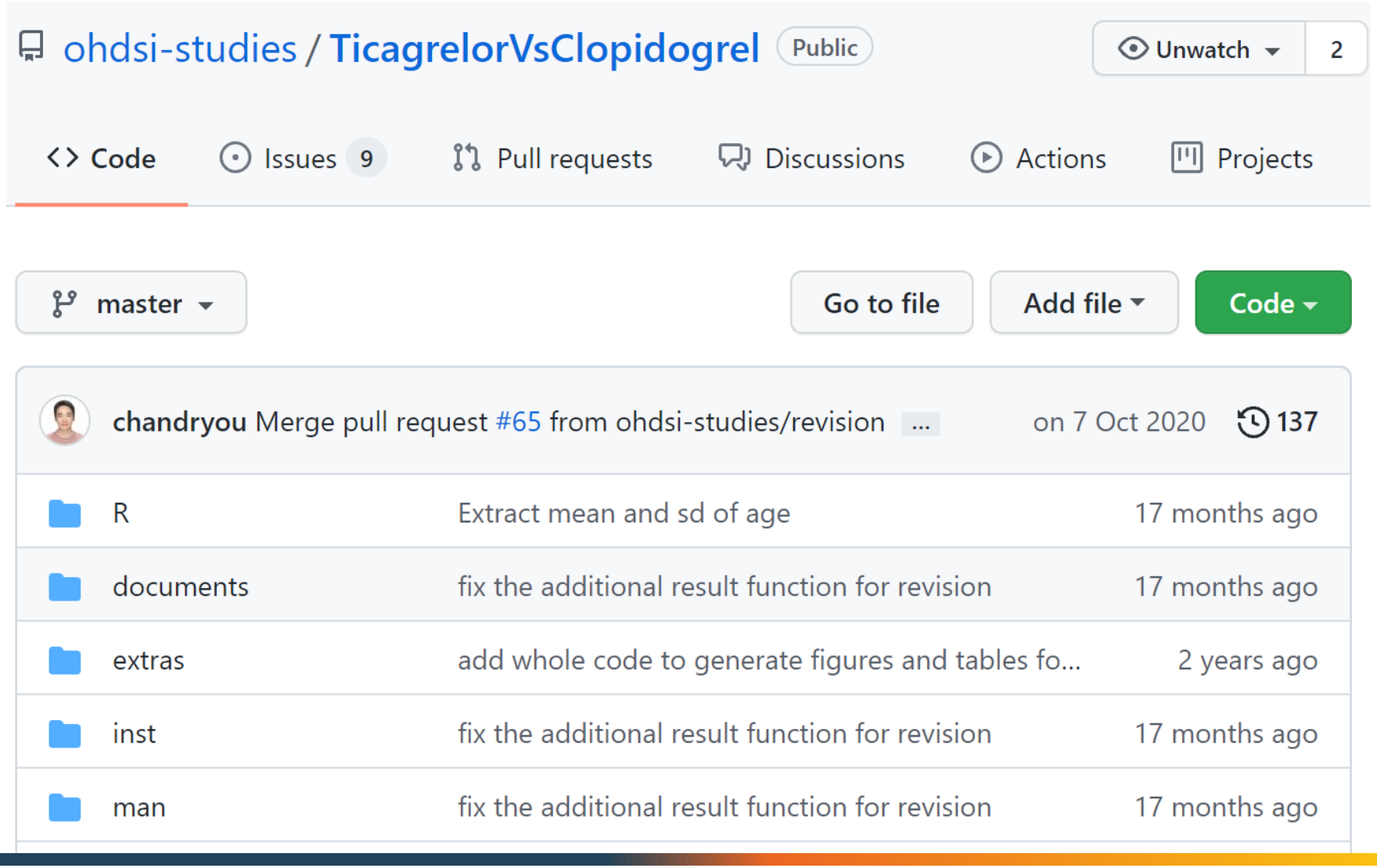
Study Package Repository



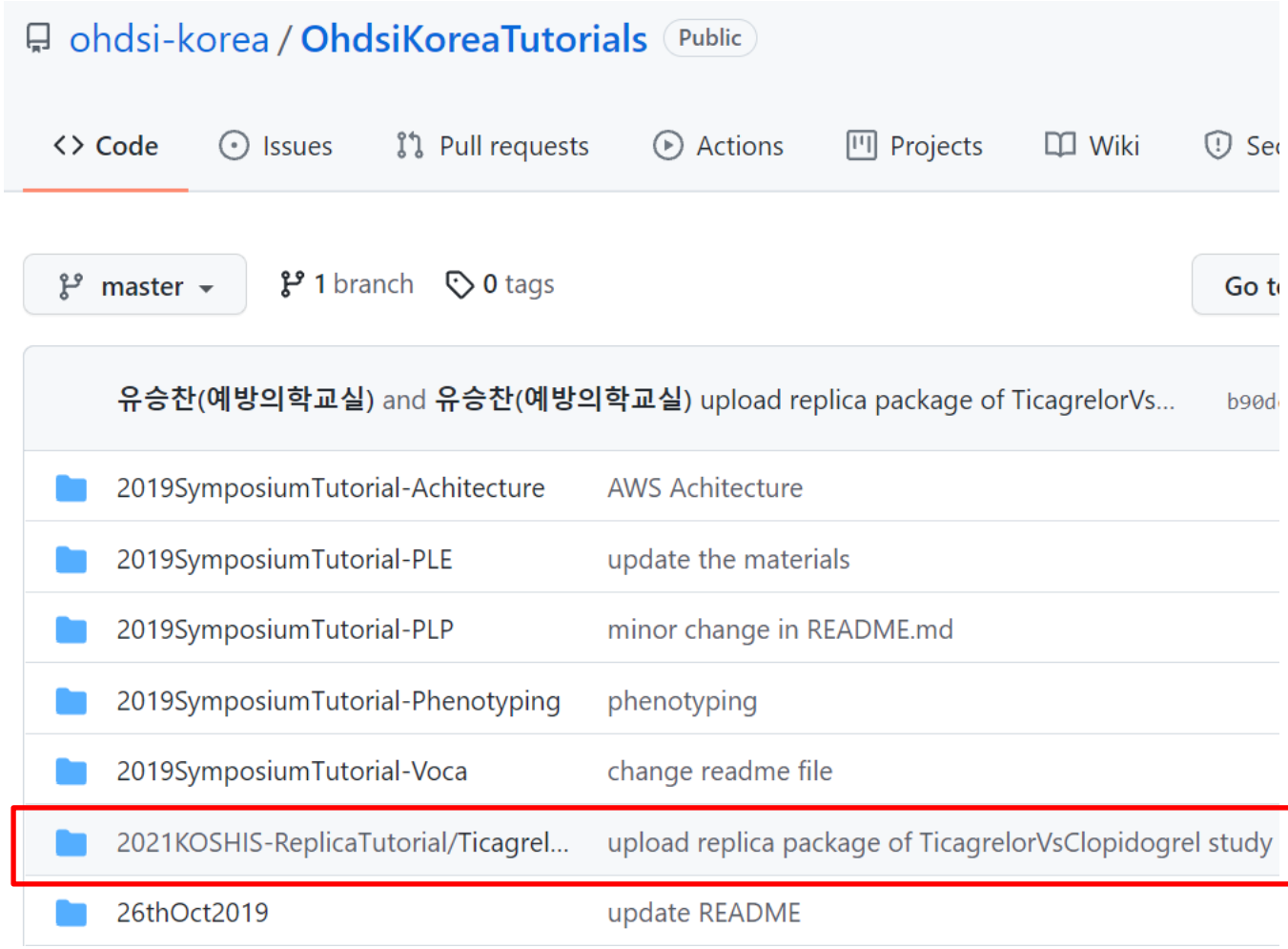
https://github.com/ohdsi-studies/TicagrelorVsClopidogrel

Study Package Repository



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

Study Package Repository
for this tutorial



https://github.com/ohdsi-korea/OhdsiKoreaTutorials/

To find cohort definitions

master | TicagrelorVsClopidogrel / inst / cohorts / | Go to file

chandryou revise definition of hemorrhagic event requiring intervention or lead... ... on 13 May

..

AMI.json	revise individual outcomes
AMI_narrow.json	revise individual outcomes
Cardiovascular-related_mortality.json	add MACE and narrow definition for MACE and cv mortality to the outco...
Cardiovascular-related_mortality_narr...	add MACE and narrow definition for MACE and cv mortality to the outco...
Clopidogrel.json	revise the definition of cohort not to use visit id for the primary e...
Clopidogrel2013To2015.json	revise the definition of cohort not to use visit id for the primary e...

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

To find cohort definitions in this tutorial

master OhdsiKoreaTutorials / 2021KOSHIS-ReplicaTutorial / TicagrelorVsClopidogrelMiniReplica / inst / cohorts /

유승찬(예방의학교실) and 유승찬(예방의학교실) upload replica package of TicagrelorVsClopidogrel study

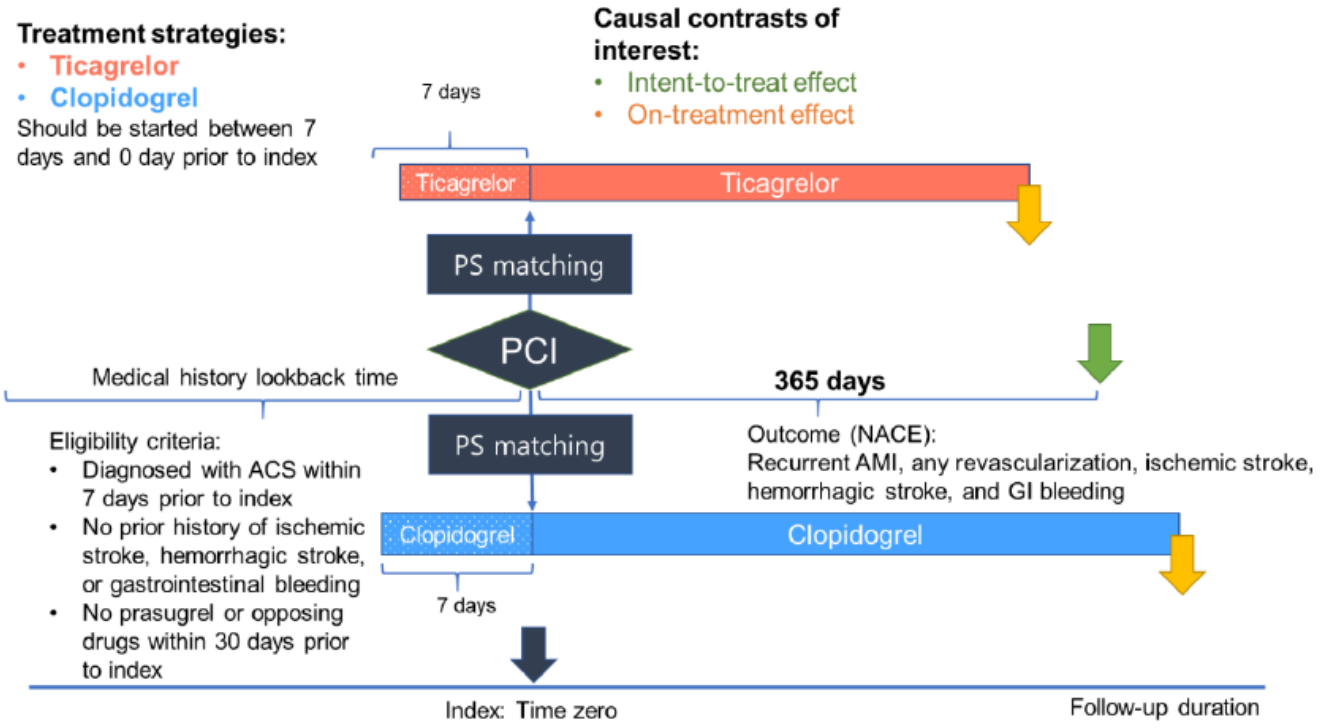
..

SCYouAcute_Myocardial_Infarction.json	upload replica package of TicagrelorVsClopidogrel study
SCYouClopidogrel.json	upload replica package of TicagrelorVsClopidogrel study
SCYouGI_bleeding.json	upload replica package of TicagrelorVsClopidogrel study
SCYouTicagrelor.json	upload replica package of TicagrelorVsClopidogrel study

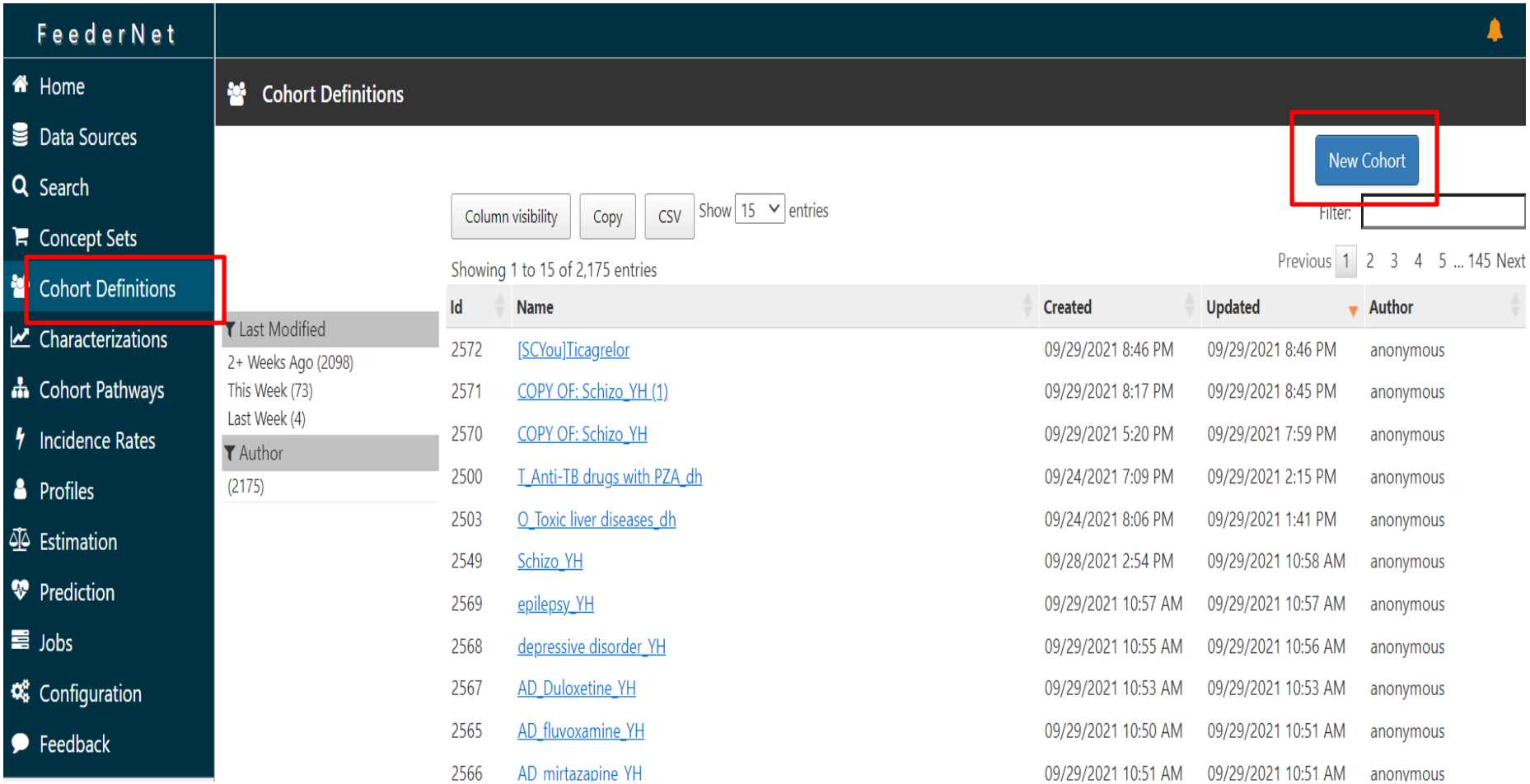
https://github.com/ohdsi-korea/OhdsiKoreaTutorials/tree/master/2021KOSHIS-ReplicaTutorial/TicagrelorVsClopidogrelMiniReplica/inst/cohorts

Method: Study Population

- Inclusion Criteria
  - Adults (>=20 yrs) who initiated ticagrelor or clopidogrel due to acute coronary syndrome (ACS) and undertook percutaneous coronary intervention (PCI)
- Exclusion Criteria
  - Prior history of stroke or gastrointestinal bleeding
  - Use of prasugrel or opposing drug within previous 30 days from index date



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


FeederNet
Home
Data Sources
Search
Concept Sets
Cohort Definitions
Characterizations
Cohort Pathways
Incidence Rates
Profiles
Estimation
Prediction
Jobs
Configuration
Feedback
Cohort Definitions
New Cohort
Column visibility
Copy
CSV
Show 15 entries
Filter:
Showing 1 to 15 of 2,175 entries
Previous 1 2 3 4 5 ... 145 Next
Last Modified
2+ Weeks Ago (2098)
This Week (73)
Last Week (4)
Author
(2175)
Id
Name
Created
Updated
Author
2572 [SCYou]Ticagrelor 09/29/2021 8:46 PM 09/29/2021 8:46 PM anonymous
2571 COPY OF: Schizo_YH (1) 09/29/2021 8:17 PM 09/29/2021 8:45 PM anonymous
2570 COPY OF: Schizo_YH 09/29/2021 5:20 PM 09/29/2021 7:59 PM anonymous
2500 T_Anti-TB drugs with PZA_dh 09/24/2021 7:09 PM 09/29/2021 2:15 PM anonymous
2503 O_Toxic liver diseases_dh 09/24/2021 8:06 PM 09/29/2021 1:41 PM anonymous
2549 Schizo_YH 09/28/2021 2:54 PM 09/29/2021 10:58 AM anonymous
2569 epilepsy_YH 09/29/2021 10:57 AM 09/29/2021 10:57 AM anonymous
2568 depressive disorder_YH 09/29/2021 10:55 AM 09/29/2021 10:56 AM anonymous
2567 AD_Duloxetine_YH 09/29/2021 10:53 AM 09/29/2021 10:53 AM anonymous
2565 AD_fluvoxamine_YH 09/29/2021 10:50 AM 09/29/2021 10:51 AM anonymous
2566 AD_mirtazapine_YH 09/29/2021 10:51 AM 09/29/2021 10:51 AM anonymous

[MyName]Ticagrelor

Definition | Concept Sets | Generation | Reporting | Export | Messages 6

Text View | Graphical View | JSON | SQL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    "CONCEPT_CLASS_ID": "Procedure"
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},
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    "STANDARD_CONCEPT": "S",
    "STANDARD_CONCEPT_CAPTION": "Standard",
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```


Copy and paste the cohort.json file

Copy To Clipboard

Reload

Cohort #2572

[SCYou]Ticagrelor

Definition | Concept Sets | Generation | Reporting | Export | Messages 6

enter a cohort definition description here

Cohort Entry Events

Events having any of the following criteria:

+ Add Initial Event

a procedure occurrence of PCI

+ Add attribute...

Delete Criteria

✖ for the first time in the person's history

✖ with age Greater or Equal To 20

with continuous observation of at least 365 days before and 0 days after event index date

Limit initial events to: earliest event per person.

Restrict intial events to:

having all of the following criteria:

+ Add criteria to group...

with at least 1 using all occurrences of:

a condition occurrence of ACS

+ Add attribute...

Delete Criteria

where event starts between 7 days Before and 0 days After index start date *add additional constraint*

☐ restrict to the same visit occurrence

☐ allow events from outside observation period

and with at least 1 using all occurrences of:

a drug exposure of ticagrelor

+ Add attribute...

Delete Criteria

where event starts between 7 days Before and 0 days After index start date *add additional constraint*

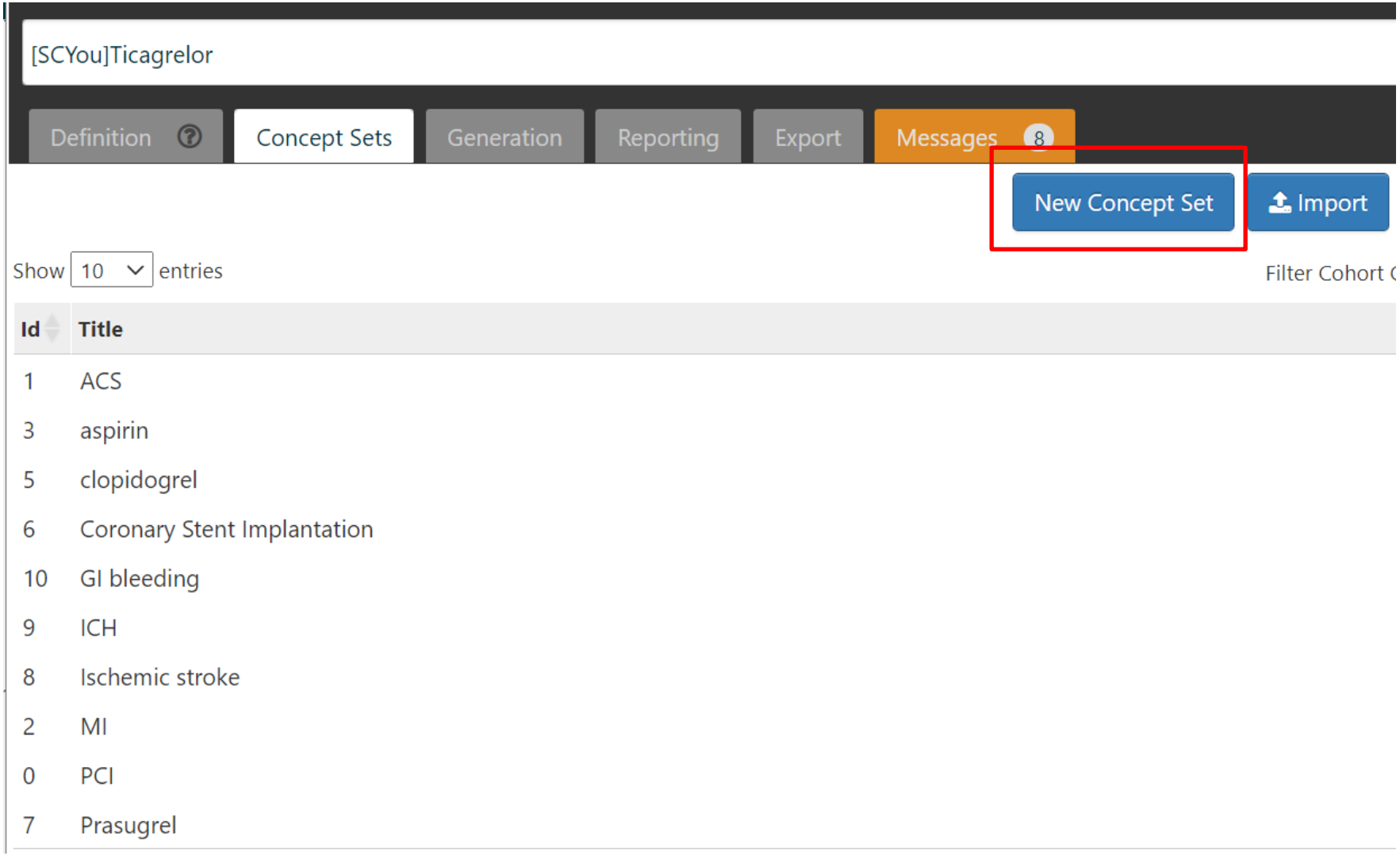
☐ restrict to the same visit occurrence

☐ allow events from outside observation period

Limit initial events to: earliest event per person.

Remove initial event restriction

#1 Create Concept Set: Ticagrelor



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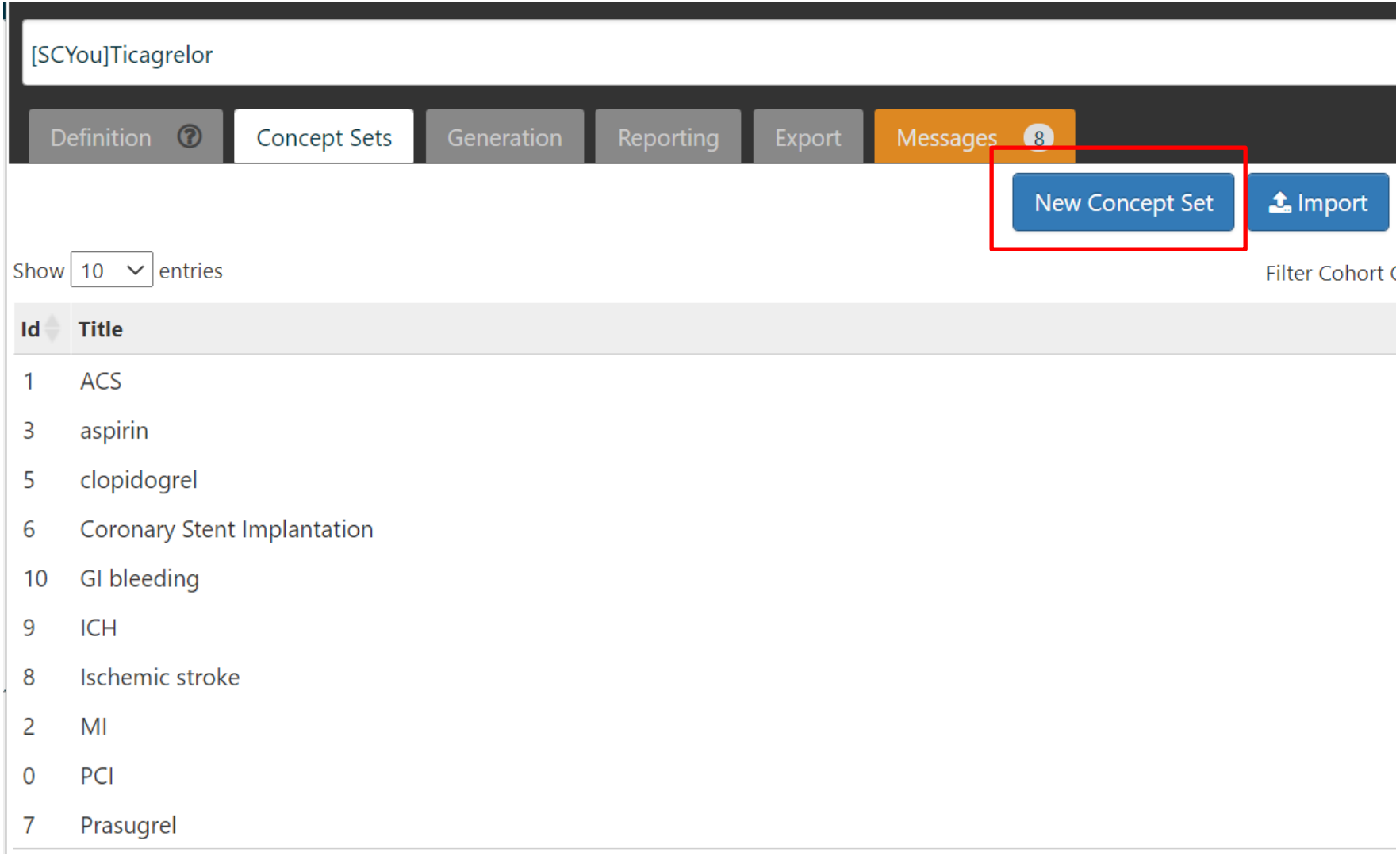

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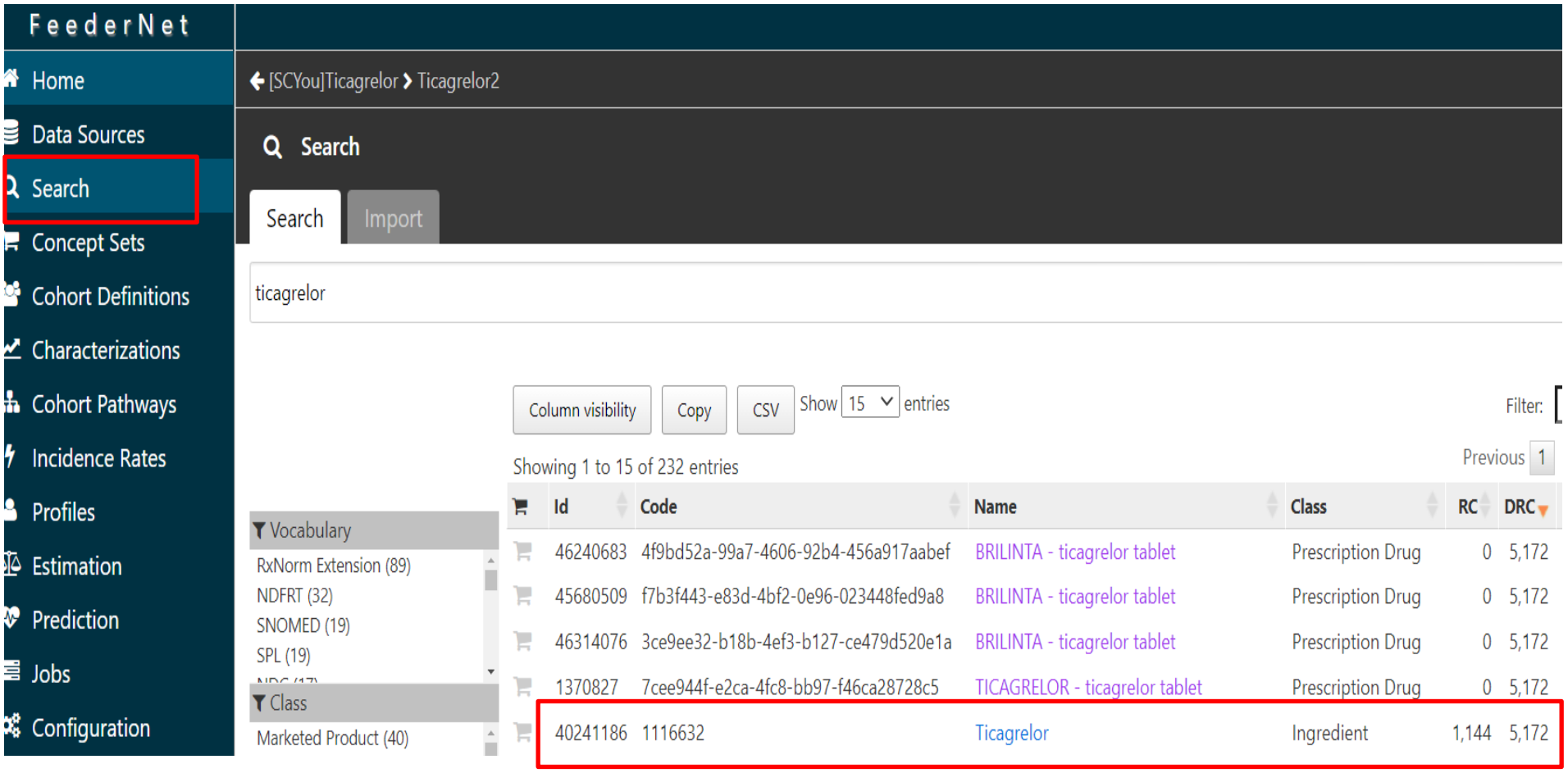

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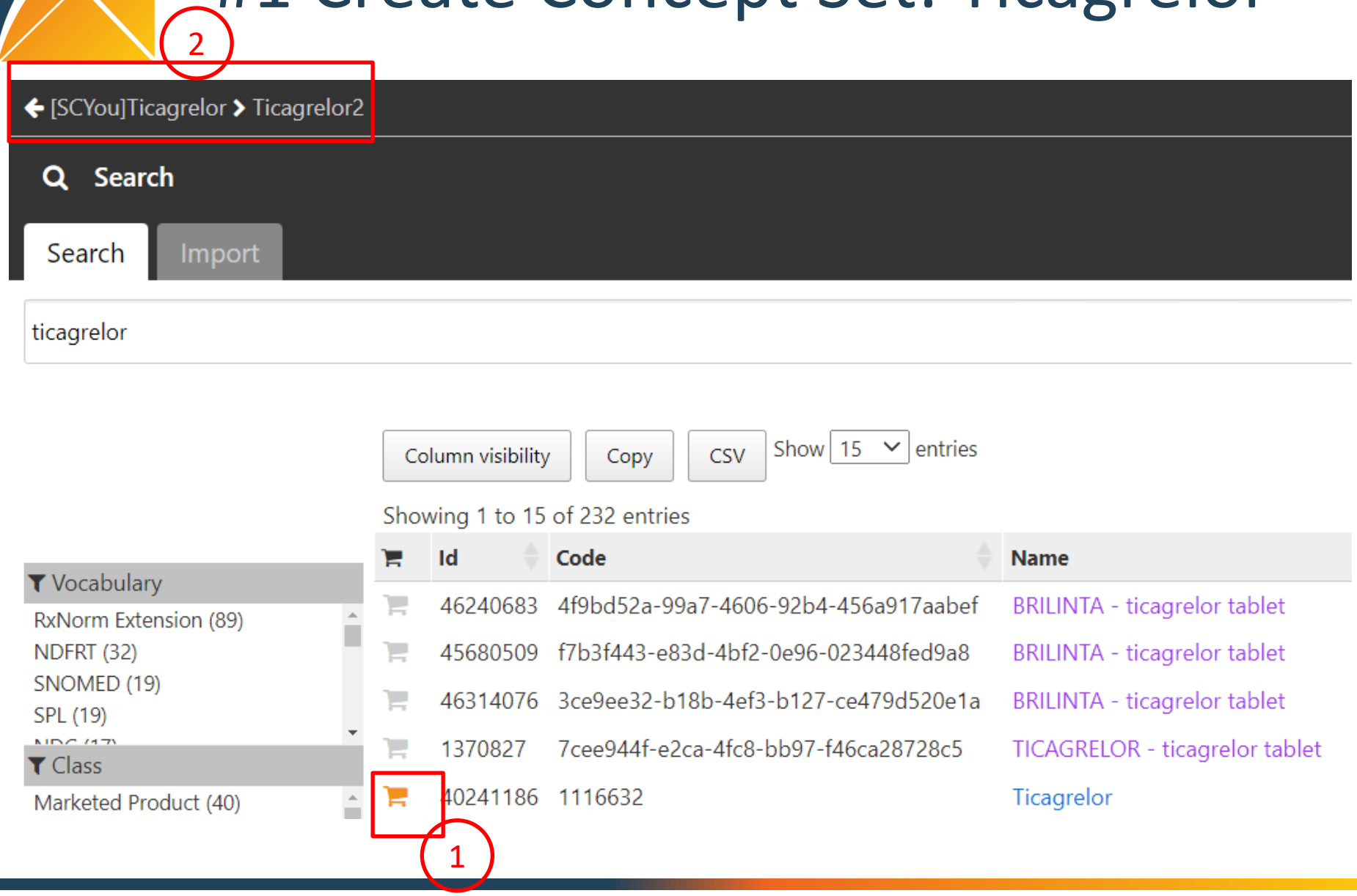
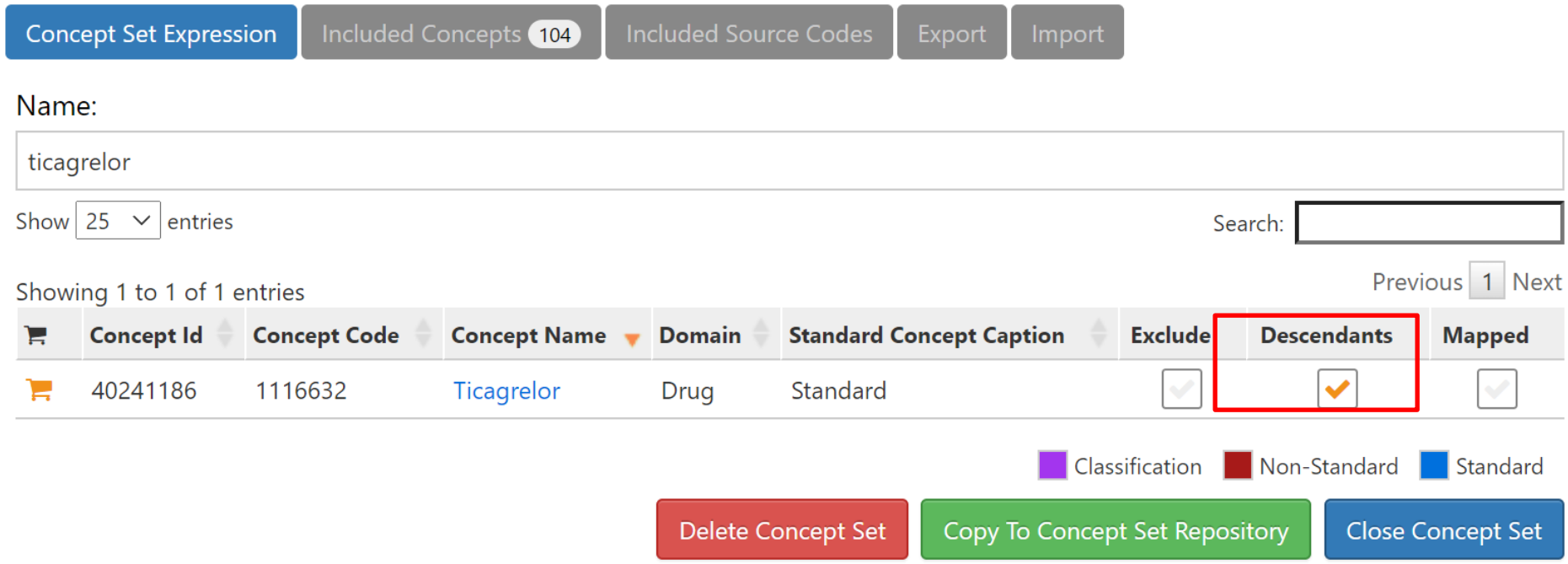


#1 Create Concept Set: Ticagrelor



#1 Create Concept Set: ACS

Name:

ACS

Show 25 entries

Search:

Showing 1 to 5 of 5 entries

Previ

Concept Id	Concept Code	Concept Name	Domain	Standard Concept Caption	Exclude	Descendants
315296	4557003	Preinfarction syndrome	Condition	Standard	☐	☑
444406	70422006	Acute subendocardial infarction	Condition	Standard	☐	☑
438170	73795002	Acute myocardial infarction of inferior wall	Condition	Standard	☐	☑
434376	54329005	Acute myocardial infarction of anterior wall	Condition	Standard	☐	☑
312327	57054005	Acute myocardial infarction	Condition	Standard	☐	☑

#2 Create Target Cohort:Ticagrelor

Cohort Entry Events

Events having any of the following criteria:

a procedure occurrence of PCI

✖ for the first time in the person's history

✖ with age Greater or Equal To 20

with continuous observation of at least 0 days before and 0 days after event index date

Limit initial events to: earliest event per person.

#2 Create Target Cohort:Ticagrelor

Restrict intial events to:

having all of the following criteria:

with at least 1 using all occurrences of:

a condition occurrence of ACS

where event starts between 7 days Before and 0 days After index start date

restrict to the same visit occurrence

allow events from outside observation period

and with at least 1 using all occurrences of:

a drug exposure of ticagrelor

where event starts between 7 days Before and 0 days After index start date

restrict to the same visit occurrence

allow events from outside observation period

#2 Create Target Cohort:Ticagrelor

New inclusion criteria

1. Without clopidogrel or prasugrel on the day of PCI
2. Without previous stroke
3. Without previous GI bleeding

Without clopidogrel or prasugrel on the day of PCI

enter an inclusion rule description

having all of the following criteria:

+ Add cri

with at most 0 using all occurrences of:

a drug exposure of clopidogrel

+ Add attribute...

where event starts between 30 days Before and 0 days After

index start date *add additional constraint*

restrict to the same visit occurrence

allow events from outside observation period

and with at most 0 using all occurrences of:

a drug exposure of Prasugrel

+ Add attribute...

where event starts between 30 days Before and 0 days After

index start date *add additional constraint*

restrict to the same visit occurrence

allow events from outside observation period

#2 Create Target Cohort:Ticagrelor

Inclusion Criteria

New inclusion criteria

1. Without clopidogrel or prasugrel on the day of PCI
2. Without previous stroke
3. Without previous GI bleeding

Without previous stroke

enter an inclusion rule description

having all of the following criteria: + Add cri

with at most 0 using all occurrences of:

a condition occurrence of Ischemic stroke + Add attribute...

where event starts between All days Before and 0 days After

index start date *add additional constraint*

restrict to the same visit occurrence

allow events from outside observation period

and with at most 0 using all occurrences of:

a condition occurrence of ICH + Add attribute...

where event starts between All days Before and 0 days After

index start date *add additional constraint*

restrict to the same visit occurrence

allow events from outside observation period

#2 Create Target Cohort:Ticagrelor

New inclusion criteria

1. Without clopidogrel or prasugrel on the day of PCI
2. Without previous stroke
3. Without previous GI bleeding

Without previous GI bleeding

enter an inclusion rule description

having all of the following criteria:

with at most 0 using all occurrences of:

a condition occurrence of GI bleeding

where event starts between All days Before and 0 days After

index start date *add additional constraint*

restrict to the same visit occurrence

allow events from outside observation period

#2 Create Target Cohort:Ticagrelor

Cohort Exit

Event Persistence:

Event will persist until: end of a continuous drug exposure

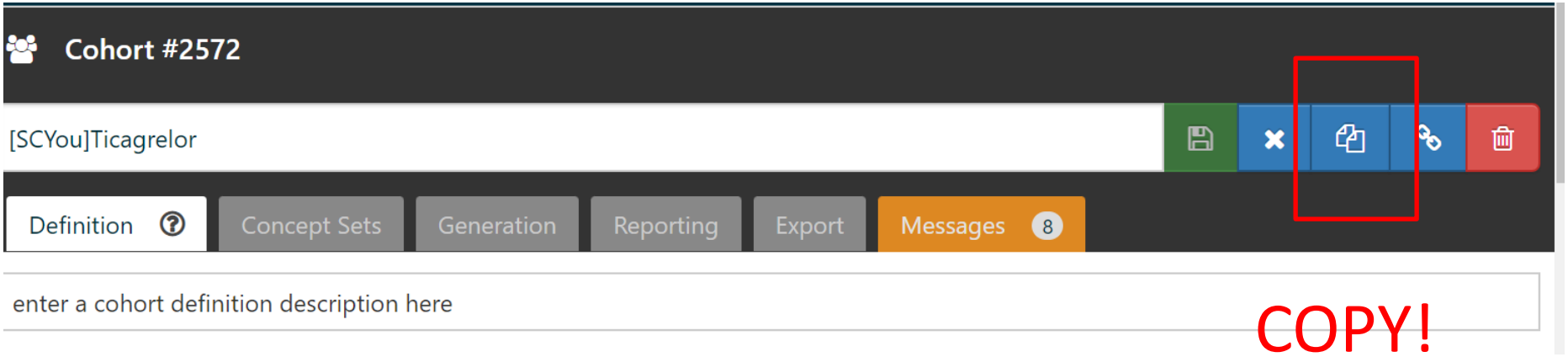
Continuous Exposure Persistence:

Specify a concept set that contains one or more drugs. A drug era will
the concept set, using the specified persistence window as a maximum
adding a specified surveillance window to the final exposure event. If
date is inferred to be event start date + days supply in cases when da
persistence assures that the cohort end date will be no greater than th

Concept set containing the drug(s) of interest: ticagrelor

- Persistence window: allow for a maximum of 7 days betwe
- Surveillance window: add 0 days to the end of the era of p
  cohort exit.

#3 Create Comparator Cohort: Clop



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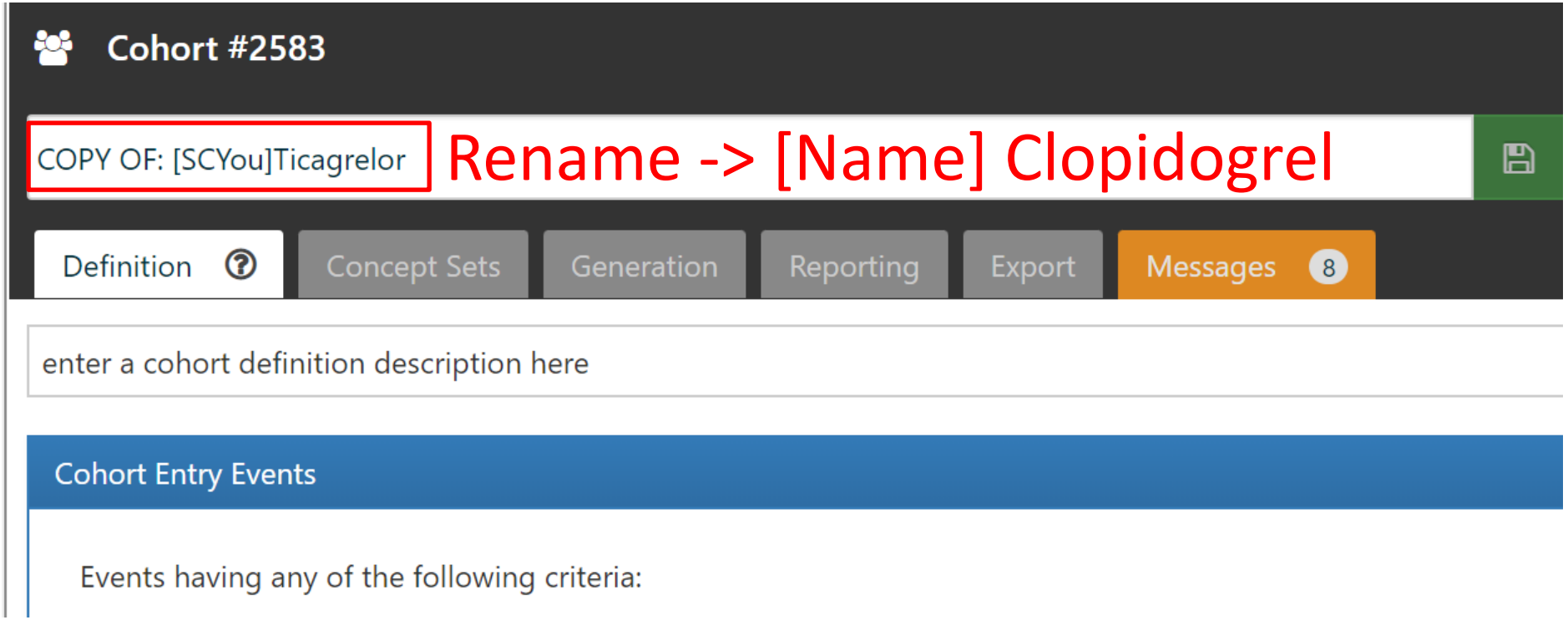


#3 Create Comparator Cohort: Clop

with at least 1 using all occurrences of:

a condition occurrence of ACS

Add attribute...

where event starts between 7 days Before and 0 days After index start date *add additional constraint*

☐ restrict to the same visit occurrence

☐ allow events from outside observation period

and with at least 1 using all occurrences of:

a drug exposure of clopidogrel

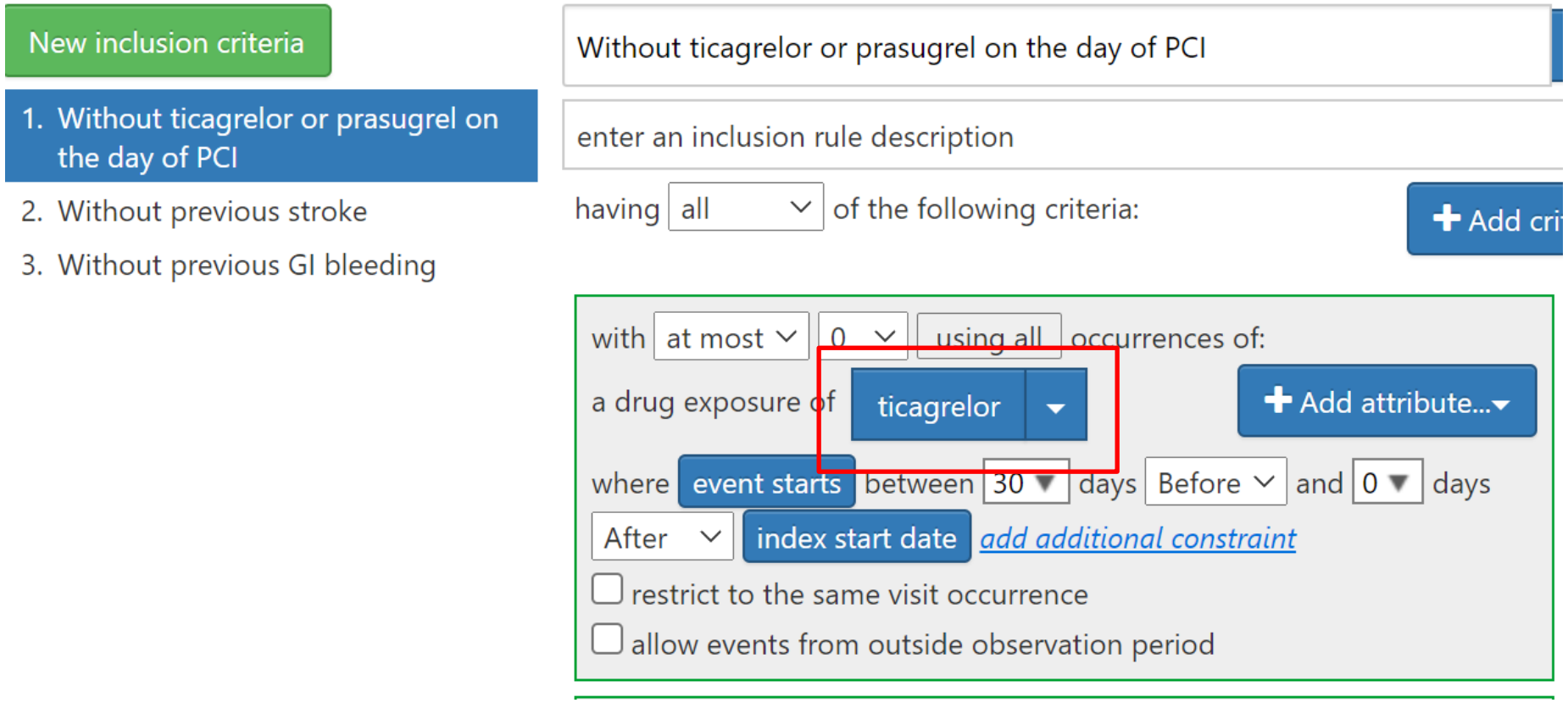
Add attribute...

where event starts between 7 days Before and 0 days After index start date *add additional constraint*

☐ restrict to the same visit occurrence

☐ allow events from outside observation period

#3 Create Comparator Cohort: Clop



#3 Create Comparator Cohort: Clop

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Specify a concept set that contains one or more drugs. A drug era will b
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adding a specified surveillance window to the final exposure event. If nc
date is inferred to be event start date + days supply in cases when days
persistence assures that the cohort end date will be no greater than the

Concept set containing the drug(s) of interest: clopidogrel

- Persistence window: allow for a maximum of 7 days betwee
- Surveillance window: add 0 days to the end of the era of pe
  cohort exit.

#4 Create Outcome Cohort:AMI

Name:

Acute MI

Show 25 entries

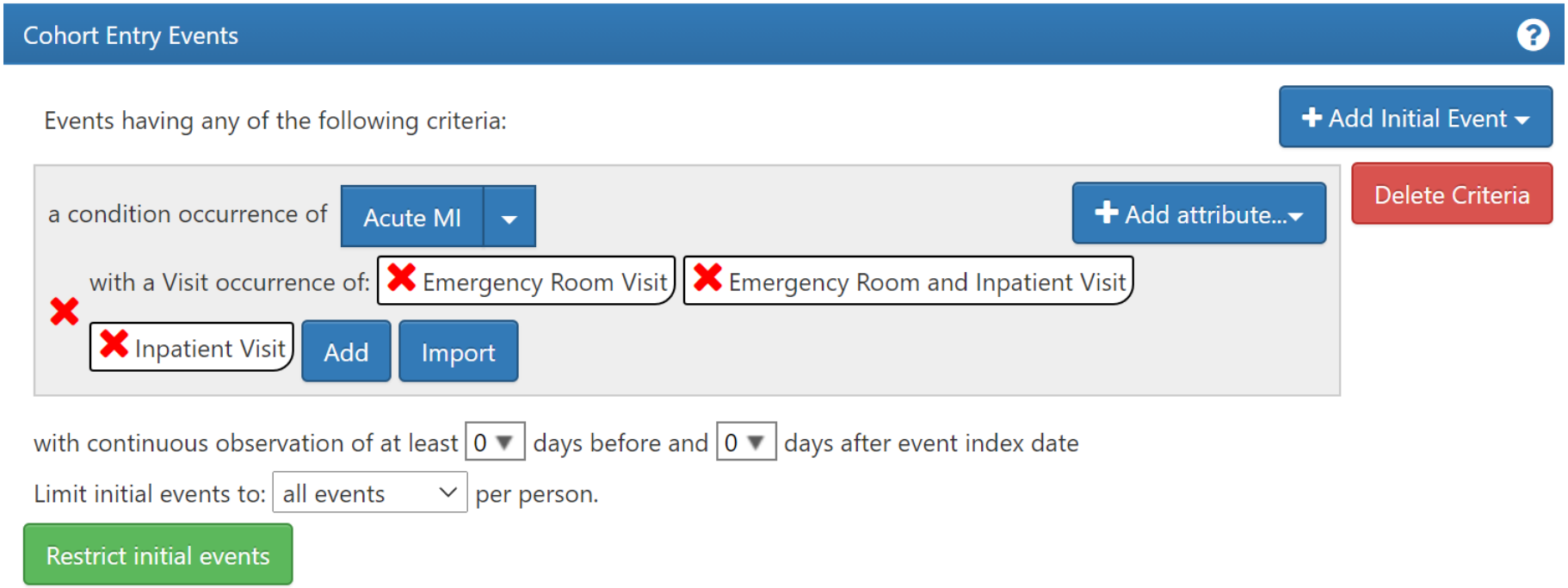
Search:

Showing 1 to 4 of 4 entries

Previous 1 Next

	Concept Id	Concept Code	Concept Name	Domain	Standard Concept Caption	Exclude	Descendants	Mapped
	444406	70422006	Acute subendocardial infarction	Condition	Standard	☐	☑	☐
	438170	73795002	Acute myocardial infarction of inferior wall	Condition	Standard	☐	☑	☐
	434376	54329005	Acute myocardial infarction of anterior wall	Condition	Standard	☐	☑	☐
	312327	57054005	Acute myocardial infarction	Condition	Standard	☐	☑	☐

#4 Create Outcome Cohort:AMI



#4 Create Outcome Cohort:AMI

emergency | Visit | Search

Show 10 entries | Filter records:

	Concept Id	Code	Concept Name	Standard Type	Vocabulary	Domain
✓	8870	23	Emergency Room - Hospital	S	CMS Place of Service	Visit
✓	38004220	261QE0002X	Ambulatory Emergency Care Clinic/Center	S	NUCC	Visit
✓	38004337	333300000X	Emergency Response System Supplier	S	NUCC	Visit
✓	38004362	343900000X	Non-emergency Medical Transport	S	NUCC	Visit
✓	9203	ER	Emergency Room Visit	S	Visit	Visit
✓	262	ERIP	Emergency Room and Inpatient Visit	S	Visit	Visit
✓	581381	OMOP4822040	Emergency Room Critical Care Facility	S	CMS Place of Service	Visit
✓	32583	7	Emergency Room	N	UB04 Point of Origin	Visit

#4 Create Outcome Cohort:AMI

Show 10 entries

Filter records: inpatient

	Concept Id	Code	Concept Name	Standard Type	Vocabulary	Domain
✓	8717	21	Inpatient Hospital	S	CMS Place of Service	Visit
✓	38004311	315D00000X	Inpatient Hospice	S	NUCC	Visit
✓	8971	51	Inpatient Psychiatric Facility	S	CMS Place of Service	Visit
✓	8920	61	Comprehensive Inpatient Rehabilitation Facility	S	CMS Place of Service	Visit
✓	262	ERIP	Emergency Room and Inpatient Visit	S	Visit	Visit
✓	9201	IP	Inpatient Visit	S	Visit	Visit
✓	581384	OMOP4822037	Inpatient Nursery	S	CMS Place of Service	Visit
✓	581383	OMOP4822038	Inpatient Cardiac Care Facility	S	CMS Place of Service	Visit
✓	581379	OMOP4822042	Inpatient Critical Care Facility	S	CMS Place of Service	Visit
✓	32211	02	Discharged/transferred to other short term general hospital for inpatient care.	N	UB04 Pt dis status	Visit

#4 Create Outcome Cohort:AMI

Cohort Exit

Event Persistence:

Event will persist until: fixed duration relative to initial event

Fixed Duration Persistence:

The event end date is derived from adding a number of days to the eve
all cohort episodes will have the same fixed duration (subject to furthe
the cohort may have varying cohort duration times due to the varying
length of stay). This event persistence assures that the cohort end date
offset.

- Event date to offset from: start date
- Number of days offset: 1 days

Censoring Events:

Exit Cohort based on the following criteria:

No censoring events selected.

#5 Create Outcome Cohort:GI bleeding

Cohort Entry Events

Events having any of the following criteria:

a condition occurrence of **GI bleeding**

✖ for the first time in the person's history

with continuous observation of at least 0 days before and 0 days after event index date

Limit initial events to: earliest event per person.

Restrict initial events

Inclusion Criteria

New inclusion criteria

#5 Create Outcome Cohort:GI bleeding

Cohort Exit

Event Persistence:

Event will persist until: fixed duration relative to initial event

Fixed Duration Persistence:

The event end date is derived from adding a number of days to th
all cohort episodes will have the same fixed duration (subject to fu
the cohort may have varying cohort duration times due to the var
length of stay). This event persistence assures that the cohort end
offset.

- Event date to offset from: start date
- Number of days offset: 1 days

Censoring Events:

Exit Cohort based on the following criteria: