TreatmentPatterns

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OHDSI
OBSERVATIONAL HEALTH DATA SCIENCES AND INFORMATICS

2014

Treatment Pathways in Chronic Disease

Objective: The objective of this study is to characterize the prevalence of different treatment pathways for three chronic diseases: Hypertension, Type II Diabetes, and Depression. We will systematically summarize the treatment pathways observed among patients who have at least 3 years of continuous observation and persistent treatment following initiation. We will stratify the results by year to evaluate temporal trends, and will further stratify by data source to determine if treatment pathways vary by population, geography, and data capture process.

Rationale: While numerous treatment guidelines exist for chronic conditions, there is a paucity of data on the real-world treatment pathways that patients experience in practice. Understanding these pathways is essential for establishing context around questions of drug utilization, effectiveness, and adherence.

Project Leads: Patrick Ryan, Jon Duke, George Hripcsak, Martijn Schuemie, Nigam Shah

Coordinating Institution(s): Janssen R&D, Columbia University, Regenstrief Institute, Stanford University

Additional Participants:

Full Protocol: Hypertension Treatment Pathways 12-4-2014

Initial Proposal Date: 12/3/2014

Launch Date: 12/5/2014

Study Closure Date: 12/31/2014

Results Submission: Email or SFTP

What did that look like?

```
/********************************************************************************
# Copyright 2014-2015 Observational Health Data Sciences and Informatics
#
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********************************************************************************/


/***********************
script to create treatment patterns among patients with a disease
last revised: 8 Jan 2015
author:  Patrick Ryan
description:
create cohort of patients with index at first treatment.
patients must have >365d prior observation and >1095d of follow-up.
patients must have >1 diagnosis during their observation.
patients must have >1 treatment every 120d from index through 1095d.
for each patient, we summarize the sequence of treatments (active ingredients, ordered by first date of dispensing)
we then count the number of persons with the same sequence of treatments
the results queries allow you to remove small cell counts before producing the final summary tables as needed
--update 29 Dec 2014:
***changed the handling of small cell counts to aggregate treatment sequences until cell count is achieved (rather than removing full sequence)
***changed mincellcount default = 0
***changed to create only 2 output files, plus new summary.   both stratified by year, but overall is set with year = 9999
--update 8 jan 2015:
***changed table names to be shorter to work with Oracle
***added semicolons to work with postgresql/Oracle
***********************/

{DEFAULT @cdmSchema = 'cdmSchema'}  /*cdmSchema:  @cdmSchema*/
```

Publication

Characterizing treatment pathways at scale using the OHDSI network

George Hripcsak, Patrick B. Ryan, Jon D. Duke, +13, and David Madigan Authors Info & Affiliations

Edited by Richard M. Shiffrin, Indiana University, Bloomington, IN, and approved April 5, 2016 (received for review June 14, 2015)

June 6, 2016 | 113 (27) 7329-7336 | https://doi.org/10.1073/pnas.1510502113

27,624 | 218 PDF/EPUB

Abstract

Observational research promises to complement experimental research by providing large, diverse populations that would be infeasible for an experiment. Observational research can test its own clinical hypotheses, and observational studies also can contribute to the design of experiments and inform the generalizability of experimental research. Understanding the diversity of populations and the variance in care is one component. In this study, the Observational Health Data Sciences and Informatics (OHDSI) collaboration created an international data network with 11 data sources from four countries, including electronic health records and administrative claims data on 250 million patients. All data were mapped to common data standards, patient privacy was maintained by using a distributed model, and results were aggregated centrally

https://doi.org/10.1073/pnas.1510502113

Hypertension (2008 – 2012) - IPCI

valsartan
ramipril
bisoprolol
irbesartan
chlorthalidone
lisinopril
amlodipine
enalapril
telmisartan
losartan
perindopril
metoprolol
hydrochlorothiazide
indapamide


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OBSERVATIONAL HEALTH DATA SCIENCES AND INFORMATICS

2021

TreatmentPatterns R package

ELSEVIER

Computer Methods and Programs in Biomedicine

Volume 225, October 2022, 107081

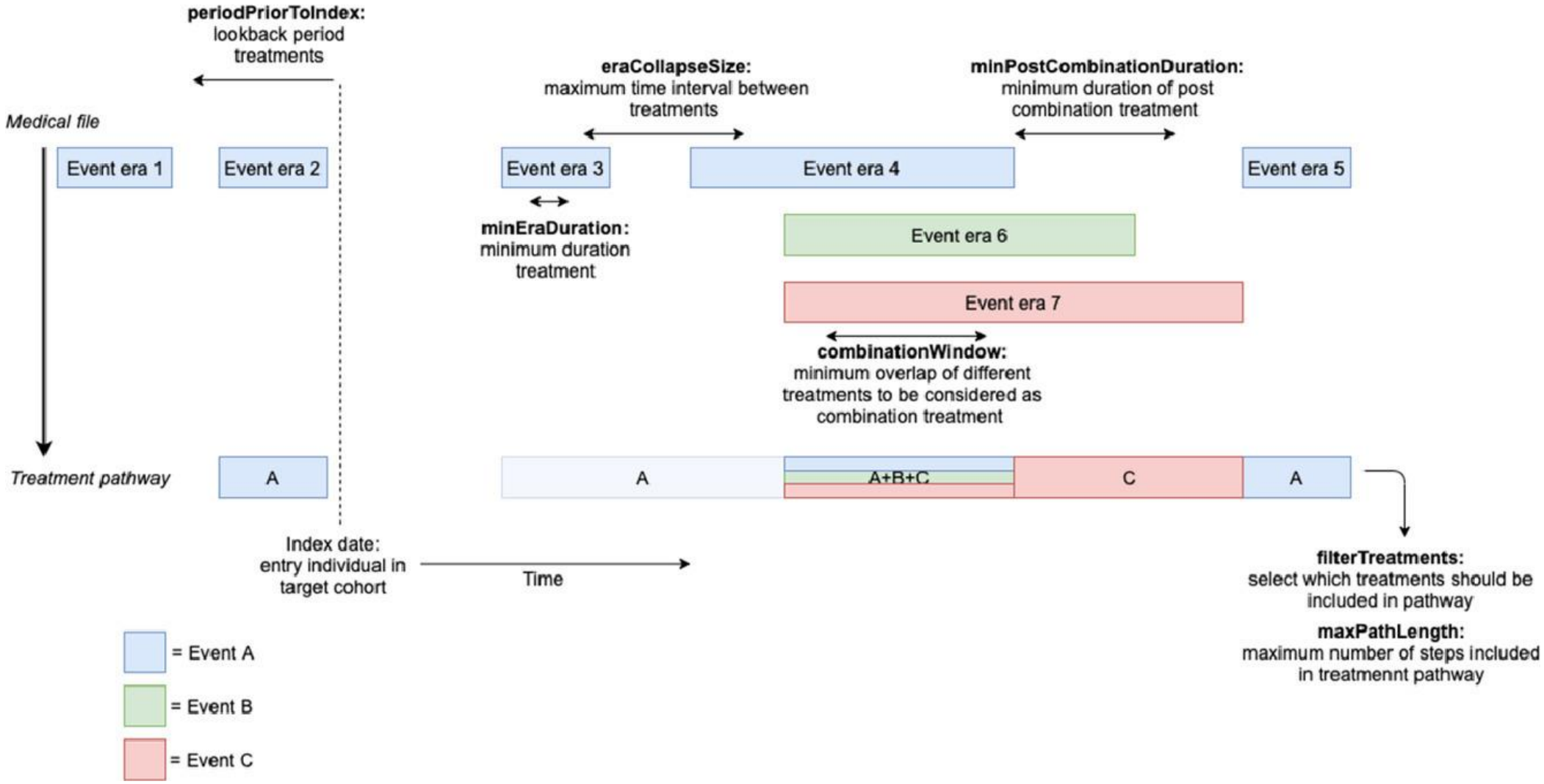
TreatmentPatterns: An R package to facilitate the standardized development and analysis of treatment patterns across disease domains

Aniek F. Markus [a], Katia M.C. Verhamme [a b], Jan A. Kors [a], Peter R. Rijnbeek [a]

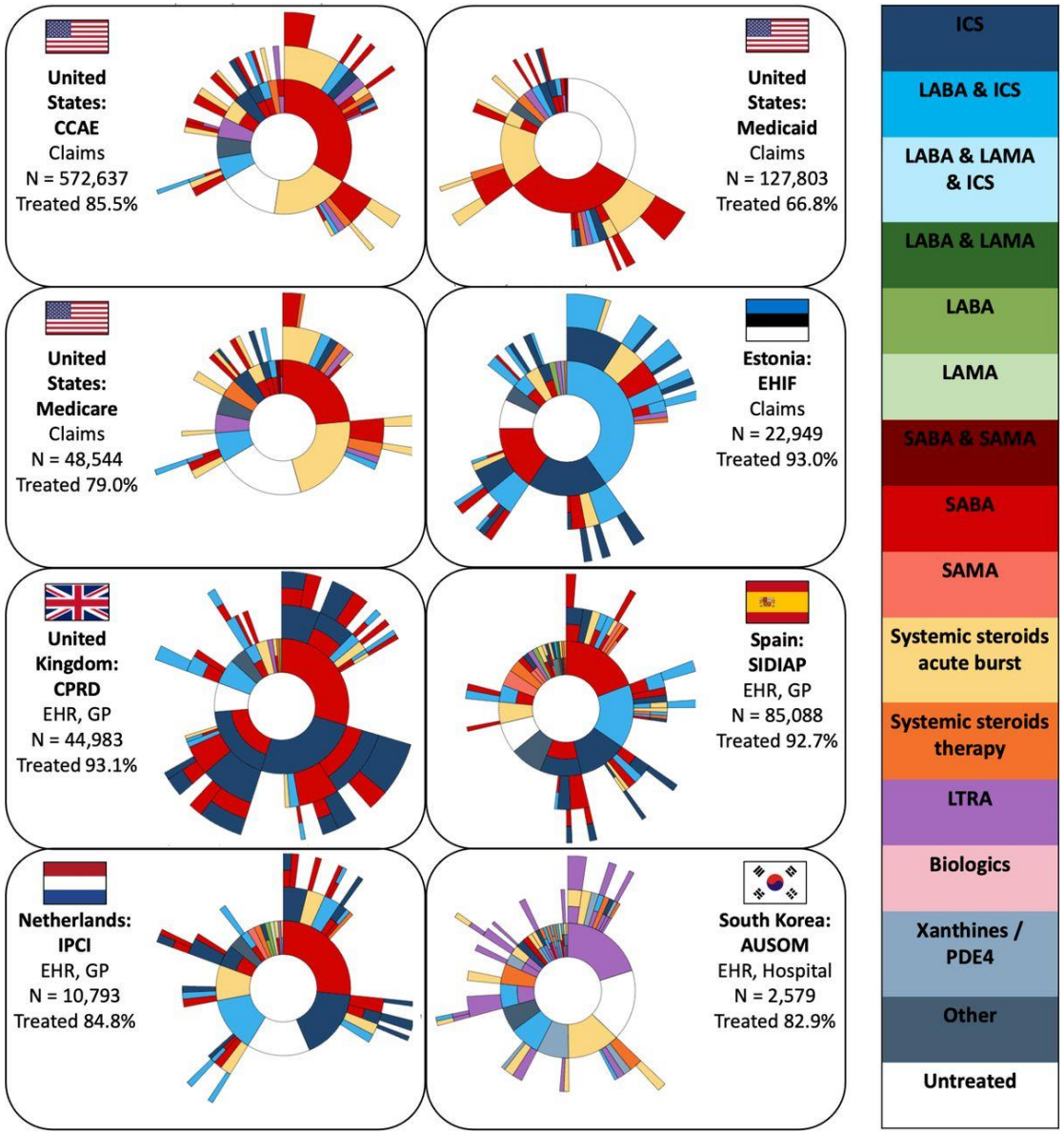
Show more

https://doi.org/10.1016/j.cmpb.2022.107081

New Features!



https://doi.org/10.1016/j.cmpb.2022.107081



https://doi.org/10.1136/bmjresp-2023-002127


OHDSI
OBSERVATIONAL HEALTH DATA SCIENCES AND INFORMATICS

2022

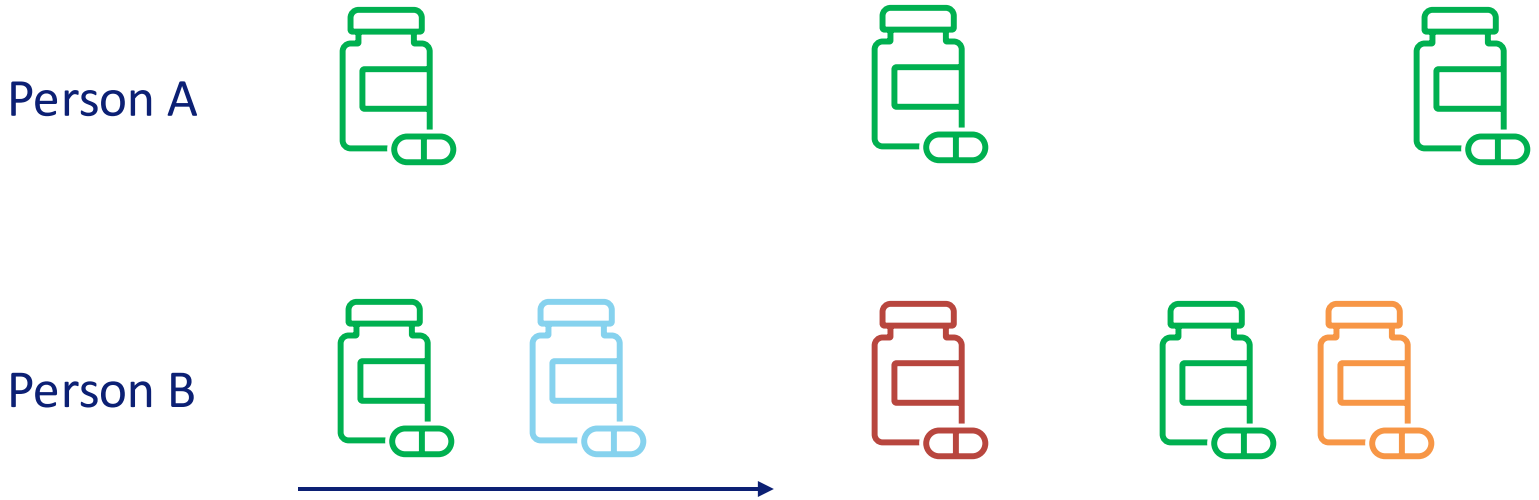
TreatmentPatterns

- >1700 (behavioural) unit tests
- On CRAN since August 2023
- In HADES since Feburary 2025
- Compatability
  - DatabaseConnector
  - CDMConnector

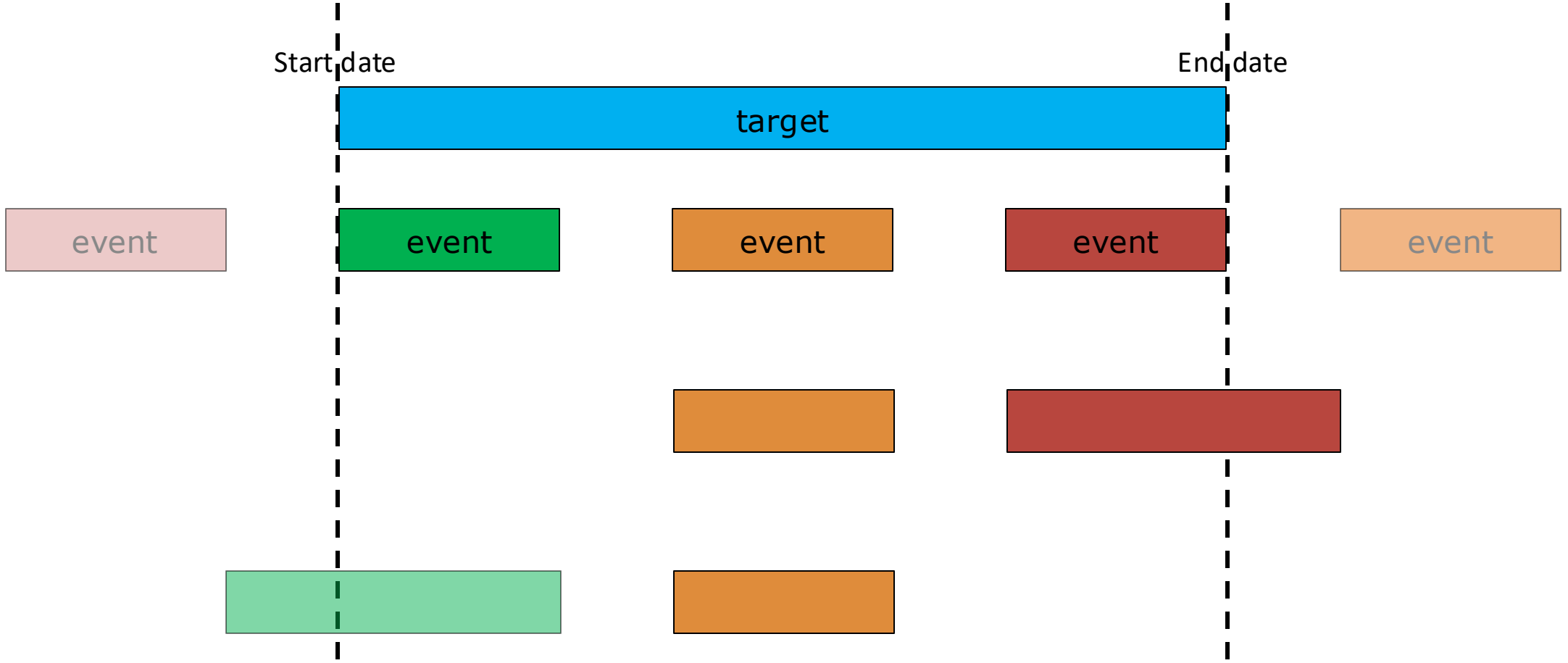
DatabaseConnector (JDBC)	CDMConnector (ODBC)
PostgreSQL passing	PostgreSQL passing
SQL Server passing	SQL Server passing
Snowflake passing	Snowflake passing
Oracle passing	
Redshift passing	Redshift passing
Spark passing	Spark failing
Iris passing *	
BigQuery passing	

Study Design

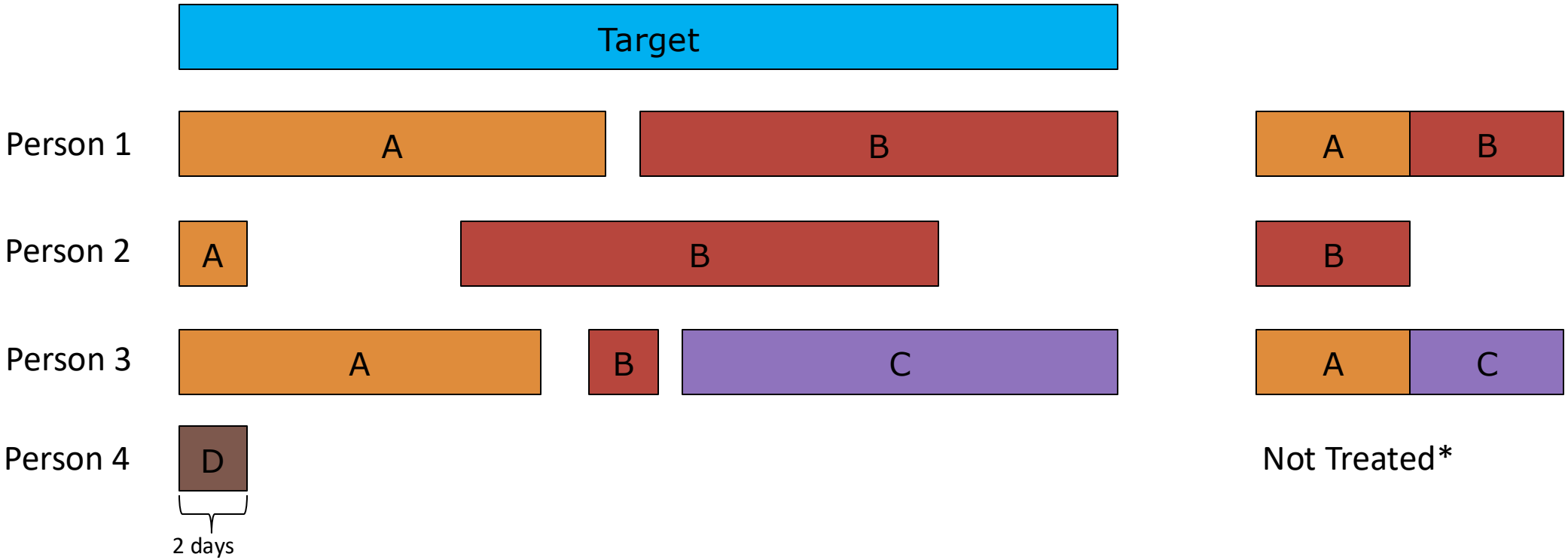
- A pathway is a **sequence of events**.



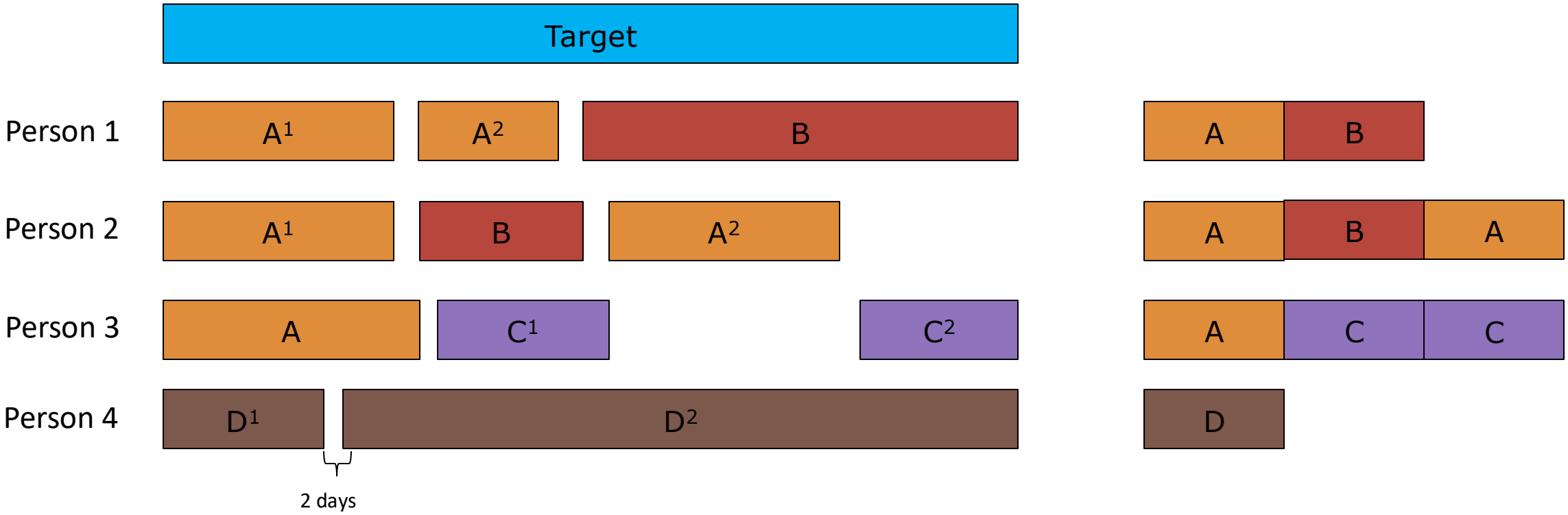
- <u>Problem definition:</u> Find pathways consisting of **events** within a certain **study population** (*target*).


Start date
End date
target
event
event
event
event
event

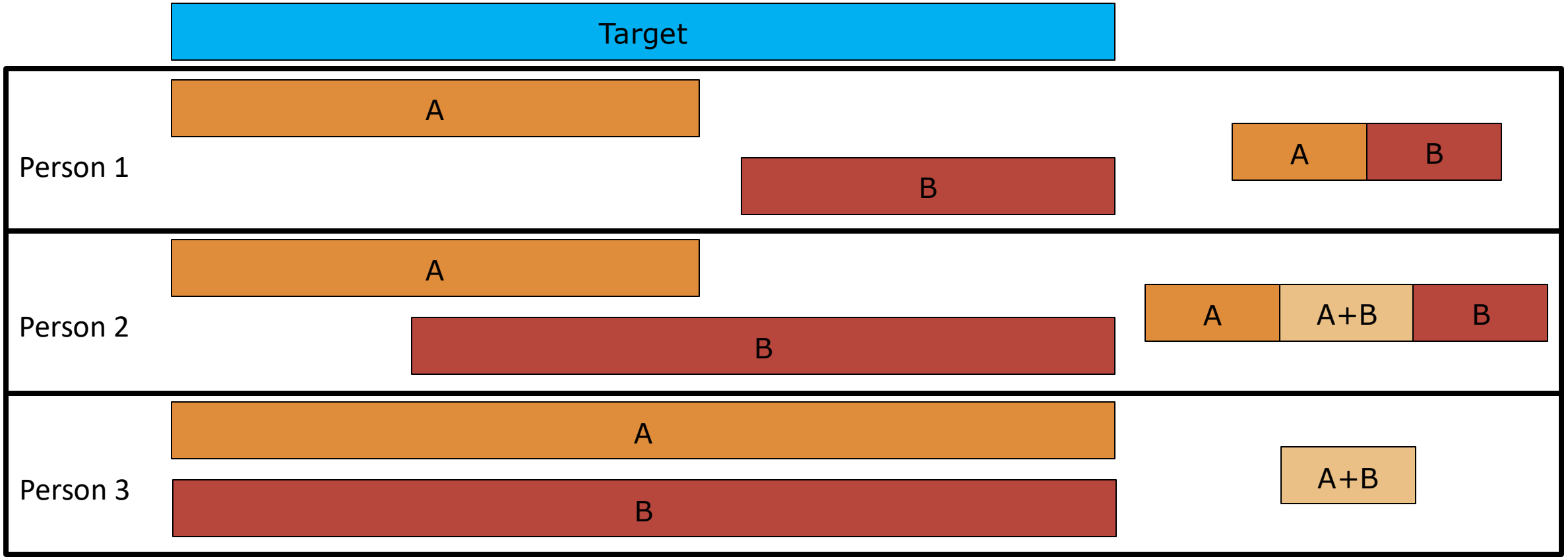
minEraDuration



eraCollapseSize



combinationWindow



Persitant vs short-lasting targets

Hypertension

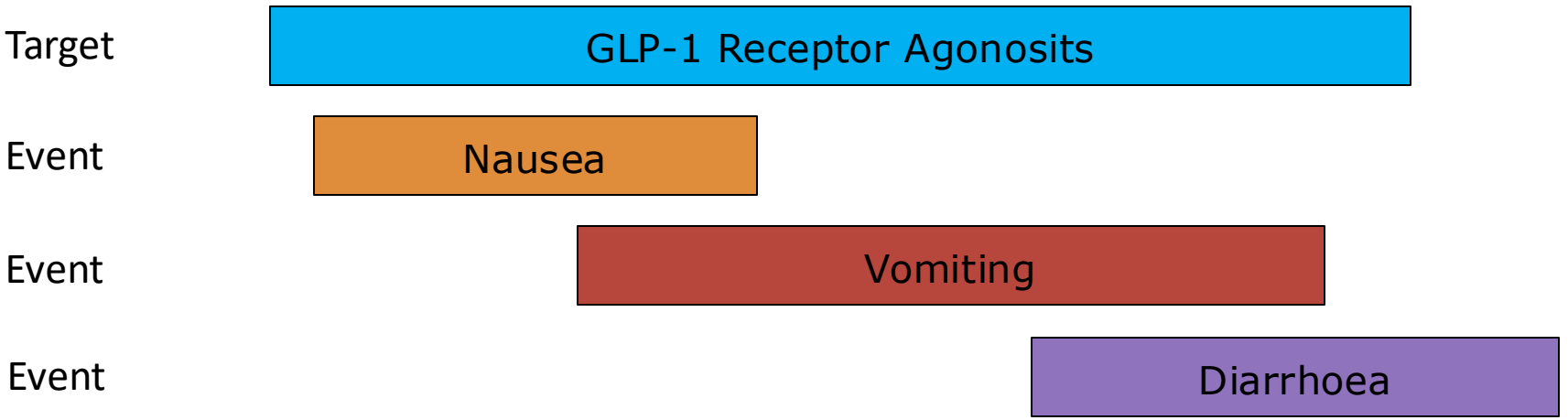
- 3 years of follow-up

- minEraDuration: 30 days
- combinationWindow: 30 days
- eraCollapseSize: 7 days

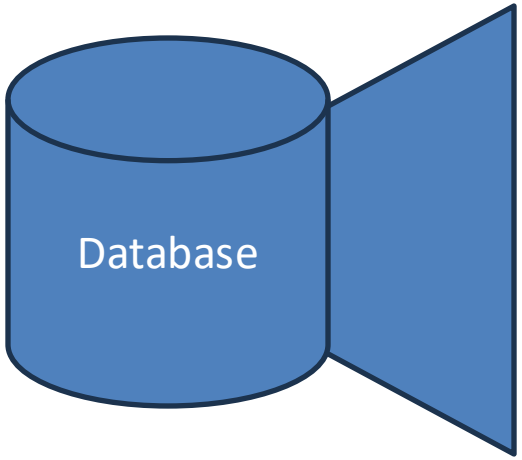
Infection

- 2-3 weeks of follow up

- minEraDuration: 7 days
- combinationWindow: 7 days
- eraCollapseSize: 2 days


Target
GLP-1 Receptor Agonosits
Event
Nausea
Event
Vomiting
Event
Diarrhoea

Cohort Table

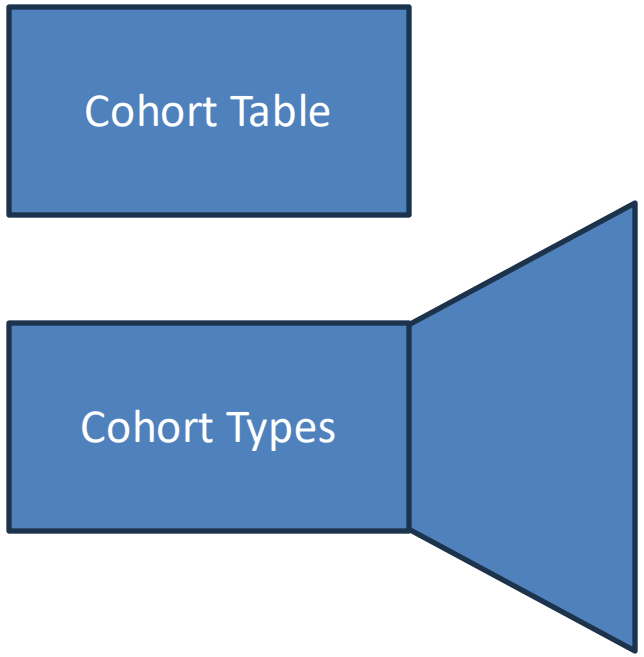


cohort_definition_id	subject_id	cohort_start_date	cohort_end_date
1 – *hypertension*	1	…	…
2 – *metoprolol*	1	…	…
3 – *hydrochlorothiazide*	1	…	…
4 – *etc.*	1	…	…

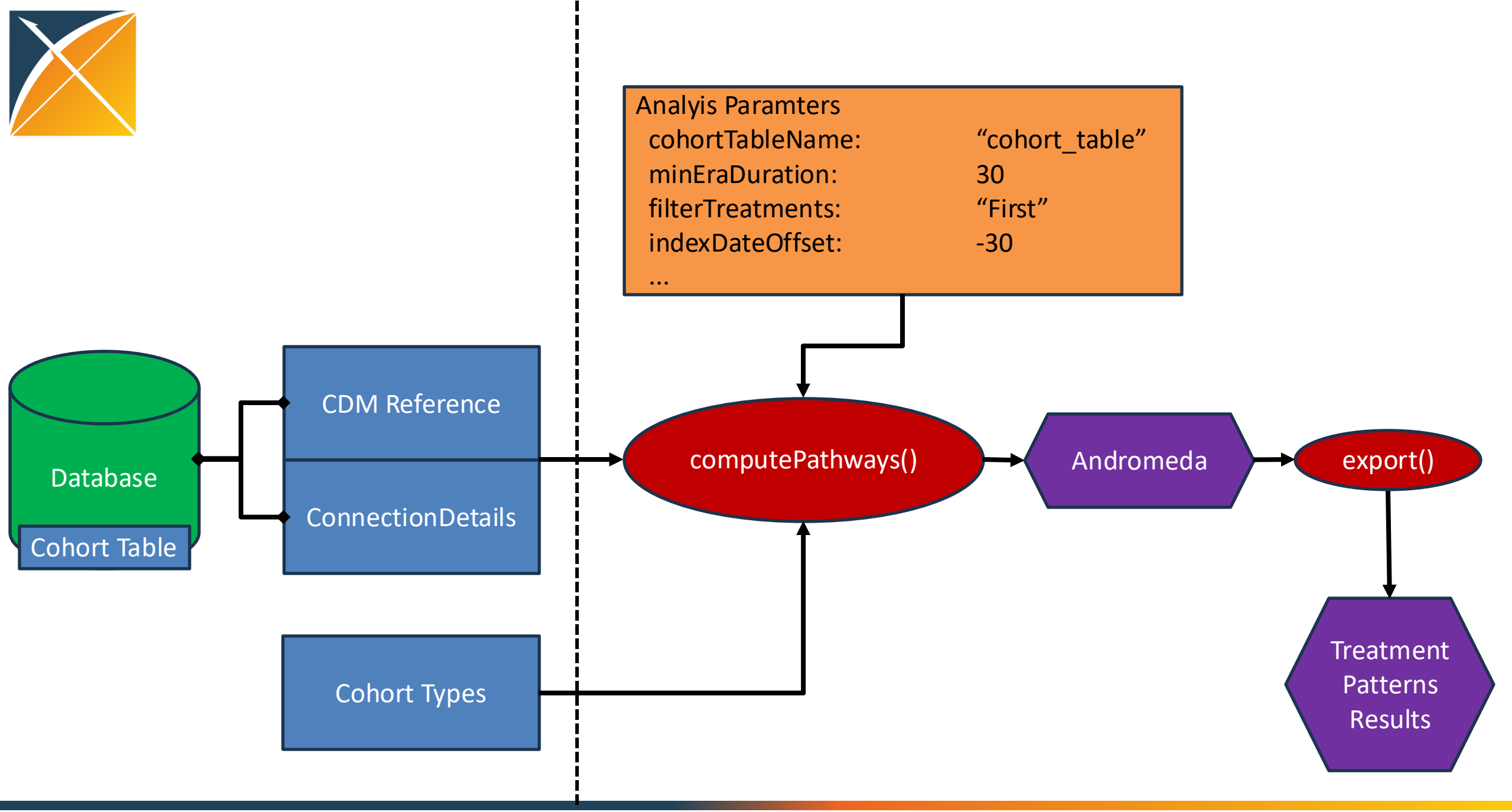
SQL

CDMConnector

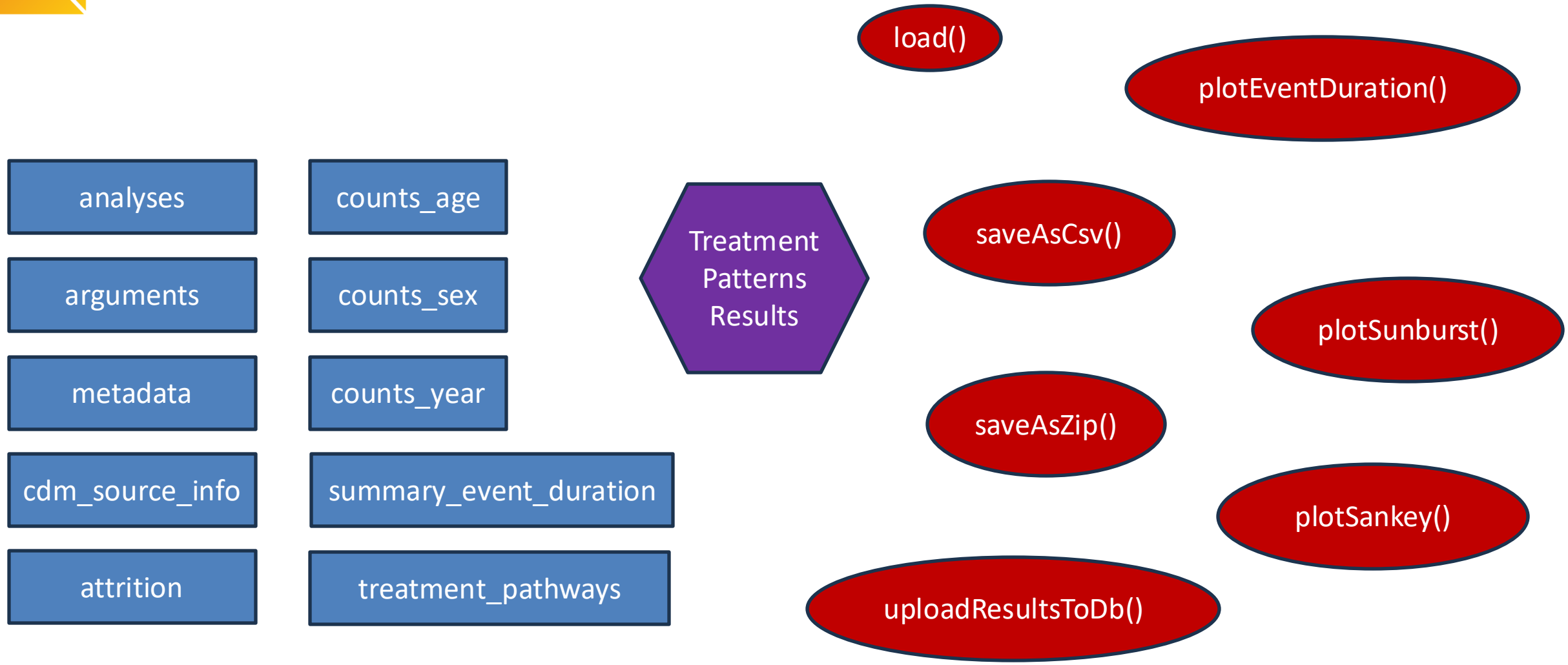
CohortGenerator



cohortId	cohortName	type
1	Hypertension	target
2	Metoprolol	event
3	Hydrochlorothiazide	event
4	Etc.	event


Analyis Paramters
cohortTableName: "cohort_table"
minEraDuration: 30
filterTreatments: "First"
indexDateOffset: -30
...
Database
Cohort Table
CDM Reference
ConnectionDetails
Cohort Types
computePathways()
Andromeda
export()
Treatment Patterns Results

TreatmentPatternsResults



Hypertension (2008 – 2012) - IPCI

valsartan
ramipril
bisoprolol
irbesartan
chlorthalidone
lisinopril
amlodipine
enalapril
telmisartan
losartan
perindopril
metoprolol
hydrochlorothiazide
indapamide

Hypertension (2008 – 2012) - IPCI