



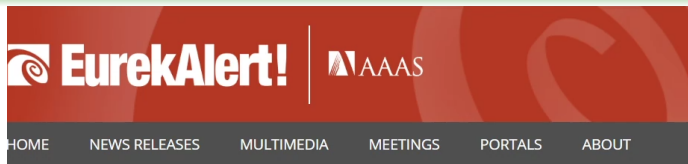
Open science with OHDSI: from question to evidence in 4 days

Kees van Bochove, Founder, The Hyve

@keesvanbochove

Oct 7, 2020, EASME workshop

March 2020: frantic search for medical evidence



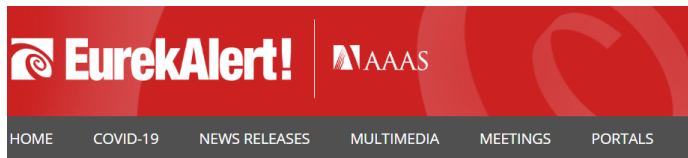
NEWS RELEASE 23-MAR-2020

ACE inhibitors and angiotensin receptor blockers may increase the risk of severe COVID-19

LOUISIANA STATE UNIVERSITY HEALTH SCIENCES CENTER



PRINT E-MAIL



NEWS RELEASE 30-MAR-2020

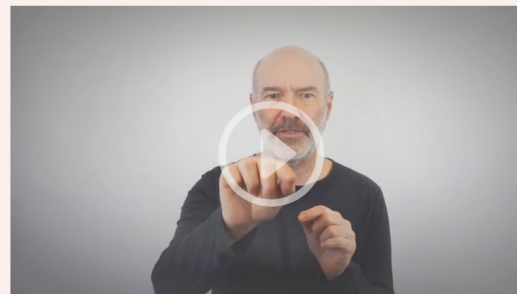
Evidence suggests that ACE inhibitors and angiotensin receptor blockers may improve prognosis in COVID-19 hypertensive patients

Recent concerns that common antihypertensive drugs may have a negative effect in COVID-19 patients are not supported by the evidence, report scientists in a new review published in Mayo Clinic Proceedings



Closing the door to Corona

"AT1R antagonists may be life-saving for acutely ill SARS-CoV-2-infected patients"



Common cold vs Covid-19 – 8:26 min

Treatments of Covid-19 should aim at:

- 1) preventing the virus from entering the cell
- 2) while preventing ACE2 deficiency at the same time

Current treatments don't match both criteria. AT1R antagonists do.



the hyve

We enable **open science** by
developing and implementing
open source solutions and FAIRifying
data in life sciences



Software engineers, data scientists, project managers & staff; expertise in bioinformatics, medical informatics, biostatistics, knowledge management etc.

Fast-growing

Started in 2012

40+ people by now

Core values

Share



Reuse



Specialize



Customer Segments

Pharma

Life Sciences

Healthcare



Open Targets

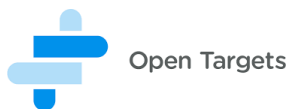


OHDSI
OBSERVATIONAL HEALTH DATA SCIENCES AND INFORMATICS



Our open innovation ecosystem the hyve

Open Source Software



Precompetitive Health Data Projects



PIONEER



FNS - Cloud
Food Nutrition Security



QualiFY



eTRIKS

ND4BB

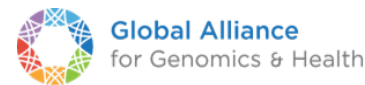
TRANSLOCATION



National Health Data Networks



Partner Communities



Outline



1. The case for open science
2. Medical evidence generation is changing through open science
3. Case study: COVID-19 studyathon

Statement #1

Science is broken
but it can be fixed

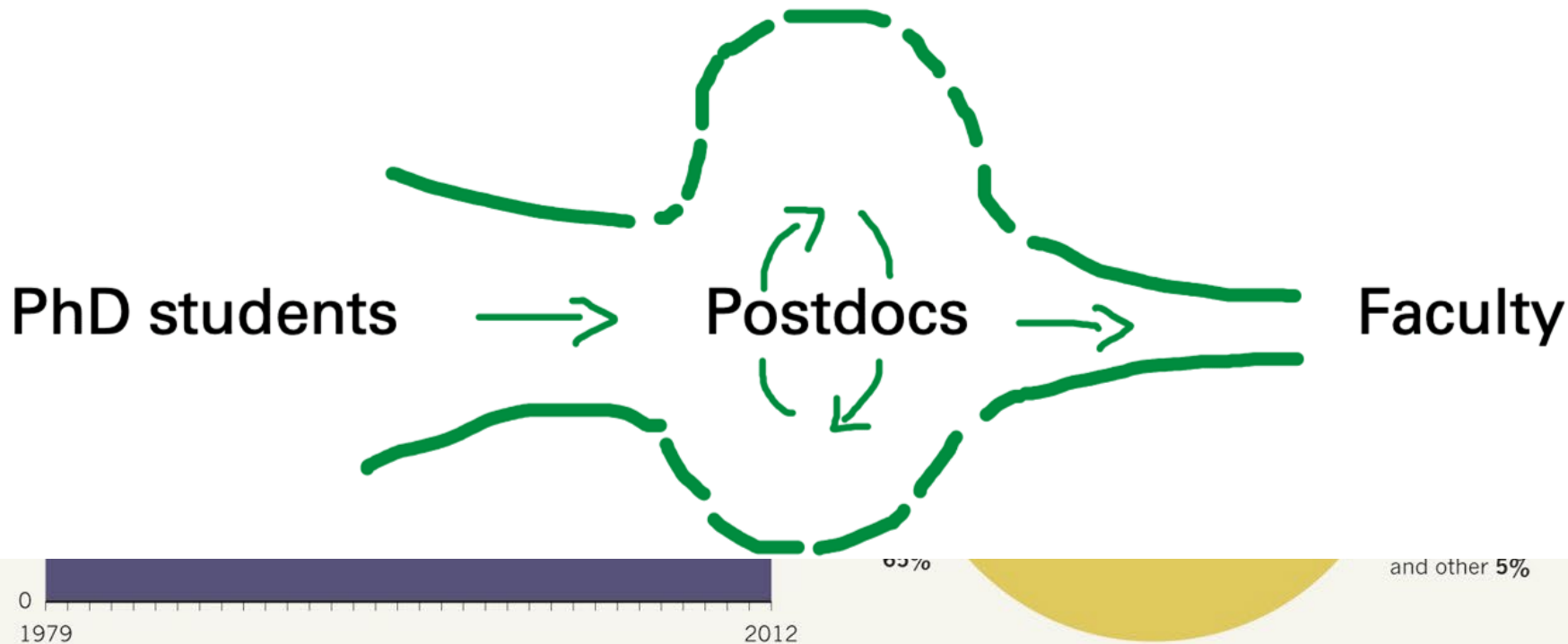
@keesvanbochove @TheHyveNL

What's wrong with the academic career path?



THE POSTDOC PILE-UP

The number of researchers in US postdoctoral positions has more than tripled since 1979. The vast majority of postdocs are in the life sciences. Across fields, median salaries for postdocs are outstripped by those for non-postdoc positions, when measured up to 5 years after receiving a PhD.



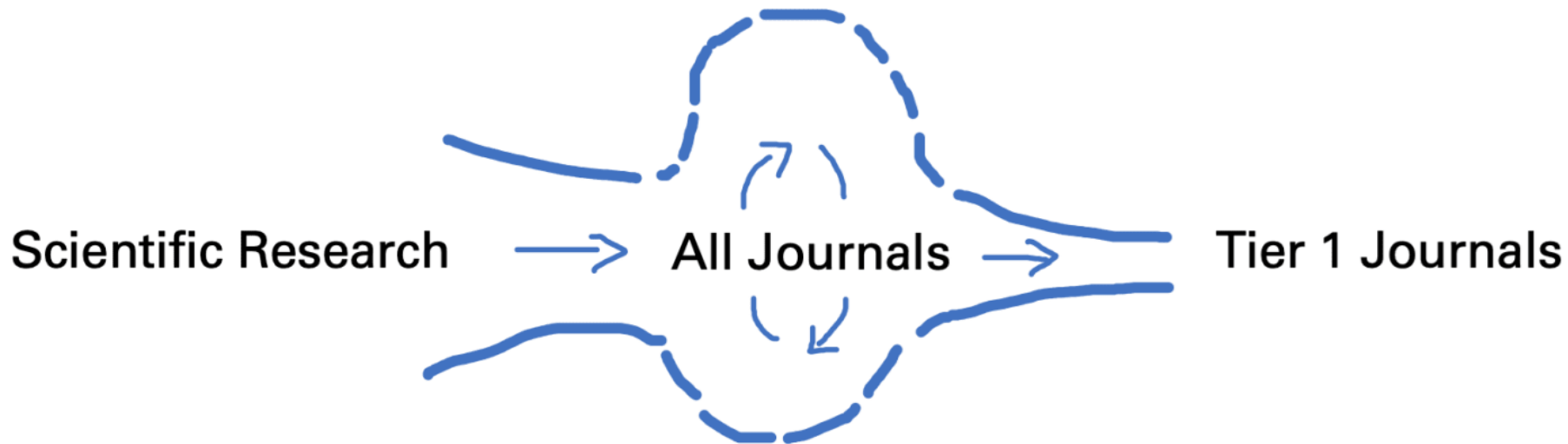
What's wrong with the academic career path?



Can Twitter Save Science?

Two Truths and a Take, Season 2 Episode 4

Alex Danco Feb 16 ♡ 10 📌



<https://danco.substack.com/p/can-twitter-save-science>

Poor usage of statistics in biomedical science



FREE

#2 of 100

Scientists rise up against statistical significance

More than 800 scientists call for statistical significance to be retired, and thus bring an end to hyped claims, wasted resources and missed opportunities.

Published in

Nature

Date

March 2019

Subject area

Mathematical Sciences

Affiliations

University of Basel

University of California, Los Angeles

Northwestern University

Authors

Valentin Amrhein

Sander Greenland

Blake McShane

[Open Altmetric Details Page](#)

[View on publisher site](#)



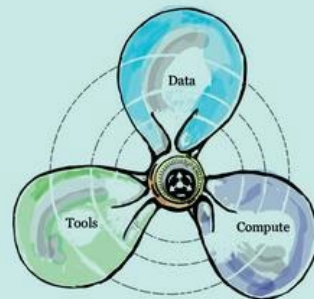
| | |
|--------|-------------------------|
| 42 | News stories |
| 40 | Blog posts |
| 21,654 | Tweets |
| 127 | Facebook posts |
| 2 | Wikipedia mentions |
| 1 | Reddit post |
| 9 | F1000 reviews |
| 4 | Videos |
| 736 | Readers on Mendeley |
| 198 | Citations on Dimensions |

Data that is not FAIR and behind paywalls



DATA STEWARDSHIP FOR OPEN SCIENCE

Implementing FAIR Principles

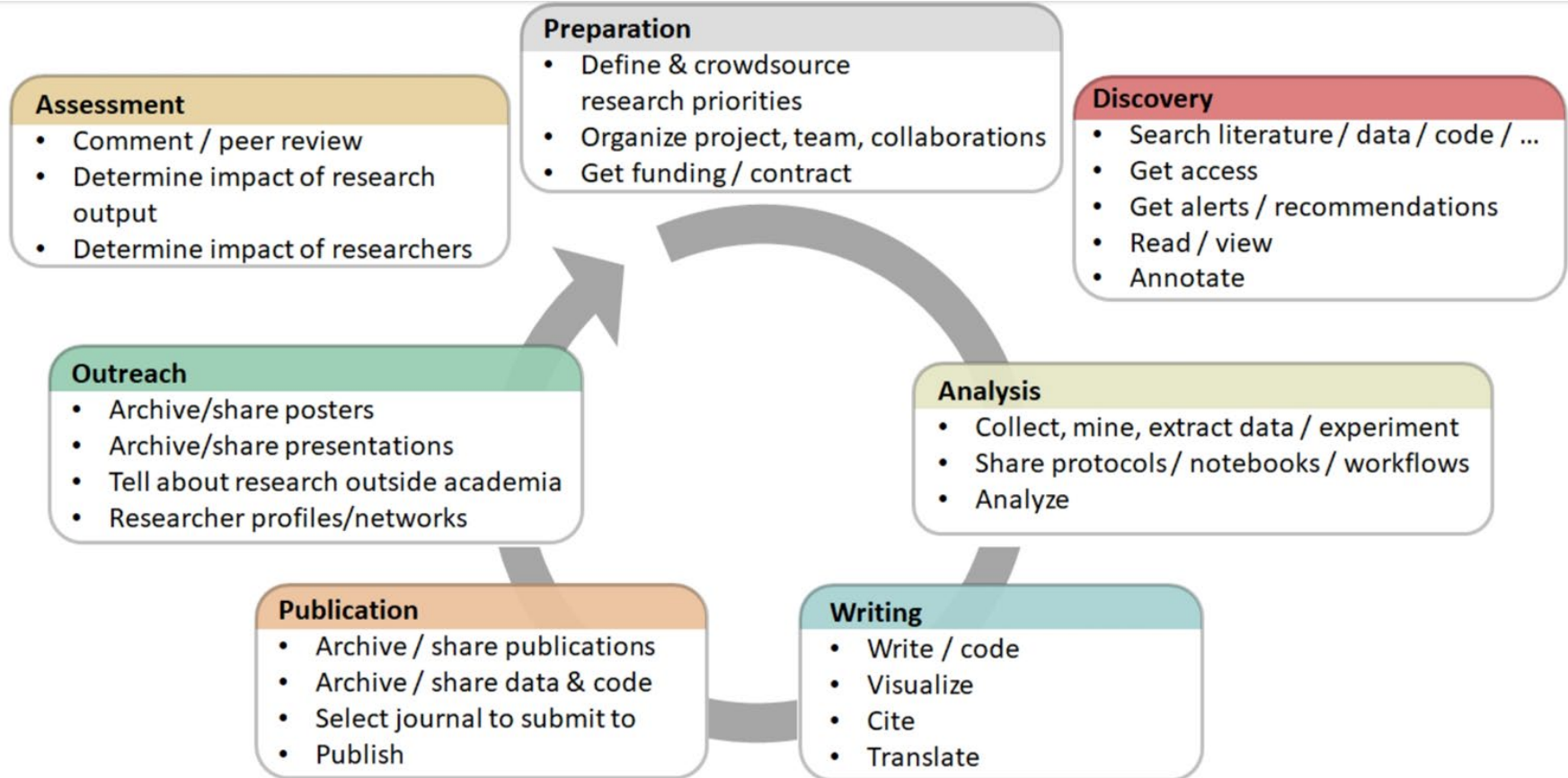


BAREND MONS

WITH VITALSOURCE®
EBOOK

CRC Press
Taylor & Francis Group
A CHAPMAN & HALL BOOK

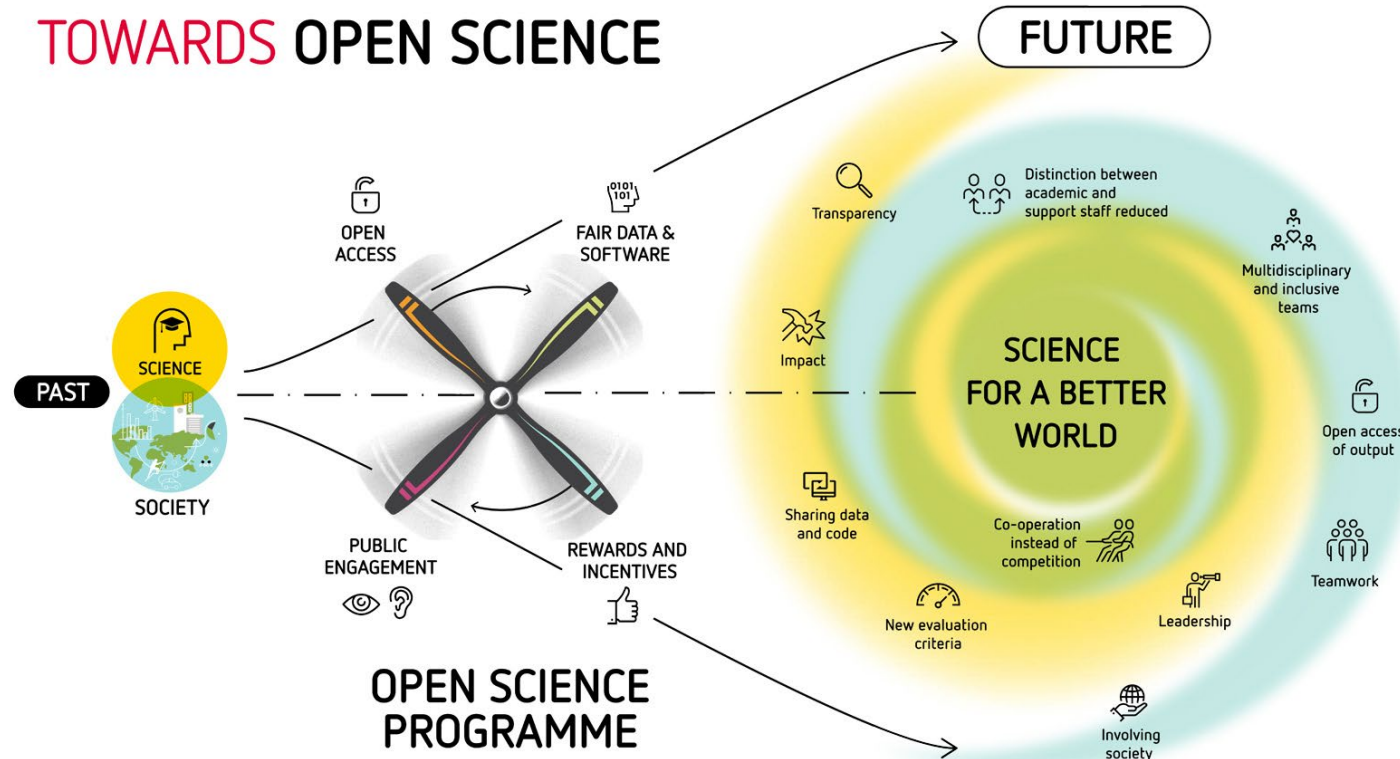
Open Science means re-inventing the process



From ivory tower to societal service



TOWARDS OPEN SCIENCE



Statement #1

Science is
broken, but it can
be fixed

- The classical way of doing science has now too many perverse incentives
- Digital collaboration can change that for the better
- Open science and FAIR data stewardship offer a way forward for society

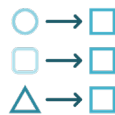
Statement #2

Medical evidence
generation is
changing through
open science

- Scale
- Speed
- Impact



OBJECTIVES OF THE EH DEN PROJECT



Harmonisation

Harmonise in excess of **100 million** anonymised **health records** to the OMOP common data model, supported by an ecosystem of certified SMEs, and technical architecture for a federated network



Evidence

Impact our understanding of, and improvement of, clinical **outcomes for patients** within diverse healthcare systems in the EU



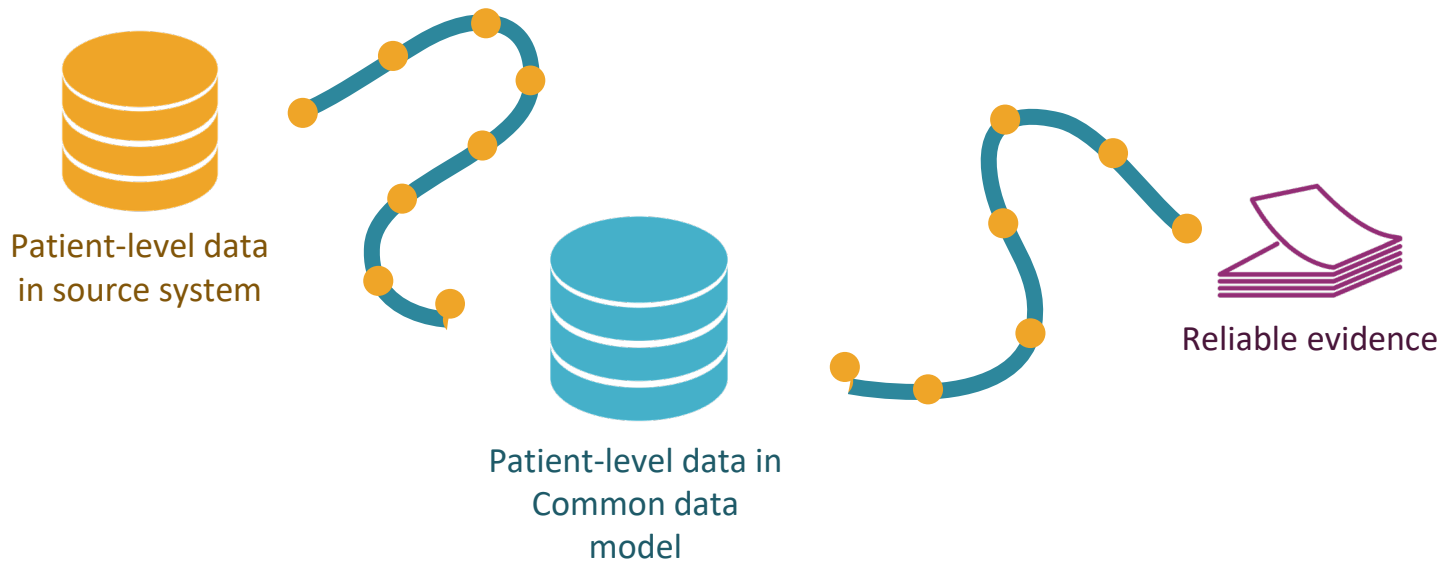
Community

Establish a self-sustaining **open science collaboration** in Europe, supporting academia, industry, regulators, payers, government, NGOs and others





THE JOURNEY TO REAL WORLD EVIDENCE



Reproducible data flow

Documented manipulations and procedures.
Automated, end-to-end analysis code.

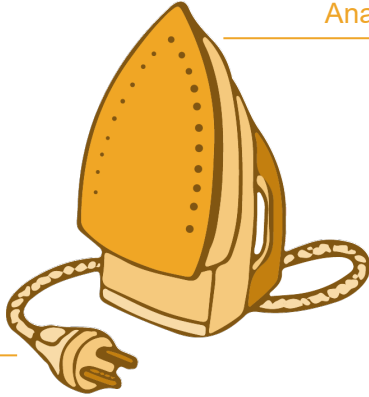
Common data model & standardised vocabulary

Two-step process: standardisation before analysis.
ETL & source code separated from analysis.
Re-use of data & analysis.



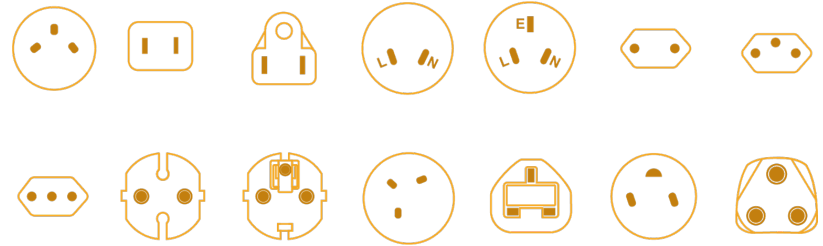
WHY IS THIS NOT CURRENT PRACTICE?

Analytical method

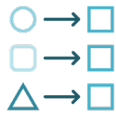


Link to data

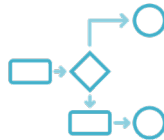
The data...



What will it require?



Data interoperability



Standardised analytics

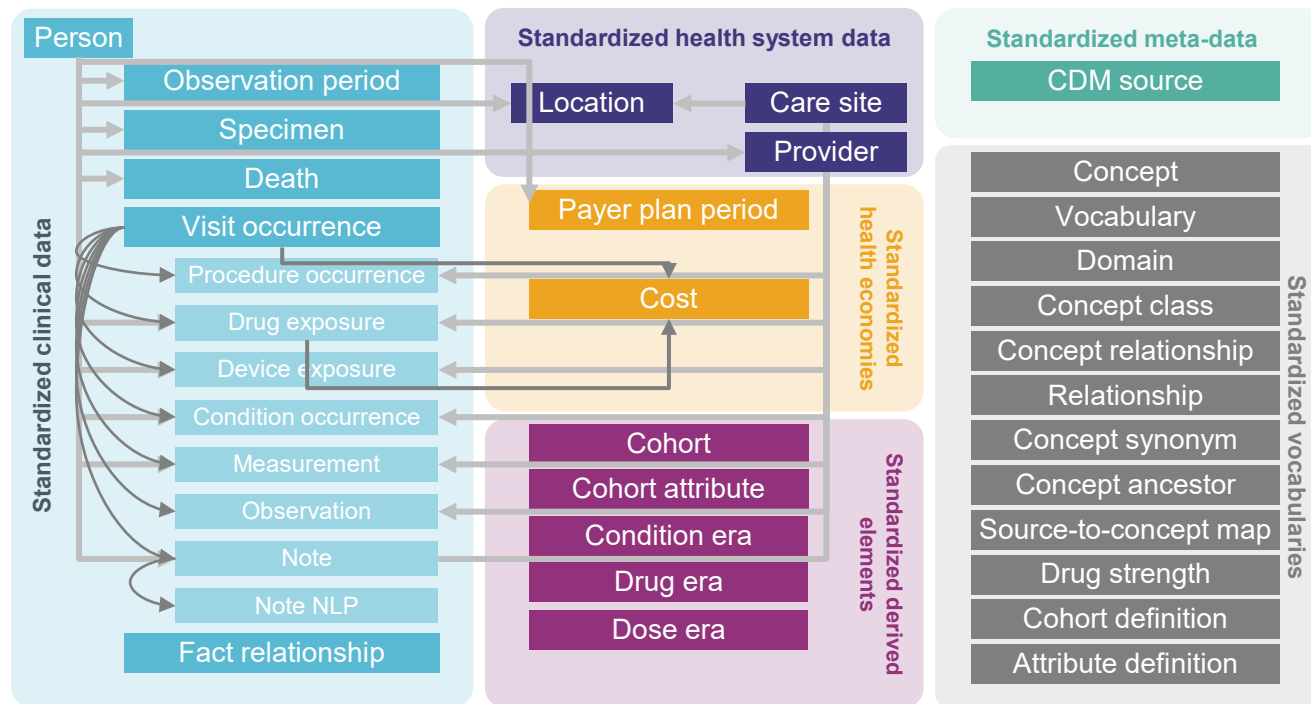


Data network



Strong community





Patient-centric
Tabular
Extendable
Built for analytics
Relational design





STANDARDIZED VOCABULARIES

← → ↺ 🏠

athena.ohdsi.org/search-terms/terms?query=nivolumab&page=1

⋮ 📧 ☆ 🔍 Zoeken

⏴ ⏵ 📄 📁 📂 📅 📆 📇 📈 📉 📊 📋 📌 📍 📎 📏 📐 📑 📒 📓 📔 📕 📖 📗 📘 📙 📚 📛 📜 📝 📞 📟 📠 📡 📢 📣 📤 📥 📦 📧 📨 📩 📪 📫 📬 📭 📮 📯 📰 📱 📲 📳 📴 📵 📶 📷 📸 📹 📺 📻 📼 📽 📾 📿 📰 📱 📲 📳 📴 📵 📶 📷 📸 📹 📺 📻 📼 📽 📾 📿

SEARCH

DOWNLOAD

LOGIN

?

SEARCH BY KEYWORD

nivolumab

🔍

nivolumab ✕

DOMAIN ▼

STANDARD CONCEPT ▼

CLASS ▼

VOCABULARY ▲

☐ BDPM (1)

☐ DPD (2)

☐ GCN_SEQNO (2)

☐ GGR (1)

☐ HCPCS (2)

☐ HemOnc (6)

☐ JMDC (4)

☐ MeSH (2)

☐ NDC (6)

☐ NDFRT (1)

☐ RxNorm (18)

☐ RxNorm Extension (140)

☐ SNOMED (16)

☐ SPL (12)

DOWNLOAD RESULTS

Show by 15 items Total 235 items

1

2

3

4

5

...

16

>

| ID ▼ | CODE ▼ | NAME ▼ | CLASS ▼ | CONCEPT ▼ | VALIDITY ▼ | DOMAIN ▼ | VOCAB ▼ |
|----------|--------------------------------------|---------------------------------------------------------|---------------------|----------------|------------|-------------|-----------|
| 40693761 | 35541511000001107 | Nivolumab 240mg/24ml solution for infusion vials 1 vial | VMPP | Non-standard | Valid | Drug | dm+d |
| 40693762 | 35541811000001105 | Nivolumab 240mg/24ml solution for infusion vials | VMP | Non-standard | Valid | Drug | dm+d |
| 581177 | 073248 | NIVOLUMAB 40 mg/4 mL INTRAVEN VIAL (ML) | GCN_SEQNO | Non-standard | Valid | Drug | GCN_SEQNO |
| 581178 | 073249 | NIVOLUMAB 100 mg/10 mL INTRAVEN VIAL (ML) | GCN_SEQNO | Non-standard | Valid | Drug | GCN_SEQNO |
| 722630 | 9453 | Injection, nivolumab | APC | Standard | Valid | Observation | APC |
| 737145 | bc7fd319-857c-46fc-915e-cec0680b0ce8 | nivolumab 10mg/mL INTRAVENOUS INJECTION [opdivo] | Prescription Drug | Classification | Valid | Drug | SPL |
| 793167 | 1991412 | 24 ML nivolumab 10 MG/ML Injection | Quant Clinical Drug | Standard | Valid | Drug | RxNorm |
| 793168 | 1991413 | 24 ML nivolumab 10 MG/ML Injection [Opdivo] | Quant Branded Drug | Standard | Valid | Drug | RxNorm |
| 915599 | C9453 | Injection, nivolumab, 1 mg | HCPCS | Non-standard | Invalid | Drug | HCPCS |
| 915811 | J9299 | Injection, nivolumab, 1 mg | HCPCS | Non-standard | Valid | Drug | HCPCS |
| 958743 | D000077594 | Nivolumab | Main Heading | Non-standard | Valid | Drug | MeSH |





Estimation methods

Cohort Method

New-user cohort studies using large-scale regression for propensity and outcome models

Self-Controlled Case Series

Self-Controlled Case Series analysis using few or many predictors, includes splines for age and seasonality.

Self-Controlled Cohort

A self-controlled cohort design, where time preceding exposure is used as control.

IC Temporal Pattern Disc.

A self-controlled design, but using temporal patterns around other exposures and outcomes to correct for time-varying confounding.

Case-control

Case-control studies, matching controls on age, gender, provider, and visit date. Allows nesting of the study in another cohort.

Case-crossover

Case-crossover design including the option to adjust for time-trends in exposures (so-called case-time-control).

Prediction methods

Patient Level Prediction

Build and evaluate predictive models for user-specified outcomes, using a wide array of machine learning algorithms.

Feature Extraction


Automatically extract large sets of features for user-specified cohorts using data in the CDM.

Method characterization

Empirical Calibration

Use negative control exposure-outcome pairs to profile and calibrate a particular analysis design.

Method Evaluation

Use real data and established reference sets as well as simulations injected in real data to evaluate the performance of methods. 

Supporting packages

Database Connector

Connect directly to a wide range of database platforms, including SQL Server, Oracle, and PostgreSQL.

Sql Render

Generate SQL on the fly for the various SQL dialects.

Cyclops

Highly efficient implementation of regularized logistic, Poisson and Cox regression.

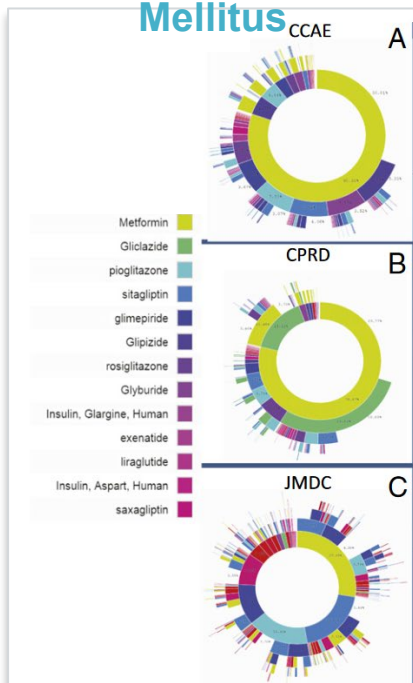
Ohdsi R Tools

Support tools that didn't fit other categories, including tools for maintaining R libraries.

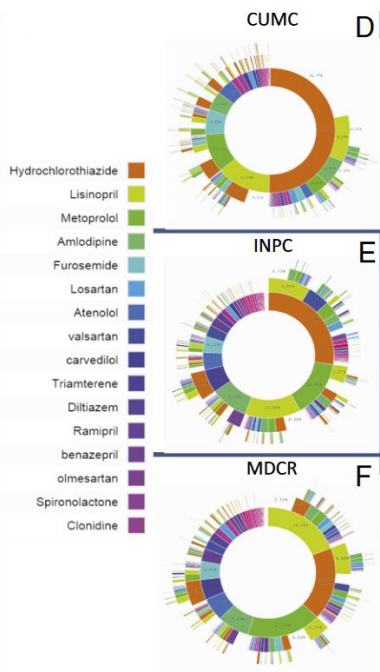


LARGE-SCALE OBSERVATIONAL RESEARCH IS FEASIBLE.

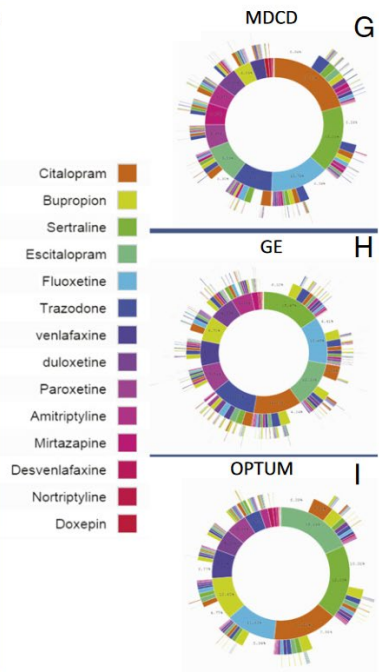
T2 Diabetes Mellitus



Hypertension



Depression



11 Data sources



4 Countries



> 250 million patients

“Characterizing treatment pathways at scale using the OHDSI network.”

George Hripcsak et al. - PNAS (2016)27:7329–7336





OHDSI
OBSERVATIONAL HEALTH DATA SCIENCES AND INFORMATICS



THE LANCET

ARTICLES | [VOLUME 394, ISSUE 10211, P1816-1826, NOVEMBER 16, 2019](#)

Comprehensive comparative effectiveness and safety of first-line antihypertensive drug classes: a systematic, multinational, large-scale analysis

[Prof Marc A Suchard, MD](#)   • [Martijn J Schuemie, PhD](#) • [Prof Harlan M Krumholz, MD](#) • [Seng Chan You, MD](#) • [RuiJun Chen, MD](#) • [Nicole Pratt, PhD](#) • et al. [Show all authors](#)

Published: October 24, 2019 • DOI: [https://doi.org/10.1016/S0140-6736\(19\)32317-7](https://doi.org/10.1016/S0140-6736(19)32317-7) •



Check for updates



Lancet Paper Shows Most Popular Hypertension Drug Isn't Most Effective, Per OHDSI's LEGEND Study

VIDEO FEATURES: [Collaborators Discuss The Hypertension Study/Findings](#) | [Introducing The LEGEND Project](#)

Lancet Study Link

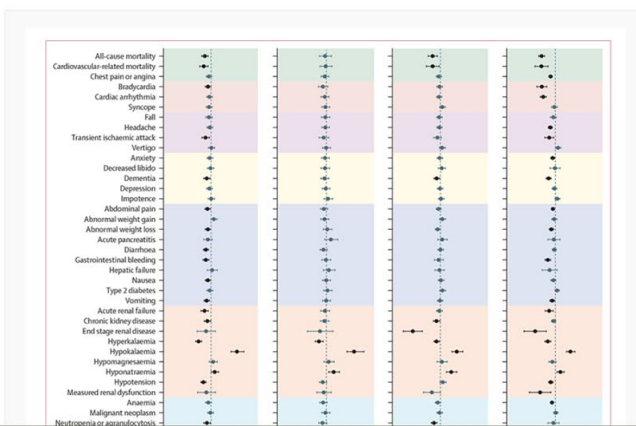
Thiazide diuretics demonstrate better effectiveness and cause fewer side effects than ACE inhibitors as first-line antihypertensive drugs, [according to a report published Oct. 24 in *The Lancet*](#). The study factors insurance claim data and electronic health records from 4.9 million patients across nine observational databases, making it the most comprehensive one ever on first-line antihypertensives, and it provides additional context to the 2017 guidelines for high blood pressure treatment developed by the American College of Cardiology (ACC) and American Heart Association (AHA).

Collaborators in the Observational Health Data Sciences and Informatics (OHDSI) network produced the paper “*Comprehensive comparative effectiveness and safety of first-line antihypertensive drug classes: a systematic, multinational, large-scale analysis*” as part of the collaborative's ongoing Large-Scale Evidence Generation and Evaluation across a Network of Databases (LEGEND) project, which applies high-level analytics to perform observational research on hundreds of millions of patient records within OHDSI's international database network.

OHDSI researchers believe LEGEND will continue to significantly enhance how real-world evidence is used to study important healthcare questions that impact millions of patients worldwide.

First-Line Thiazide Diuretic Users Experience 15% Fewer Adverse Cardiovascular Outcomes Than ACE Inhibitor Users

The 2017 ACC/AHA guidelines on antihypertensives recommend initiating hypertension (high blood pressure) treatment with prescription medications from any of five drug classes, including both thiazides and ACE inhibitors. Within the LEGEND project, ACE inhibitors produced both worse cardiovascular outcomes and worse side effects than thiazides.



First-line thiazide new-users experienced three major medical

The COVID-19 Study-a-thon

The power of Interoperability

- Background
- OMOP CDM:
Interoperable Data
Assets
- OHDSI tooling:
Reusable Analytics

Fast observational research is feasible



COVID-19 Study-A-Thon

ohdsi.org/covid-19-updates

March 26-29, 2020

- Virtual event
- >300 collaborators from 30 countries
- Four time zones
- 37 healthcare databases
- Twelve concurrent network studies

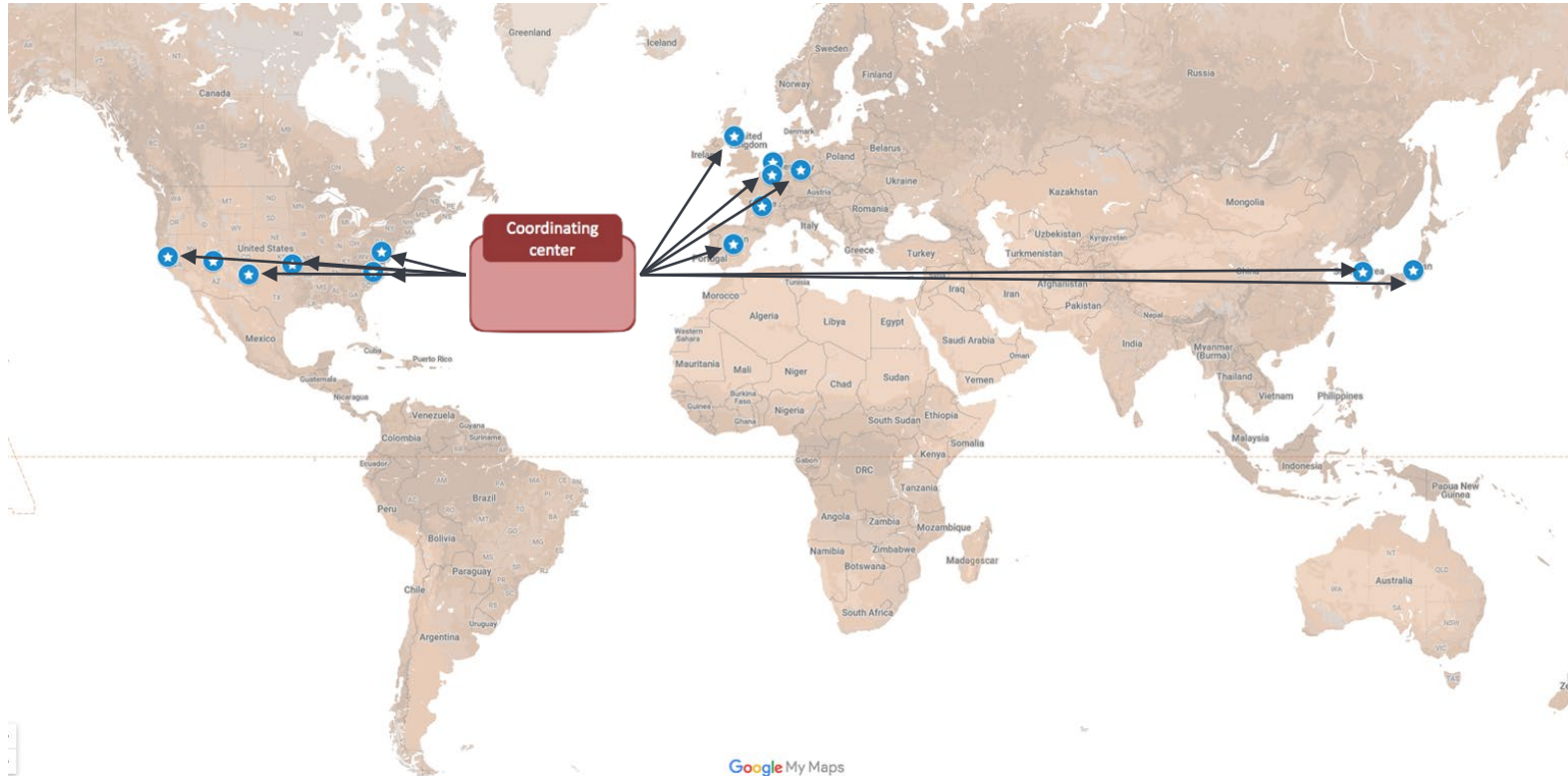


OHDSI COVID-19 Study-A-Thon • Day 1, Call 1

52 views • 26 Mar 2020

👍 3 🗨️ 0 ➦ SHARE ➦ SAVE ...

Interoperable data network



Key pharmacology terms



- **Efficacy** is the capacity of a drug to produce an effect (e.g., lower blood pressure).
 - Typically studied in RCTs (under 'ideal' conditions)
- **Effectiveness** differs from efficacy in that it takes into account how well a drug works in real-world use
- **Safety** concerns the type and likelihood of adverse effects that a drug has.

Three focus areas, Twelve Questions



| Analytic use case | Study |
|-------------------|--------------------------------------------------------------------------------------|
| Characterization | |
| | COVID-19 positive patients |
| | COVID-19 +ve subgroup analyses |
| | Influenza, symptoms, and complications |
| | Invasive treatments for respiratory distress |
| | other questions? |
| Prediction | |
| | 1) Who presenting with flu, symptoms, or complications will be admitted to hospital? |
| | 2) Who sent home with symptoms will progress to require hospitalization? |
| | 3) Who admitted to hospital will require intensive care services or die? |
| | other questions? |
| Estimation | |
| | Effects of hydroxychloroquine |
| | Effects of IL6 and JAK inhibitors |
| | Effects of HIV protease inhibitors |
| | Effects of HepC protease inhibitors |
| | Effects of ACE inhibitors |

“**Safety of hydroxychloroquine**, alone and in combination with azithromycin, in light of rapid widespread **use for COVID-19**: a multinational, **network cohort** and self-controlled case series study”

<https://github.com/ohdsi-studies/Covid19EstimationHydroxychloroquine>

Standardized Analytical tooling



Cohort Definitions

Column visibility

Copy

CSV

Show 15 entries

New Cohort

Filter: HC

Last Modified

2+ Weeks Ago (84)

Last Week (59)

This Week (8)

Author

ryan@ohdsi.org (151)

Showing 1 to 4 of 4 entries (filtered from 151 total entries)

| Id | Name |
|-----|-----------------------------------------------------------------------------------------------------|
| 170 | [COVID HCQ ID63 v1] Users of Hydroxychloroquine |
| 171 | [COVID HCQ ID64 v1] Users of Hydroxychloroquine |
| 173 | [COVID HCQ ID61 v1] New users of Hydroxychloroquine with prior rheumatoid arthritis |
| 174 | [COVID HCQ ID62 v1] New users of sulfasalazine |

Showing 1 to 4 of 4 entries (filtered from 151 total entries)

ATLAS

Home

Data Sources

Search

Concept Sets

Cohort Definitions

Characterizations

Cohort Pathways

Incidence Rates

Profiles

Estimation

Prediction

Jobs

Configuration

Feedback

Apache 2.0

open source software

provided by

OHDSI

join the journey

Cohort #173

[COVID HCQ ID61 v1] New users of Hydroxychloroquine with prior rheumatoid arthritis

Definition

Concept Sets

Generation

Reporting

Export

Messages 1

Text View

Graphical View

JSON

SQL

Primary Criteria

Results will be generated for the first single event matching the following primary criterion. Result index date will be the start date of the matching primary criteria event.

First of

drug: [OHDSI Cov19]

Hydroxychloroquine

1st

No additional criteria

Inclusion Rules

has rheumatoid arthritis recorded any time on or prior to treatment

Restrict to people having events matching any of the following criteria. Events must start within bracketed period () relative to index date. Lines and arrows represent required duration of these events.

Any of

condition: [OHDSI Cov19]

Rheumatoid arthritis

or

observation: [OHDSI Cov19]

Rheumatoid arthritis

At least 1 occurrence

At least 1 occurrence

Standardized Analytical tooling



| Definition | Concept Sets | Generation | Reporting | Export | Messages 2 |
|------------------------------------|-------------------|------------|-----------|---------------------|---------------------------------------|
| Available CDM Sources | | | | | |
| Source Name | Generation Status | People | Records | Generated | Generation Duration |
| Generate SYNPUF 1K | COMPLETE | 154 | 154 | 04/24/2020 10:59 AM | 00:00:27 View Reports |
| Generate SYNPUF 5% | COMPLETE | 15,285 | 15,285 | 04/24/2020 10:59 AM | 00:00:33 View Reports |
| By Events By Person | | | | | |

DEMOGRAPHICS / Demographics Age

Export

Show 10 entries

Search:

| Strata | Count | Avg | Std Dev | Min | P10 | P25 | Median | P75 | P90 | Max |
|-------------|--------|-------|---------|-------|-------|-------|--------|-------|-------|--------|
| All stratas | 15,285 | 73.48 | 12.77 | 25.00 | 57.00 | 68.00 | 74.00 | 82.00 | 88.00 | 101.00 |

Showing 1 to 1 of 1 entries

Previous

1

Next

DRUG / Distinct Ingredient Count Long Term

Export

Show 10 entries

Search:

| Strata | Count | Avg | Std Dev | Min | P10 | P25 | Median | P75 | P90 | Max |
|-------------|--------|-------|---------|------|------|------|--------|-------|-------|--------|
| All stratas | 13,244 | 20.27 | 22.22 | 0.00 | 0.00 | 2.00 | 11.00 | 34.00 | 54.00 | 123.00 |

Showing 1 to 1 of 1 entries

Previous1Next

DEMOGRAPHICS / Demographics Gender

Export

Show10entries

Search:

| Covariate | Explore | Concept ID | Count | Pct |
|-----------|---------|------------|-------|--------|
| FEMALE | N/A | 8532 | 8,776 | 57.42% |
| MALE | N/A | 8507 | 6,509 | 42.58% |

Showing 1 to 2 of 2 entries

Previous

1

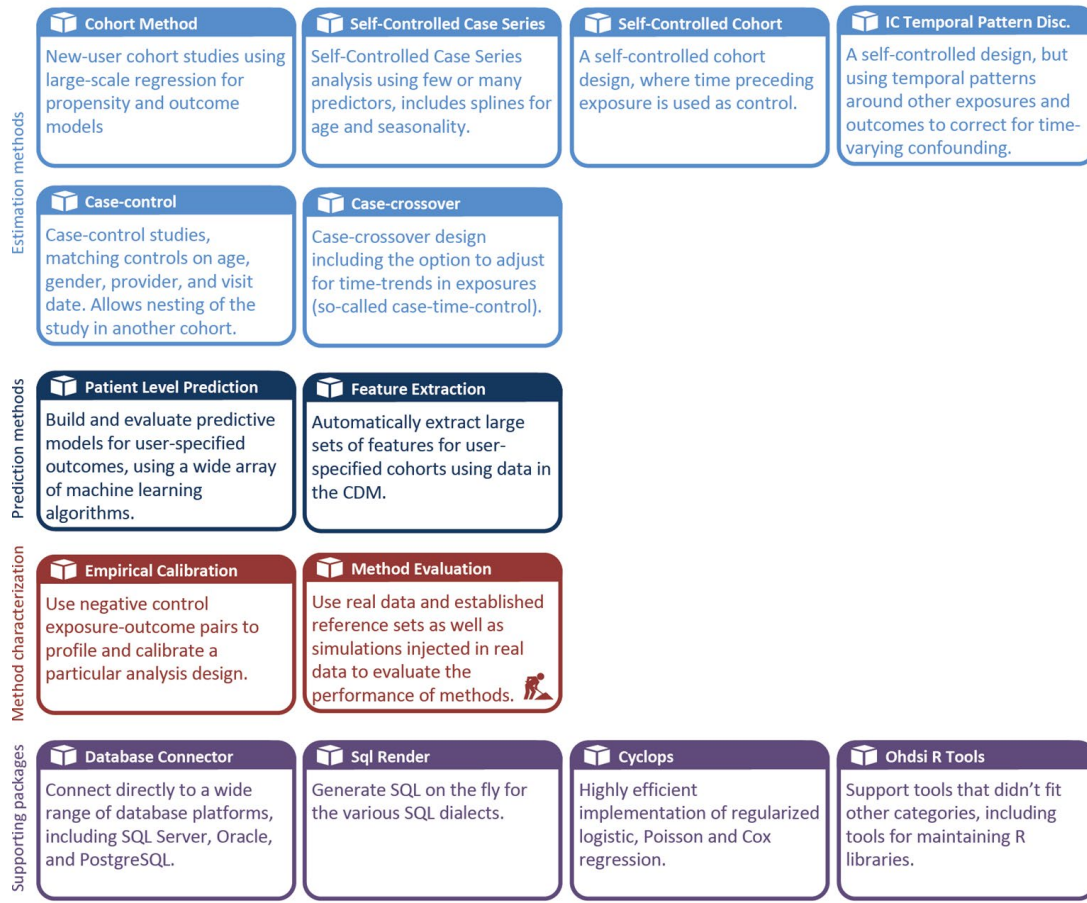
Next

DEMOGRAPHICS / Demographics Index Year Month

OHDSI Methods Library



- Reusable code packages
- Implementing best practices for observational research



Standardized Analytical tooling



ATLAS

Home

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Apache 2.0
open source software
provided by
OHDSI
Join the Journey

Population Level Effect Estimation - Comparative Cohort Analysis #6

[COVID HCQ V1] Comparative effects of hydroxychloroquine in RA

SpecificationUtilities

This study has been prepared for network analysis and is available for download at: <https://github.com/ohdsi-studies/Covid19EstimationHydroxychloroquine>

VIEW: Full SpecificationComparisonsAnalysis SettingsEvaluation Settings

Comparative Cohort Settings

Comparisons

+ Add Comparison

Show 10 entries

Filter:

| Remove | Target | Comparator | Outcomes | NC Outcomes | Copy |
|--------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------|--------------------------------------------------------------------|--------------------------------------------------------------------------|------|
| | [COVID HCQ ID61 v1] New users of Hydroxychloroquine with prior rheumatoid arthritis | [COVID HCQ ID62 v1] New users of sulfasazine with prior rheumatoid arthritis | [LEGEND HTN] Persons with chest pain or angina (15+ more outcomes) | [OHDSI COV19] HCQ SSZ amoxicillin azithromycin negative control outcomes | |
| | [COVID HCQ ID63 v1] Users of Hydroxychloroquine + Azithromycin | [COVID HCQ ID64 v1] Users of Hydroxychloroquine + Amoxicillin | [LEGEND HTN] Persons with chest pain or angina (15+ more outcomes) | [OHDSI COV19] HCQ SSZ amoxicillin azithromycin negative control outcomes | |

Showing 1 to 2 of 2 entries

Previous1Next

Effect Estimation Analysis Settings

+ Add Analysis Settings

Show 10 entries

Filter:

| Remove | Description | Time At Risk Start | Time At Risk End | Minimum Time At Risk | Adjustment Strategy | Outcome Model | Copy |
|--------|-----------------------------------------------------------------|---------------------------|----------------------------|----------------------|-----------------------------|---------------|------|
| | No prior outcome in last 30d, 5 PS strata, TAR on-treatment+14d | 1d from cohort start date | 14d from cohort end date | 1d | Stratification (stratum: 5) | cox | |
| | No prior outcome in last 30d, 5 PS strata, TAR 30d fixed | 1d from cohort start date | 30d from cohort start date | 1d | Stratification (stratum: 5) | cox | |

Showing 1 to 2 of 2 entries

Previous1Next

Evaluation Settings

Self-Controlled Case Series

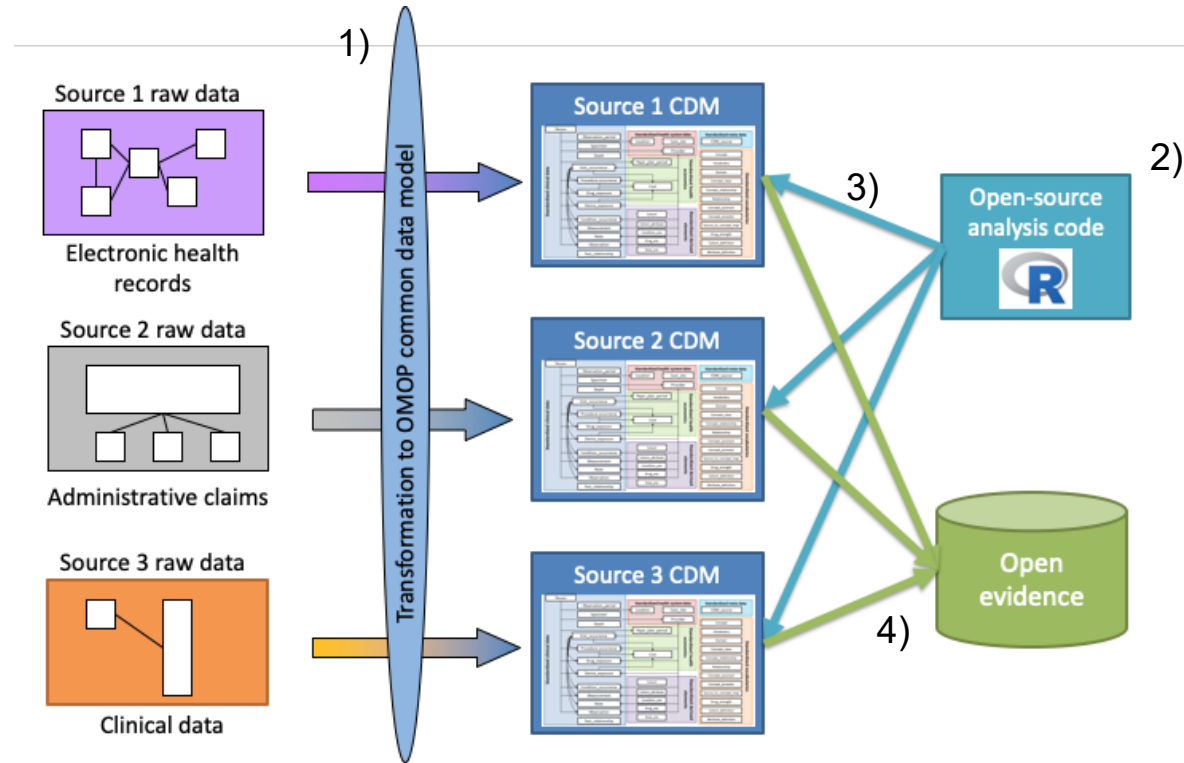
Self-Controlled Case Series analysis using few or many predictors, includes splines for age and seasonality.

Sql Render

Generate SQL on the fly for the various SQL dialects.

37 databases

Interoperable data network



Standardised Dissemination of Results



Results are still coming in!

Safety of hydroxychloroquine with azythromycin: a multi-national study

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Target
Hydroxychloroquine with prior RA

Comparator
Sulfasalazine with prior RA

Outcome
All-cause mortality

Data source

- ☒ AmbEMR
- ☒ CCAE
- ☒ CPRD
- ☒ DAGGermany
- ☒ IMRD
- ☒ IPCI
- ☒ JMDC
- ☒ MDCD
- ☒ MDCR
- ☒ OpenClaims
- ☒ Optum
- ☒ PanTher
- ☒ SIDIAP
- ☒ VA
- ☒ Meta-analysis

Analysis

- ☒ 5 PS strata, 30 days follow-up
- ☐ 5 PS strata, on-treatment + 14 days follow-up

Show 15 entries

| Analysis | Data source | I2 | HR | LB | UB | P | Cal.HR | Cal.LB | Cal.UB | Cal.P |
|--------------------------------|---------------|------|------|------|------|------|--------|--------|--------|-------|
| 5 PS strata, 30 days follow-up | CPRD | 1.24 | 0.33 | 4.99 | 0.75 | 1.51 | 0.38 | 6.04 | 0.57 | |
| 5 PS strata, 30 days follow-up | IMRD | 0.41 | 0.06 | 1.93 | 0.32 | 0.63 | 0.10 | 3.80 | 0.63 | |
| 5 PS strata, 30 days follow-up | IPCI | NA | NA | NA | NA | NA | NA | NA | NA | |
| 5 PS strata, 30 days follow-up | Optum | 0.41 | 0.19 | 0.97 | 0.04 | 0.45 | 0.20 | 1.04 | 0.07 | |
| 5 PS strata, 30 days follow-up | SIDIAP | NA | NA | NA | NA | NA | NA | NA | NA | |
| 5 PS strata, 30 days follow-up | VA | 0.99 | 0.56 | 1.85 | 0.98 | 0.99 | 0.54 | 1.81 | 0.90 | |
| 5 PS strata, 30 days follow-up | Meta-analysis | 0.21 | 0.72 | 0.42 | 1.24 | 0.24 | 0.76 | 0.44 | 1.32 | 0.33 |

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[Power](#) [Attrition](#) [Population characteristics](#) [Propensity model](#) [Propensity scores](#) [Covariate balance](#) [Systematic error](#) [Kaplan-Meier](#)

Table 1a. Number of subjects, follow-up time (in years), number of outcome events, and event incidence rate (IR) per 1,000 patient years (PY) in the target (*Hydroxychloroquine with prior RA*) and comparator (*Sulfasalazine with prior RA*) group after propensity score adjustment, as well as the minimum detectable relative risk (MDRR). Note that the IR does not account for any stratification.

| Target subjects | Comparator subjects | Target years | Comparator years | Target events | Comparator events | Target IR (/1,000 PY) | Comparator IR (/1,000 PY) | MDRR |
|-----------------|---------------------|--------------|------------------|---------------|-------------------|-----------------------|---------------------------|------|
| 51,280 | 17,389 | 4,161 | 1,411 | 20 | 10 | 4.81 | 7.09 | 3.24 |

Table 1b. Time (days) at risk distribution expressed as minimum (min), 25th percentile (P25), median, 75th percentile (P75), and maximum (max) in the target (*Hydroxychloroquine with prior RA*) and comparator (*Sulfasalazine with prior RA*) cohort after propensity score adjustment.

| Cohort | Min | P10 | P25 | Median | P75 | P90 | Max |
|------------|-----|-----|-----|--------|-----|-----|-----|
| Target | 2 | 30 | 30 | 30 | 30 | 30 | 30 |
| Comparator | 2 | 30 | 30 | 30 | 30 | 30 | 30 |

<https://data.ohdsi.org/Covid19EstimationHydroxychloroquine/>

Within weeks: Paper in pre-print

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Safety of hydroxychloroquine, alone and in combination with azithromycin, in light of rapid wide-spread use for COVID-19: a multinational, network cohort and self-controlled case series study

Jennifer C.E Lane, James Weaver, Kristin Kostka, Talita Duarte-Salles, Maria Tereza F. Abrahao, Heba Alghoul, Osaid Alser, Thami M Alshammari, Patricia Biedermann, Edward Burn, Paula Casajust, Mitch Conover, Aedin C. Culhane, Alexander Davydov, Scott L. Du Vall, Dmitry Dymshyts, Sergio Fernández Bertolin, Kristina Fister, Jill Hardin, Laura Hester, George Hripesak, Seamus Kent, Sajjan Khosla, Spyros Kolovos, Christophe G. Lambert, Johan van der Lei, Ajit A. Londhe, Kristine E. Lynch, Rupa Makadia, Andrea V. Margulis, Michael E. Matheny, Paras Mehta, Daniel R. Morales, Henry Morgan-Stewart, Mees Mosseveld, Danielle Newby, Fredrik Nyberg, Anna Ostroplets, Rae Woong Park, Albert Prats-Urbe, Gowtham A. Rao, Christian Reich, Jenna Reps, Peter Rijnbeek, Selva Muthu Kumaran Sathappan, Martijn Schuemie, Sarah Seager, Anthony Sena, Azza Shoaibi, Matthew Spotnitz, Marc A. Suchard, Joel Swerdel, Carmen Olga Torre, David Vazcay, Haini Wen, Marcel de Wilde, Seng Chan You, Lin Zhang, Oleg Zhuk, Patrick Ryan, Daniel Prieto-Alhambra

doi: <https://doi.org/10.1101/2020.04.08.20054551>

This article is a preprint and has not been certified by peer review [what does this mean?]. It reports new medical research that has yet to be evaluated and so should not be used to guide clinical practice.

Abstract Info/History Metrics Preview PDF

Abstract

Background: Hydroxychloroquine has recently received Emergency Use Authorization

Previous

Posted April 10, 2020.

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Supplementary Material

Data/Code

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COVID-19 SARS-CoV-2 preprints from medRxiv and bioRxiv

Subject Area

Rheumatology

Subject Areas

All Articles

Addiction Medicine

Science

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Pharmaceutical manufacturers have ramped up production of chloroquine amid hopes that the antimalarial drug will prove effective against COVID-19. FEATURE/CHINA VIA AP IMAGES

Antimalarials widely used against COVID-19 heighten risk of cardiac arrest. How can doctors minimize the danger?

By Kelly Servick | Apr. 21, 2020, 3:40 PM

Science's COVID-19 reporting is supported by the Pulitzer Center.

On 19 March, as much of the United States shut down to contain the new coronavirus, genetic cardiologist Michael Ackerman and his wife drove 7.5 hours to retrieve their son from college. On the radio, they heard medical experts discussing chloroquine and hydroxychloroquine, two antimalarial drugs that President Donald Trump had just touted at a press briefing, despite no

<https://www.medrxiv.org/content/10.1101/2020.04.08.20054551v1>

<https://www.sciencemag.org/news/2020/04/antimalarials-widely-used-against-covid-19-heighten-risk-cardiac-arrest-how-can-doctors>



STUDY-A-THON WEBINAR



From question to
publication in 5 days

How EHDEN and OHDSI
change medical evidence
generation through open
science



This project has received funding from the Innovative Medicines Initiative 2 Joint Undertaking (JU) under grant agreement No 806968.
The JU receives support from the European Union's Horizon 2020 research and innovation programme and EFPIA.



KEES VAN BOCHOVE

CEO TheHyve (NL)



DANIEL PRIETO-ALHAMBRA

Professor at University of Oxford (UK)
NIHR Clinician Scientist

Webinar

March 28, 2019
16h00-17h00 CET

Register at
bit.ly/EHDENWeb1

Review the webinar for a run-through of an earlier study-a-thon with the organizer, Dani Prieto from University of Oxford.



[https://youtu.be/
X5yuoJoL6xs](https://youtu.be/X5yuoJoL6xs)

[https://thehyve.nl/
resources](https://thehyve.nl/resources)



COVID-19 RESOURCES



Who We Are ▾ Latest News Standards Software Tools Methods Book of OHDSI ▾ Research Resources ▾ New To OHDSI? ▾

The Journey Newsletter ▾ COVID-19 Updates Past Events Upcoming Events 2020 OHDSI Symposium ▾

Home > 88 Hours: OHDSI's Signature Moment

88 Hours: OHDSI's Signature Moment

LINKS: COVID-19 Updates Page • COVID-19 Global Closing Call

The time was meant for highlighting OHDSI capabilities, not testing them.

The hours were meant to sharing global research, not sharing in global research.

The Observational Health Data Sciences and Informatics (OHDSI) community held a COVID-19 global, virtual study-a-thon March 26-29, believing that a network of people who valued both collaboration and open science could make a meaningful impact on the current global pandemic.

How? Nobody was quite sure in the moment, but they were confident they would figure it out.

"We chose an ambitious path and relied on our community and infrastructure to lead the way," said Patrick Ryan. "In simple terms, efforts within our community over the past 88 months set the foundation for OHDSI's most important and impactful 88 hours."



<https://www.ohdsi.org/88-hours/>

<https://www.ohdsi.org/covid-19-updates/>

ATLAS

Home Data Sources Search Concept Sets Cohort Definitions Characterizations Cohort Pathways Incidence Rates Profiles Estimation Prediction Jobs Configuration Feedback

OHDSI Kicks x [OHDSI Cov1] x ACE inhibitors x Closing the d... Literature Rev... x Chapter 12 P... x Lancet Paper... x ATLAS: Cohort... x

Not secure atlas-covid19.ohdsi.org/#/cohortdefinition/55

ARB prevalent user among hypertensive patients with covid-19

Definition Concept Sets Generation Reporting Export Messages

enter a cohort definition description here

Cohort Entry Events

Events having any of the following criteria:

+ Add Initial Event ▾

a condition occurrence of COVID-19 + Add attribute... Delete Criteria

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 initial events

Inclusion Criteria

New inclusion criteria

With hypertension diagnosis Copy Delete

Continuous use of ARB until the end of previous observation period

enter an inclusion rule description

having all of the following criteria: + Add criteria to group...

with at least 1 using all occurrences of

a condition occurrence of ILEGEND hypertension + Add attribute... Delete Criteria

where event starts between 365 days Before and 0 days Before index start date add additional constraint

restrict to the same visit occurrence

420 Viewers

OHDSI COVID-19 studyathon overview: why, what and how

Kees van Bochove

Share

10:44 13:10

<https://www.pscp.tv/w/1LyxBNwZBIExN>

Statement #2

Medical evidence
generation is
changing through
open science

- The scale is changing: “a paradigm shift from **single study** and single estimate medical research to **large-scale systematic evidence** generation”

<https://ohdsi.github.io/TheBookOfOhdsi/OpenScience.html>

- The speed is changing:
study-a-thon example

