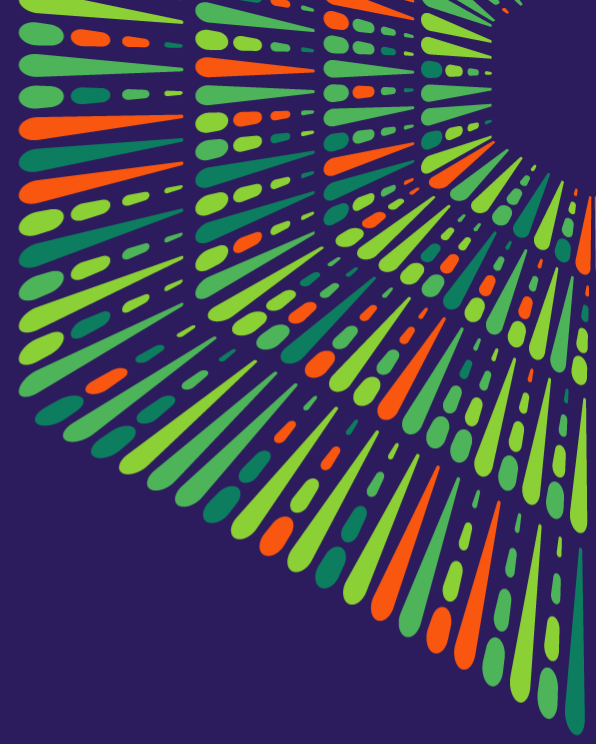




The Hyve

Studyathons: a new way of organizing and promoting multidisciplinary collaborations in biomedical open science

Maria Escala-Garcia, Business analyst



Outline

- Introduction & context:

Open science, IMI EHDEN, OMOP/OHDSI, studyathons

- Medical evidence generation:

Changing through open science

- A success story:

COVID-19 studyathon



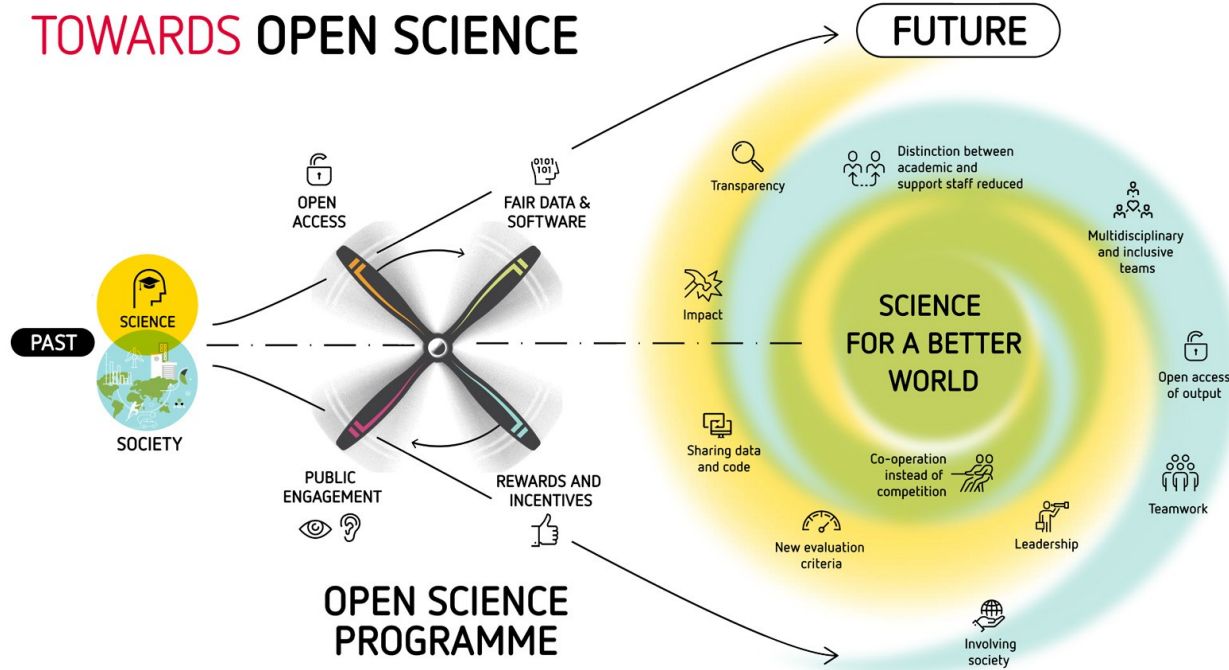
Introduction & context:

Open science
EHDEN
OHDSI
Studyathons



Open science: Science as an integral part of open & sustainable societies

TOWARDS OPEN SCIENCE





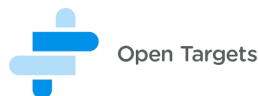
Our mission

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



Open science: working together!

Open-source Software



Precompetitive Health Data Projects



National Health Data Networks



Partner Communities



EHDEN Consortium



Start date: 1 Nov 2018

End date: 30 Apr 2024

Duration: 66 months
22 partners



Almost €29 million

Universities, public bodies and research organisations



Academic coordinator



SME & Mid-sized companies



ODYSSEUS
DATA SERVICES INC.

Non-profit organisations



EFPIA & Associated partners



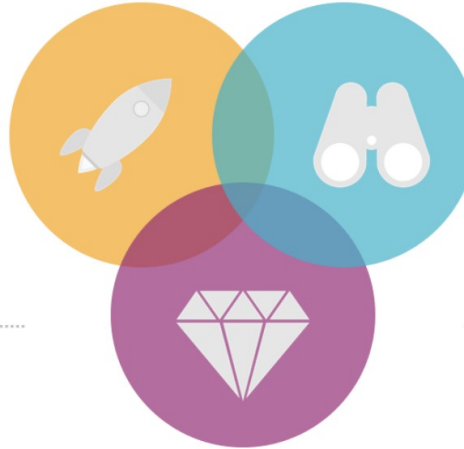
EFPIA Lead



Vision, mission & objectives

Mission

Develop a federated network, standardised to a common data model that more smartly manages and shares research methodologies, and expands education in open science and collaboration.



Vision

The European Health Data & Evidence Network (EHDEN) aspires to be the trusted observational research ecosystem to enable **better health decisions, outcomes and care**

Community

Education

Sustainability

Values

Open science

Quality

Inclusiveness

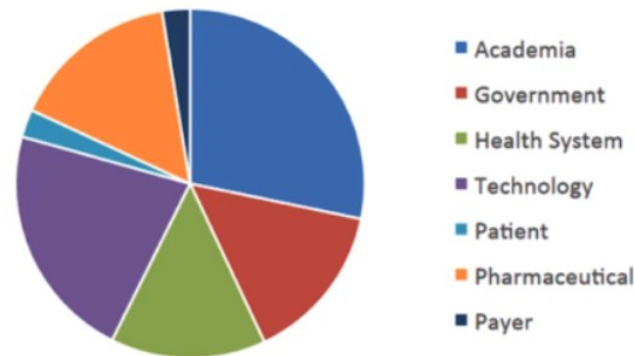
The OHDSI community

OHDSI Network:

- 160+ databases over 23 countries
- 500M distinct patients
- 2.7B de-identified patient records



Stakeholder group



OHDSI collaborators:

- 2100 forum users
- 25 workgroups
- 20 open-source applications

What is a studyathon?

A studyathon is a focused multi-day meeting to generate medical evidence on a specific topic across different countries and health systems.

What is so special about doing a medical study this way?

Concentrated effort: Using common standards and defining an precise study design and execution of the study beforehand.

Multidisciplinary nature: Clinicians, epidemiologists, computer scientists, data scientists, bio- and medical informatics experts and patients all coming together to answer an important question that matters to them.

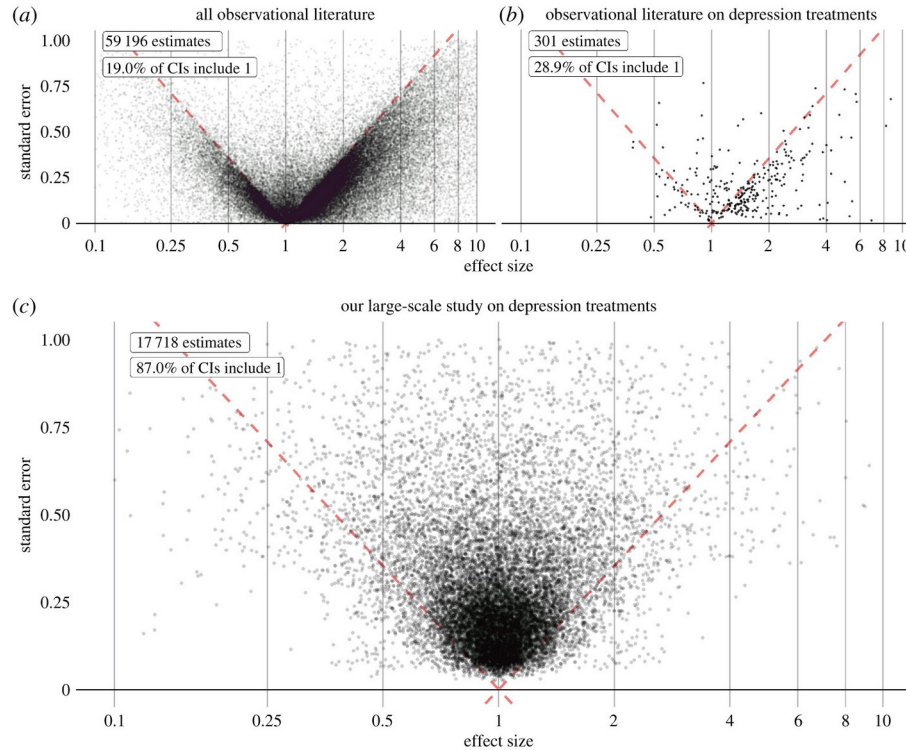


Medical evidence generation:

Changing through open
science



The importance of open science in observational research

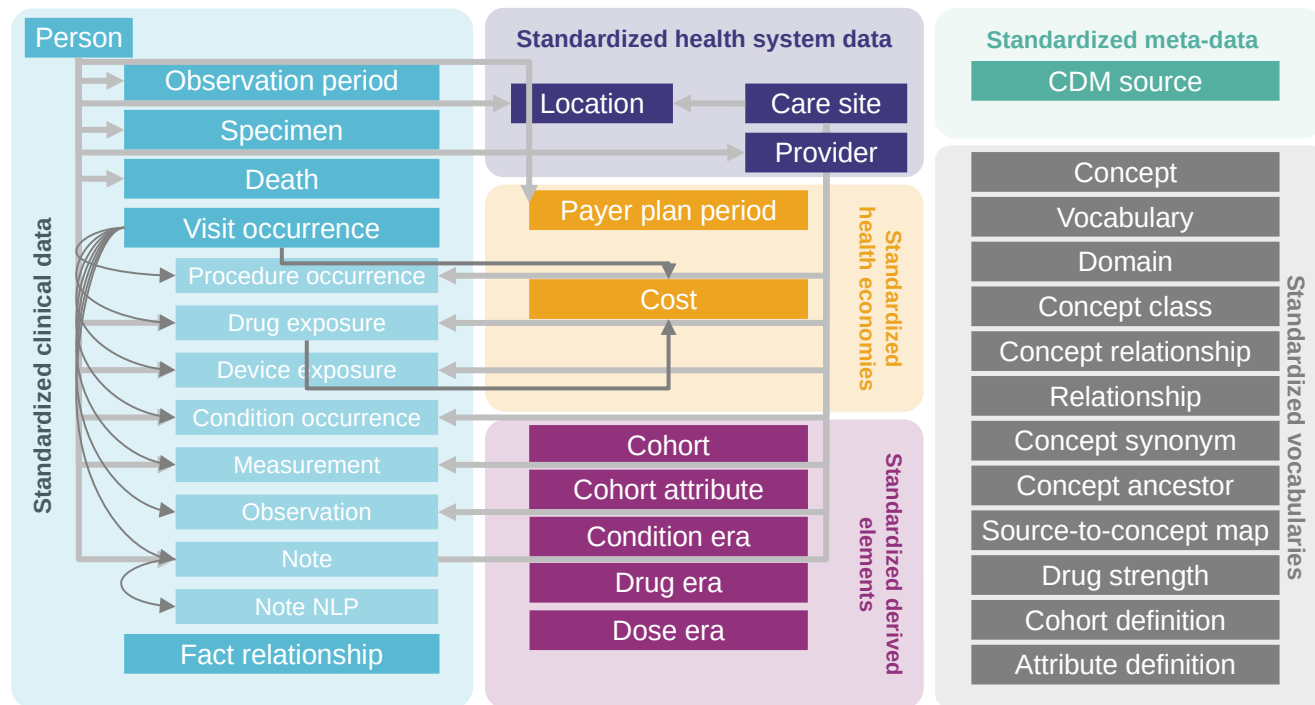


Schuemie et al. 2018

<https://doi.org/10.1098/rsta.2017.0356>



Common data models: OMOP



Patient-centric
Tabular
Extendable
Built for analytics
Relational design



Standardized vocabularies

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

ATHENA SEARCH DOWNLOAD LOGIN ?

SEARCH BY KEYWORD nivolumab

nivolumab x **DOWNLOAD RESULTS** Show by 15 items Total 235 items 1 2 3 4 5 ... 16 >

	ID	CODE	NAME	CLASS	CONCEPT	VALIDITY	DOMAIN	VOCAB
DOMAIN								
STANDARD CONCEPT								
CLASS								
VOCABULARY								
☐ BDPM (1)								
☐ DPD (2)								
☐ GCN_SEQNO (2)								
☐ GGR (1)								
☐ HCPCS (2)								
☐ HemOnc (6)								
☐ JMDCC (4)								
☐ MeSH (2)								
☐ NDC (6)								
☐ NDFRT (1)								
☐ RxNorm (18)								
☐ RxNorm Extension (140)								
☐ SNOMED (16)								
☐ SPL (12)								
	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



Standardized analytics

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.



A success story:

COVID-19 studyathon



Fast observational research is feasible!

OHDSI uses healthcare data to inform COVID-19 healthcare decisions

- More than **330 researchers, from 30 different countries**, fast-tracked research using healthcare data to inform healthcare decision-making. **Four time zones.**
- **37 healthcare databases** with COVID-19 patient data participated, and this number is still growing.
- **12 concurrent network studies**
- Two high-impact papers assessing the safety of hydroxychloroquine (the largest ever assessment) and characterising COVID-19 patients will soon be submitted for peer-review.

March 26-29th 2020, the Observational Health Data Sciences and Informatics (**OHDSI**) community, supported by **EHDEN** partners, hosted a COVID-19 virtual study-a-thon to inform healthcare decision-making in response to the current global pandemic.

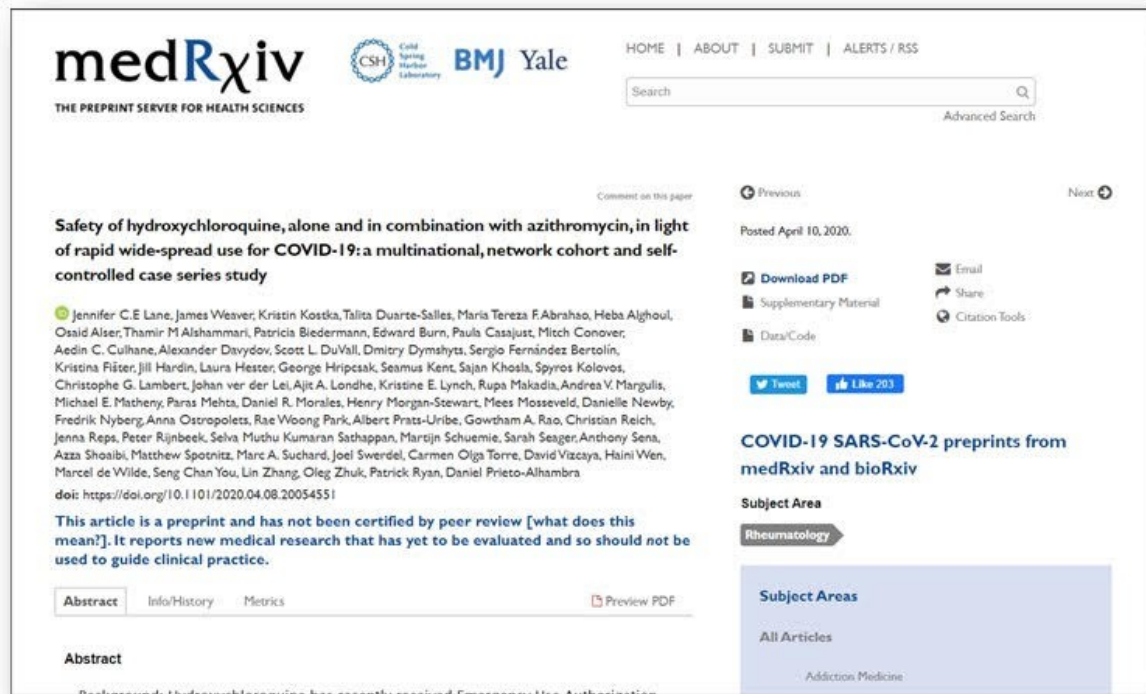


Three focus areas, twelve questions

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



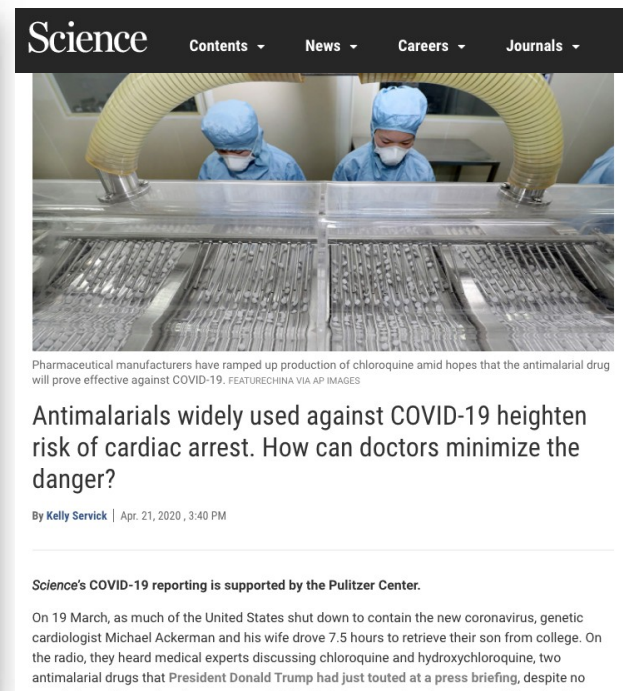
Within weeks: Paper in pre-print



The screenshot shows the medRxiv preprint server interface. At the top, the medRxiv logo is displayed alongside logos for CSH Cold Spring Harbor Laboratory and BMJ Yale. Navigation links for HOME, ABOUT, SUBMIT, and ALERTS / RSS are present. A search bar is located in the top right. The main content area features the title "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". Below the title is a list of authors starting with Jennifer C.E. Lane. A disclaimer states: "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." Navigation options include Abstract, Info/History, Metrics, and a Preview PDF button. On the right side, there are links for Previous, Next, Download PDF, Supplementary Material, Data/Code, Email, Share, and Citation Tools. A social media section shows a tweet and a like count of 203. Below this, a section titled "COVID-19 SARS-CoV-2 preprints from medRxiv and bioRxiv" lists subject areas, with Rheumatology highlighted.

<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>



The screenshot shows the Science magazine website. The top navigation bar includes Contents, News, Careers, and Journals. The main image depicts two people in blue protective suits and masks working in a laboratory setting. Below the image, the article title reads: "Antimalarials widely used against COVID-19 heighten risk of cardiac arrest. How can doctors minimize the danger?". The byline is "By Kelly Servick | Apr. 21, 2020, 3:40 PM". A note states: "Science's COVID-19 reporting is supported by the Pulitzer Center." The article text begins: "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".



medRxiv
THE PREPRINT SERVER FOR HEALTH SCIENCES

Deep phenotyping of 34,128 patients hospitalised with COVID-19 and a comparison with 81,596 influenza patients in America, Europe and Asia: an international network study

Renin-angiotensin system blockers and susceptibility to COVID-19: a multinational open science cohort study

“Clinical characteristics, symptoms, management and health outcomes in 8,598 pregnant women diagnosed with COVID-19 compared to 27,510 with seasonal influenza.”

COVID-19 patients with and without obesity in the United States, Spain, and the United Kingdom

doi:10.1371/journal.pone.0240000.g001

Baseline phenotype and 30-day outcomes of people tested for COVID-19: an international network cohort including >3.32 million people tested with real-time PCR and >219,000 tested positive for SARS-CoV-2 in South Korea, Spain

doi: [https://doi.org/10.1371/journal.pone.0232501](#)

and the United States
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-



Months later: the peer-reviewed versions

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Rheumatology

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ARTICLES | VOLUME 2, ISSUE 11, E698-E711, NOVEMBER 01, 2020

Risk of hydroxychloroquine alone and in combination with azithromycin in the treatment of rheumatoid arthritis: a multinational, retrospective study

Jennifer C E Lane, MRCS [†] • James Weaver, MSc [†] • Kristin Kostka, MPH • Talita Duarte-Salles, PhD • Maria Tereza F Abrahao, PhD • Heba Alghoul, MD et al.

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Open Access • Published: August 21, 2020

DOI: [https://doi.org/10.1016/S2665-9913\(20\)30276-9](https://doi.org/10.1016/S2665-9913(20)30276-9)

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ARTICLES | ONLINE FIRST

Renin–angiotensin system blockers and susceptibility to COVID-19: an international, open science, cohort analysis

Daniel R Morales, MD • Mitchell M Conover, PhD • Seng Chan You, MD • Nicole Pratt, PhD • Kristin Kostka, MPH • Talita Duarte-Salles, PhD et al. Show all authors

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DOI: [https://doi.org/10.1016/S2589-7500\(20\)30289-2](https://doi.org/10.1016/S2589-7500(20)30289-2)

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Research

Special paper

Characterising the background incidence rates of adverse events of special interest for covid-19 vaccines in eight countries: multinational network cohort study

BMJ 2021 ; 373 doi: <https://doi.org/10.1136/bmj.n1435> (Published 14 June 2021)
Cite this as: BMJ 2021;373:n1435

Xintong Li ¹, Anna Ostropelets, doctoral student², Rupa Makadia, associate director³, Azza Shoabi, associate director of observational health data analytics³, Gowtham Rao, senior director of observational health data analytics³, Anthony G Sena ⁴, associate director of observational health data analytics and doctoral student^{3,6}, Eugenia Martinez-Hernandez, physician-researcher⁴, Antonella Delmestri, senior health data scientist¹, Katia Verhamme, associate professor of use and analysis of observational data^{6,7}, Peter R Rijnbeek, associate professor of health data science⁴, Talita Duarte-Salles, epidemiologist³, Marc A Suchard, professor^{8,9}, Patrick B Ryan, vice president and assistant professor³, George Hripcsak, chair of biomedical informatics³, Daniel Prieto-Alhambra, professor^{1,6}

Selection, see the full list at <https://www.ohdsi.org/covid-19-updates>





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Enabling open science