



4th OHDSI Symposium



4th OHDSI Symposium

George Hripcsak, MD, MS

OHDSI Coordinating Center

Columbia University, New York, USA

NewYork-Presbyterian Hospital, New York, USA



Welcome!





Thank you to our sponsors!



We would also like to thank FDA-CBER for their support of the 2018 OHDSI Symposium through their conference grant (#1 R13 FD006470-01)



OHDSI is
an open science community



OHDSI's mission

To improve health by empowering a community to collaboratively generate the evidence that promotes better health decisions and better care





OHDSI's values

- **Innovation:** Observational research is a field which will benefit greatly from disruptive thinking. We actively seek and encourage fresh methodological approaches in our work.
- **Reproducibility:** Accurate, reproducible, and well-calibrated evidence is necessary for health improvement.
- **Community:** Everyone is welcome to actively participate in OHDSI, whether you are a patient, a health professional, a researcher, or someone who simply believes in our cause.
- **Collaboration:** We work collectively to prioritize and address the real world needs of our community's participants.
- **Openness:** We strive to make all our community's proceeds open and publicly accessible, including the methods, tools and the evidence that we generate.
- **Beneficence:** We seek to protect the rights of individuals and organizations within our community at all times.

OHDSI community

We're all in this journey together...



Check out the map in the back



Symposia around the world





OHDSI's community engagement

- Weekly community web conferences for all collaborators to share their research ideas and progress
- 15 workgroups for solving shared problems of interest
 - Common Data Model, Population-level Estimation, Patient-level Prediction, Architecture, Phenotype, NLP, GIS, Oncology, ...
- Active community online discussion: forums.ohdsi.org
- 2,010 users have made 13,625 posts on 2,369 topics:
 - Implementers, Developers, Researchers, CDM Builders, Vocabulary users, OHDSI in Korea, OHDSI in China, OHDSI in Europe



Open Science

**Open
science**

Data + Analytics + Domain expertise

Generate
evidence

Open
source
software

Enable users
to do
something

Standardized, transparent workflows

Database
summary

Cohort
definition

Cohort
summary

Compare
cohorts

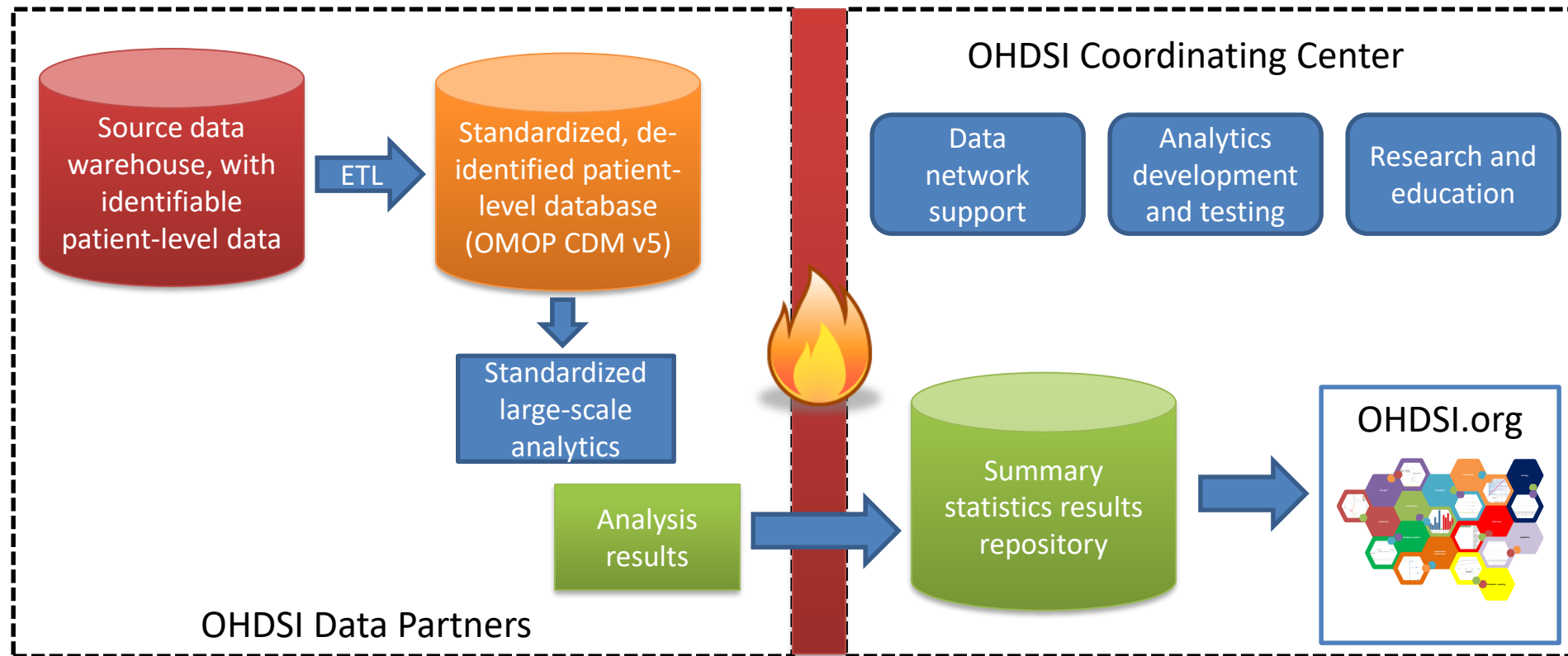
Exposure-
outcome
summary

Effect
estimation
&
calibration

Compare
databases



How OHDSI works

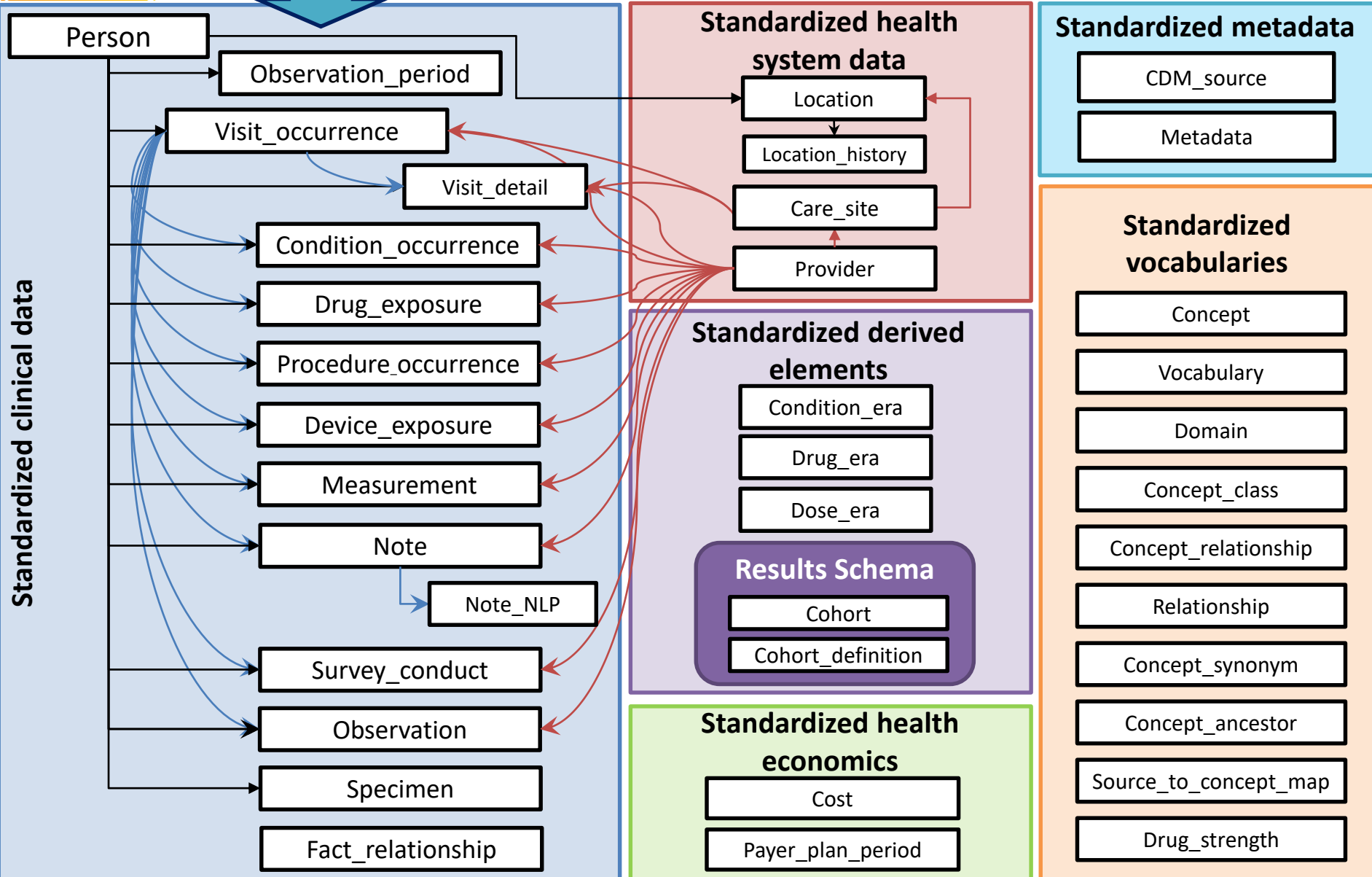


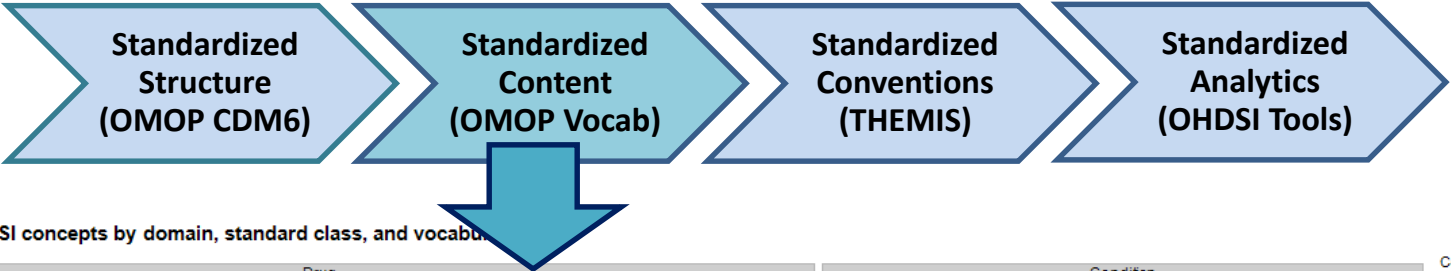


Data across the OHDSI community

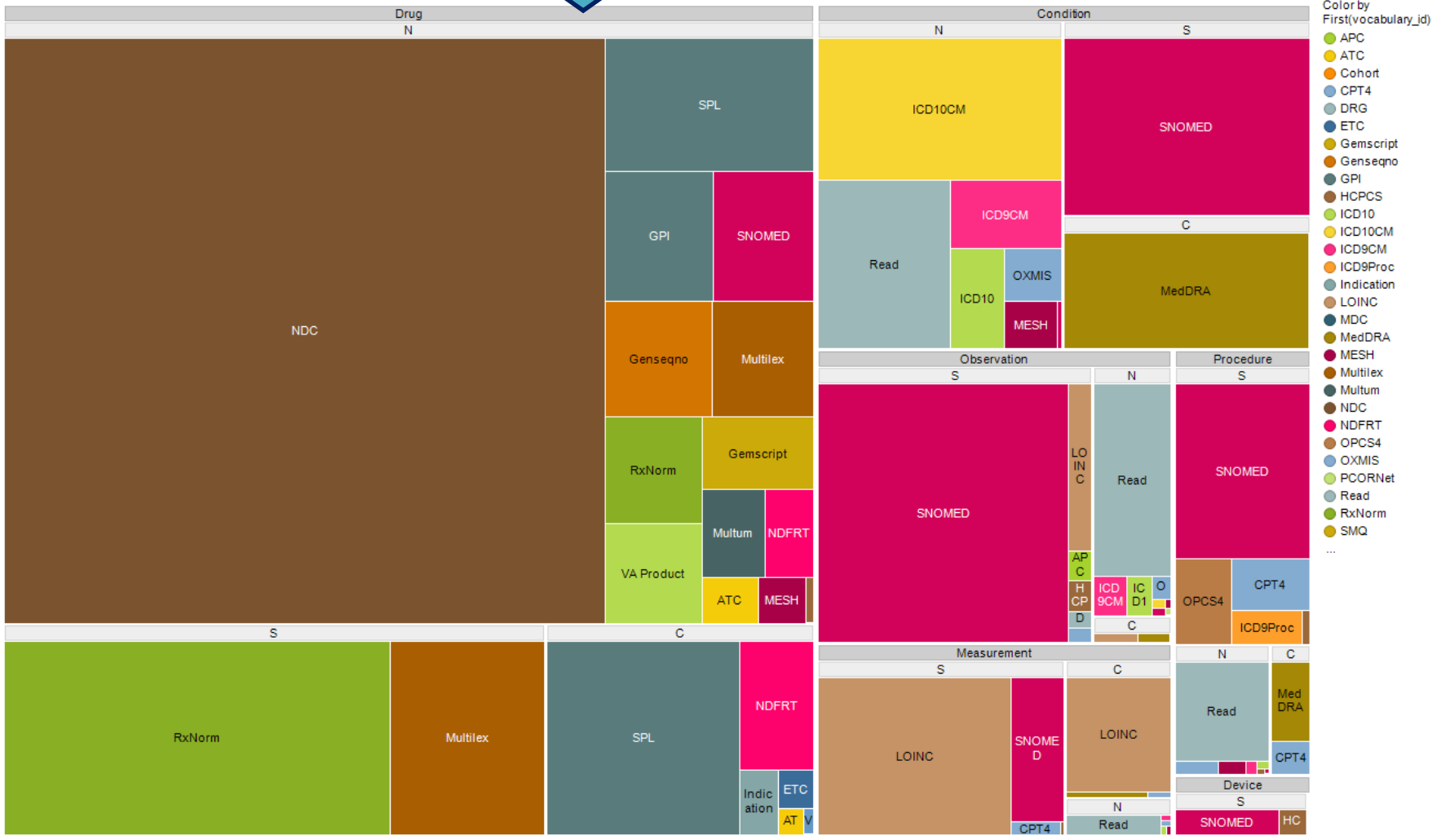
- 97 different databases
- Patient-level data from various perspectives:
 - Electronic health records, administrative claims, hospital systems, clinical registries, health surveys, biobanks
- Collectively, billions of patient records
- Data in 19 different countries, with 220 million patient records from outside US

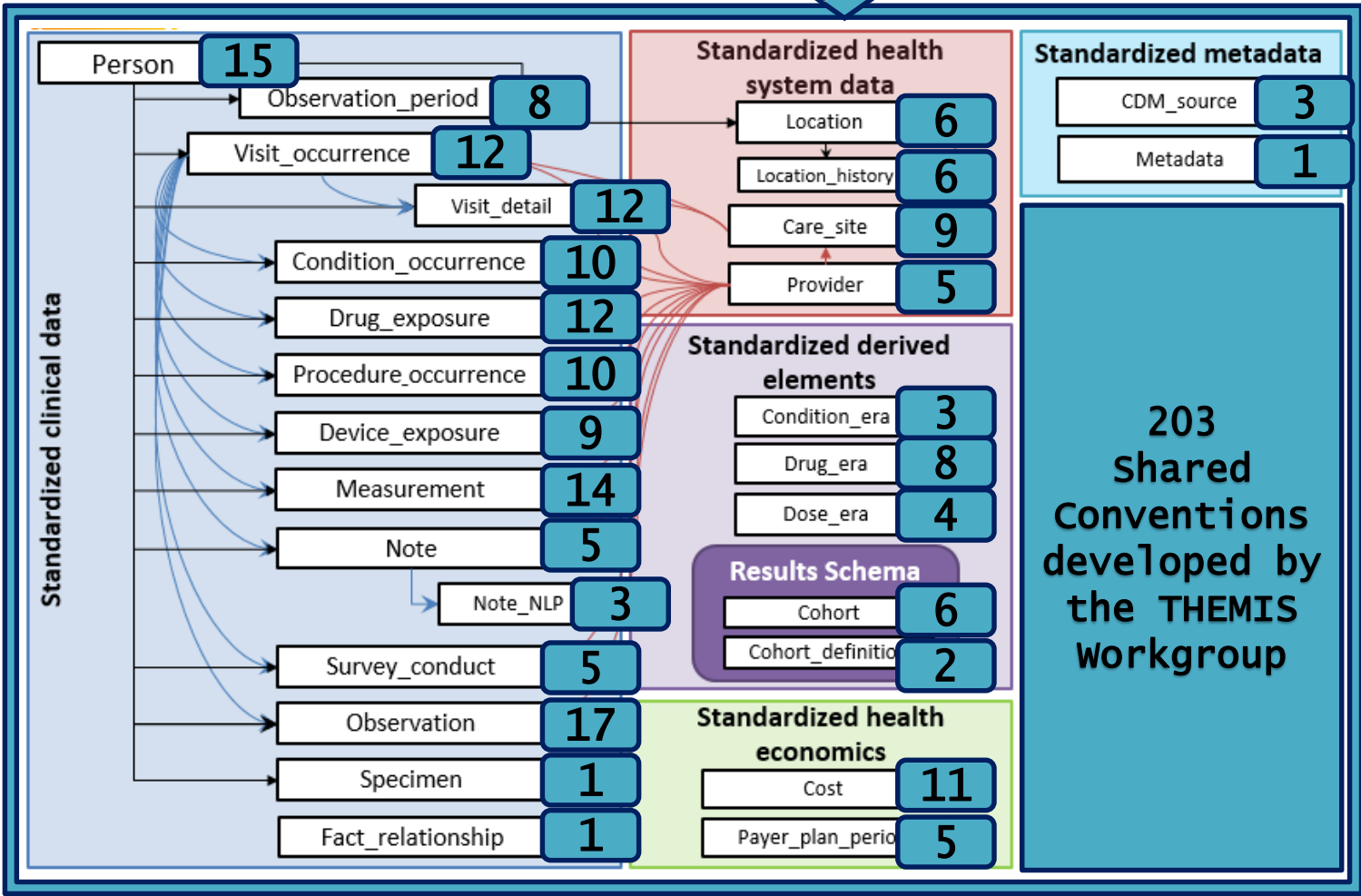
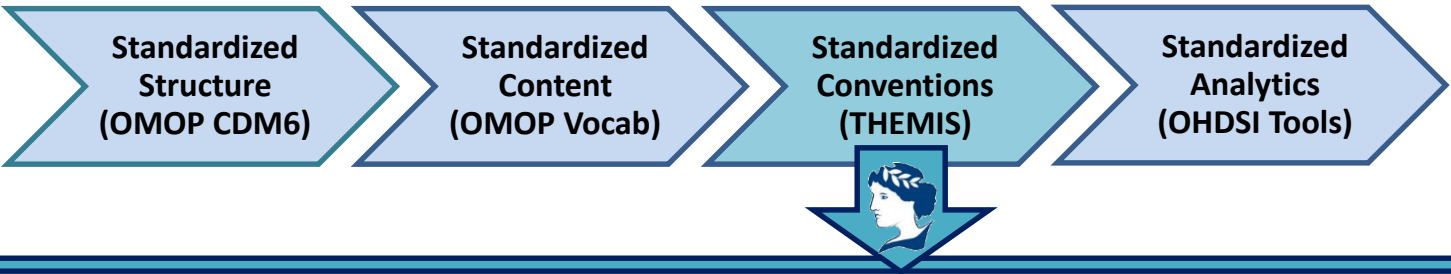
**All using one open community data standard:
OMOP Common Data Model**





Breakdown of OHDSI concepts by domain, standard class, and vocabulary





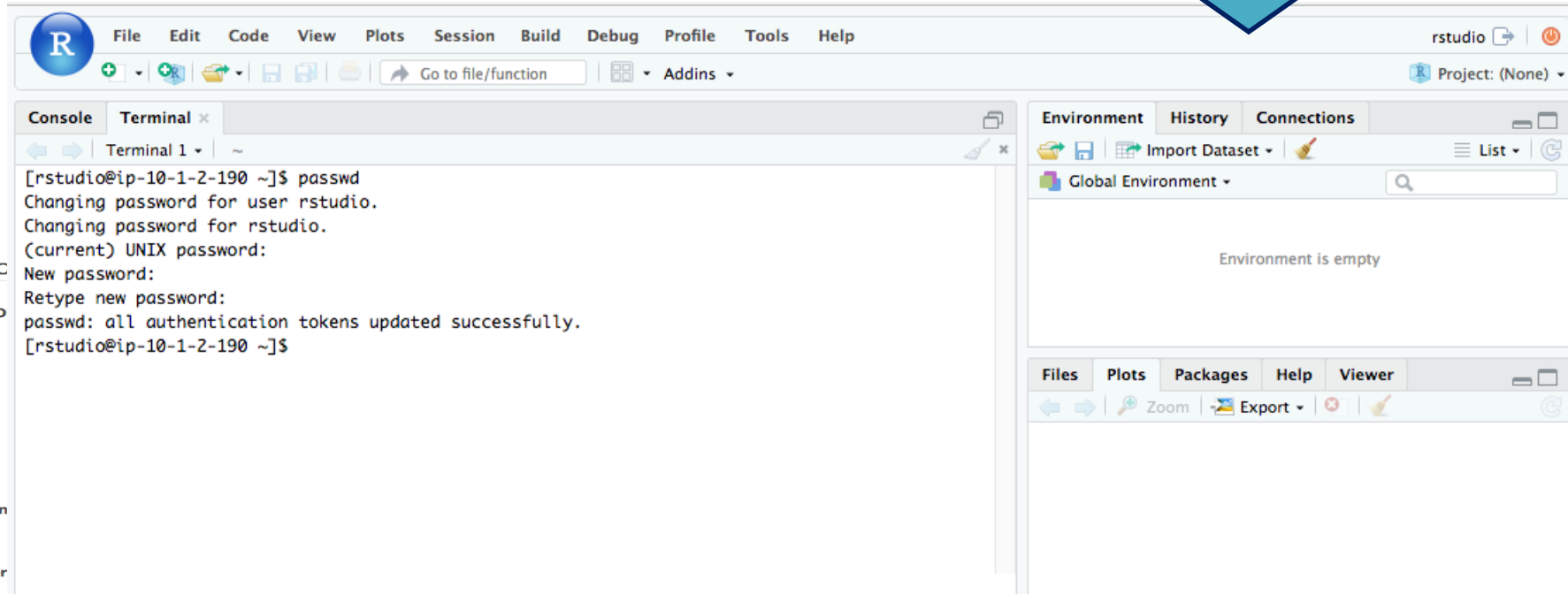


Standardized
Structure
(OMOP CDM6)

Standardized
Content
(OMOP Vocab)

Standardized
Conventions
(THEMIS)

Standardized
Analytics
(OHDSI Tools)



Amazon Web Services tutorial environment

SqlRender Version v1.5.2

DatabaseConnector
Version v2.2.0

OhdsiRTools Version v1.5.5

FeatureExtraction Version v2.1.5

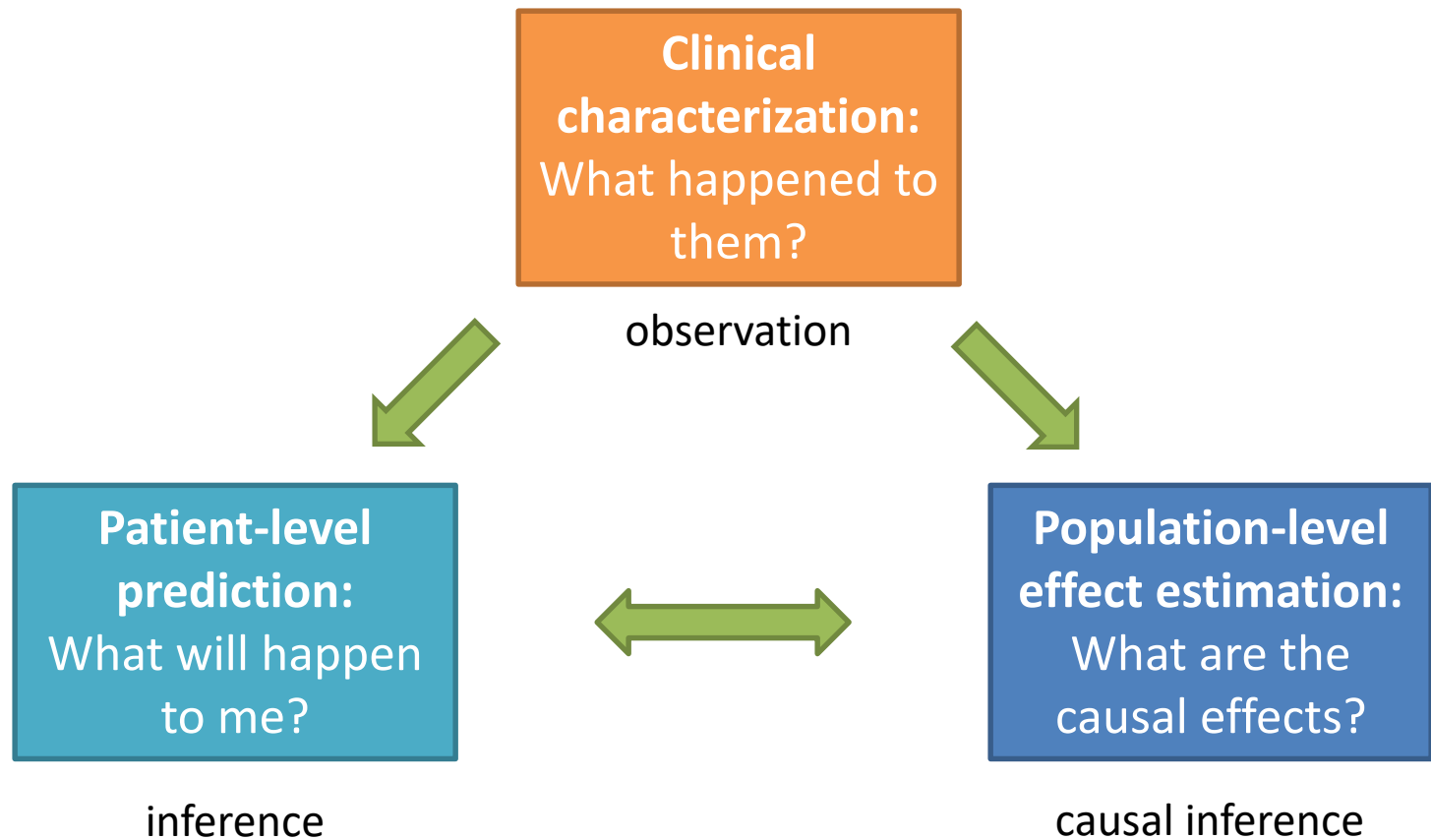
Cyclops Version v2.0.0

EmpiricalCalibration
Version v1.3.6

OhdsiSharing Version v0.1.3



Complementary evidence to inform the patient journey





National Institutes of Health
All of Us Research Program



U.S. FOOD & DRUG
ADMINISTRATION

emerge network

ELECTRONIC MEDICAL RECORDS AND GENOMICS



NATIONAL CANCER INSTITUTE



innovative
medicines
initiative



OHDSI community in action





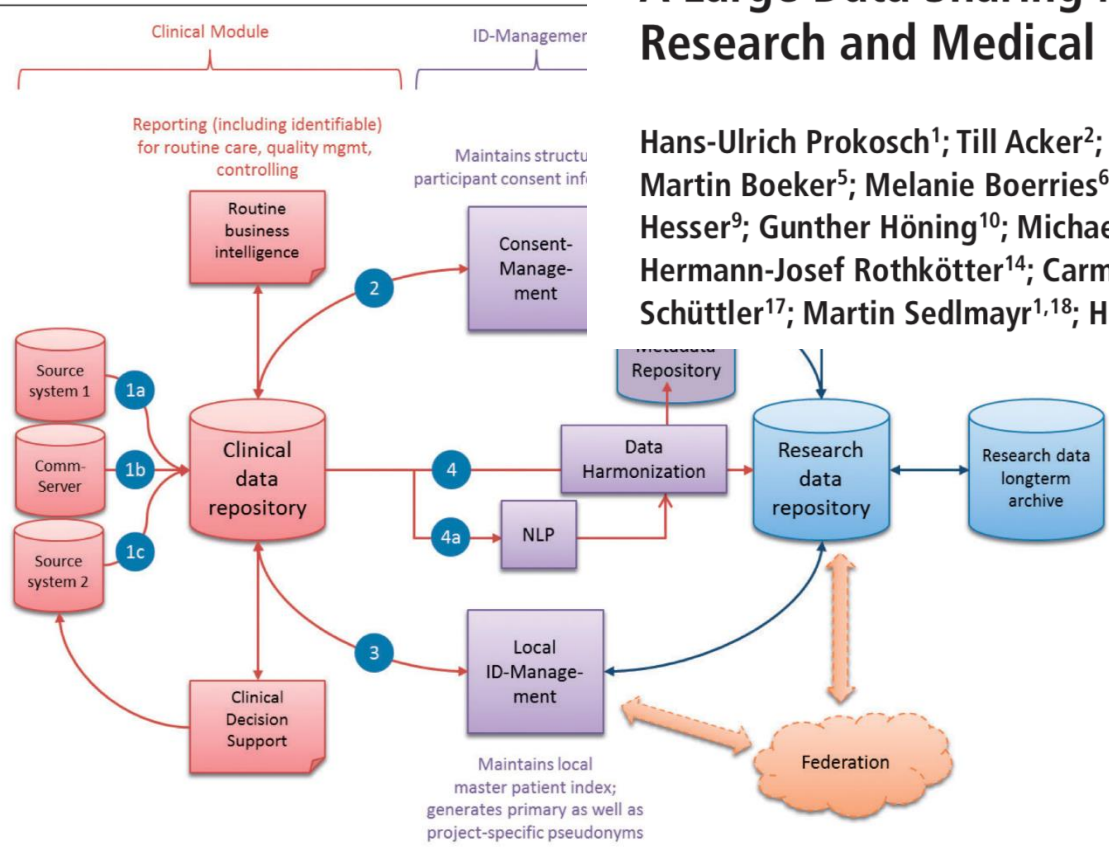
Data



MIRACUM: Medical Informatics in Research and Care in University Medicine

A Large Data Sharing Network to Enhance Translational Research and Medical Care

Hans-Ulrich Prokosch¹; Till Acker²; Johannes Bernarding³; Harald Binder^{4,5}; Martin Boeker⁵; Melanie Boerries⁶; Philipp Daumke⁷; Thomas Ganslandt^{1,8}; Jürgen Hesser⁹; Gunther Höning¹⁰; Michael Neumaier¹¹; Kurt Marquardt¹²; Harald Renz¹³; Hermann-Josef Rothkötter¹⁴; Carmen Schade-Brittinger¹⁵; Paul Schmücker¹⁶; Jürgen Schüttler¹⁷; Martin Sedlmayr^{1,18}; Hubert Serve¹⁹; Keywan Sohrabi²⁰; Holger Storf²¹

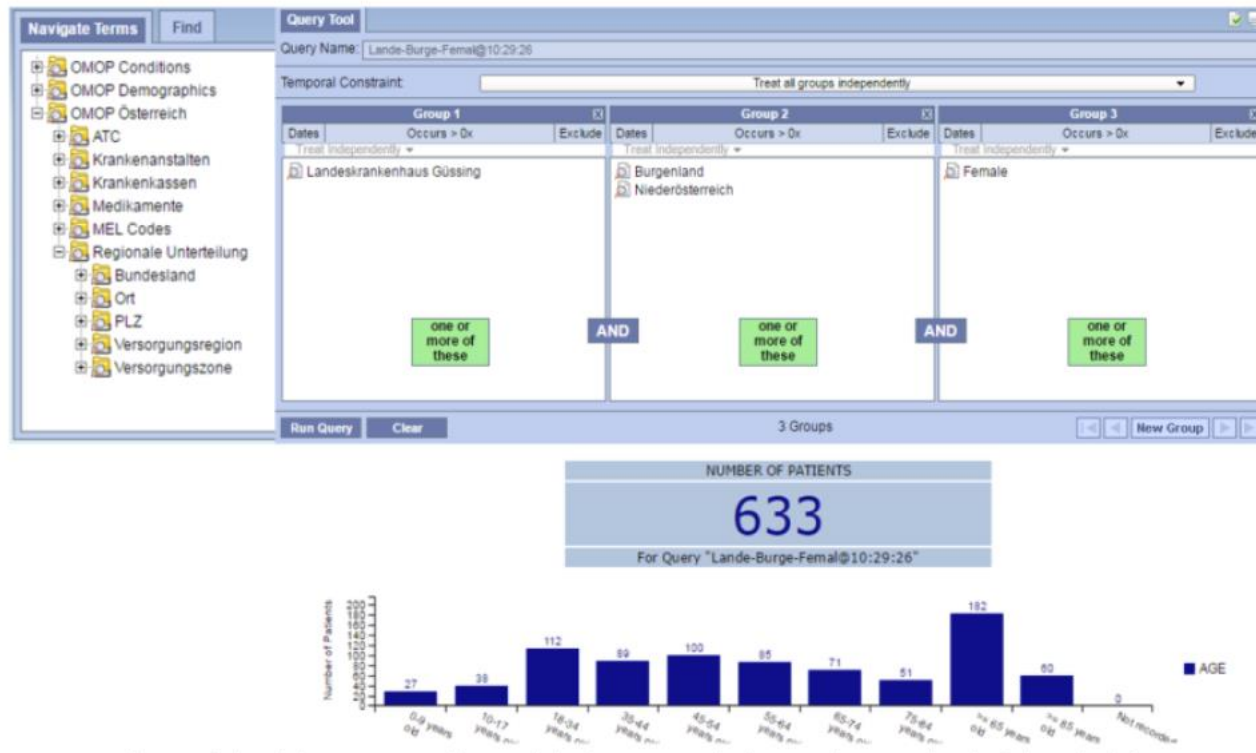




A Clinical Data Warehouse Based on OMOP and i2b2 for Austrian Health Claims Data

Christoph RINNER^{a,1}, Deniz GEZGIN^a, Christopher WENDL^a and Walter GALL^a

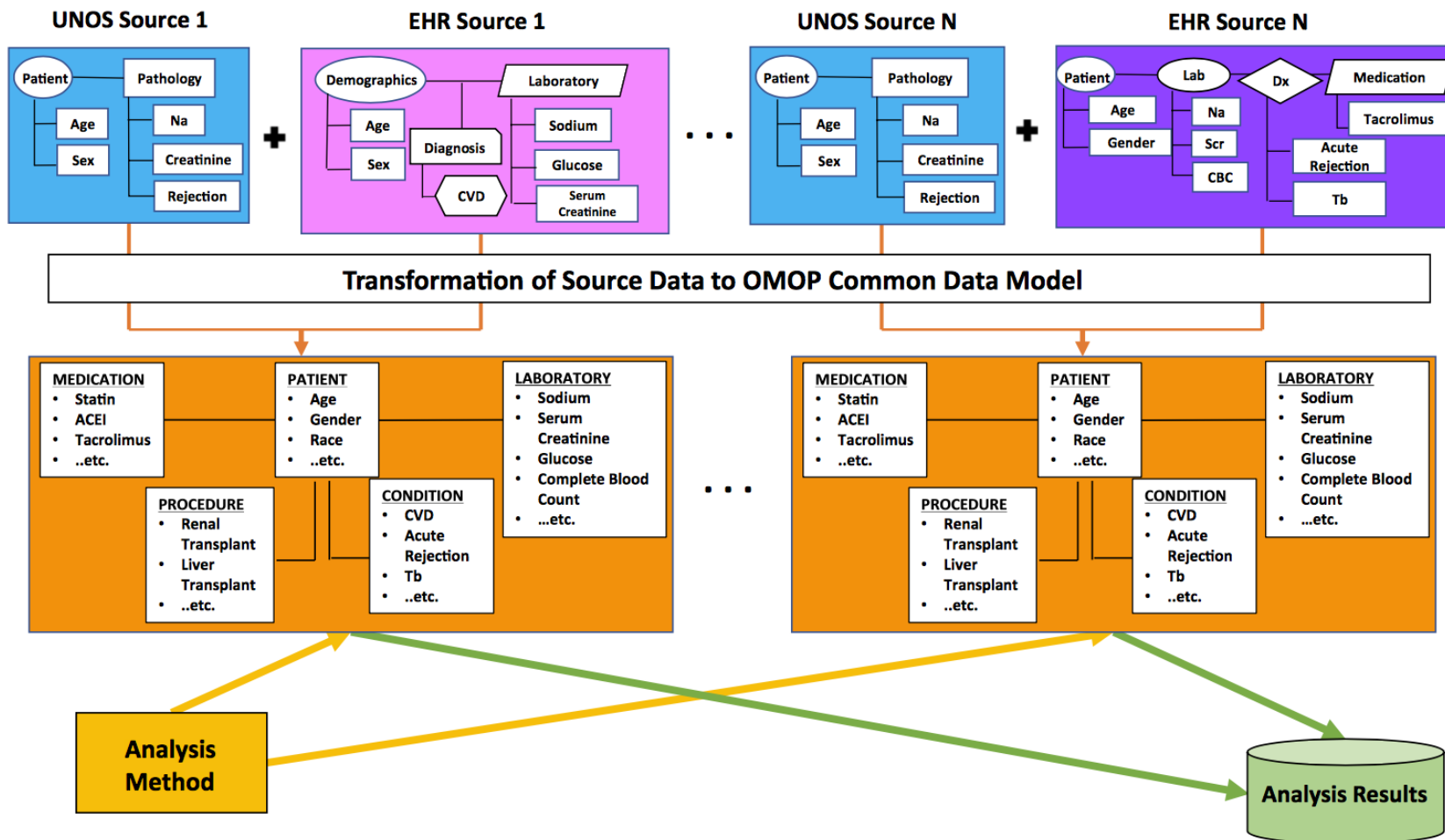
^a*Center for Medical Statistics, Informatics and Intelligent Systems,
Medical University of Vienna, Austria*





Expanding transplant outcomes research opportunities through the use of a common data model

Sylvia Cho¹ | Sumit Mohan^{2,3,4} | Syed Ali Husain^{2,4} | Karthik Natarajan¹



Using OMOP to expand a traditional transplant registry with complementary data sources



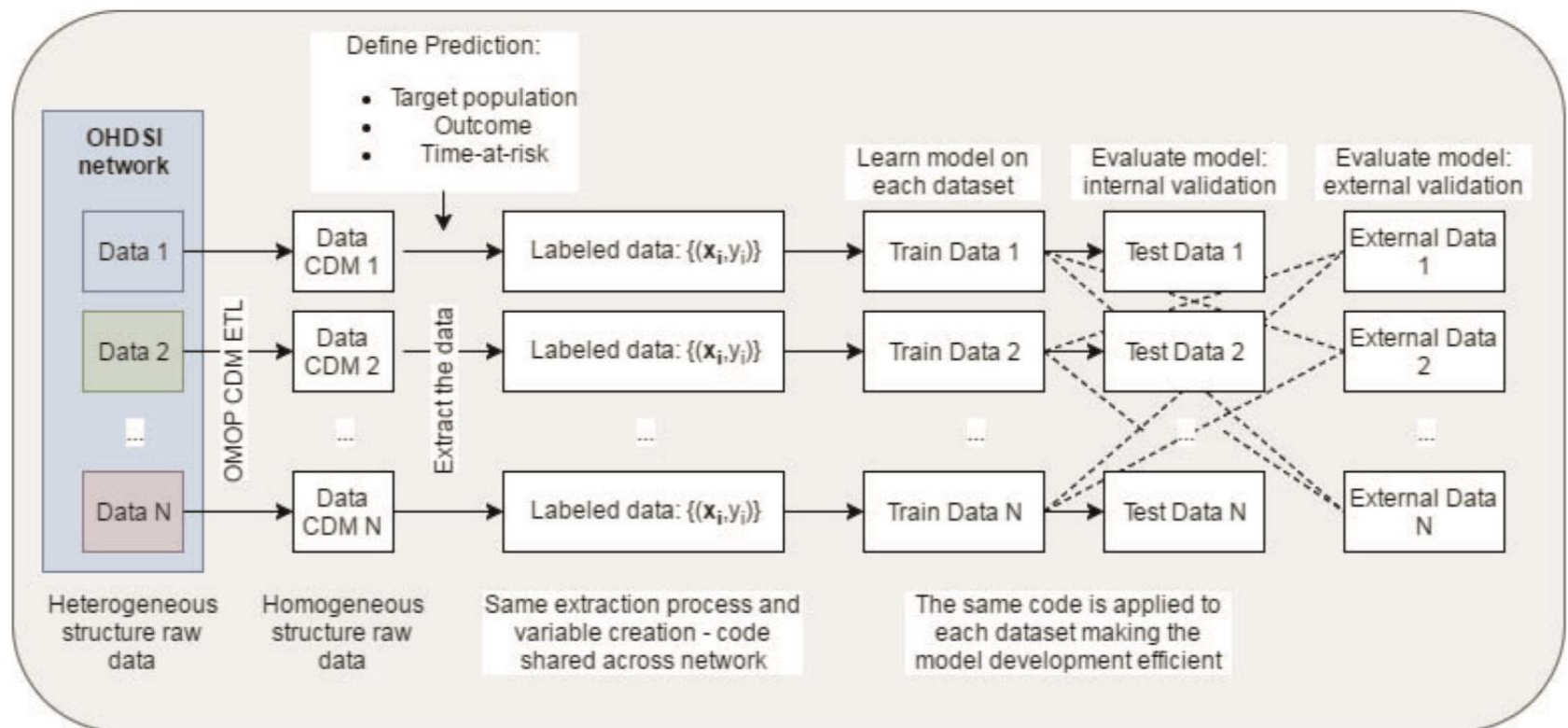
Methods





Design and implementation of a standardized framework to generate and evaluate patient-level prediction models using observational healthcare data

Jenna M Reps,¹ Martijn J Schuemie,¹ Marc A Suchard,² Patrick B Ryan,¹ and Peter R Rijnbeek³

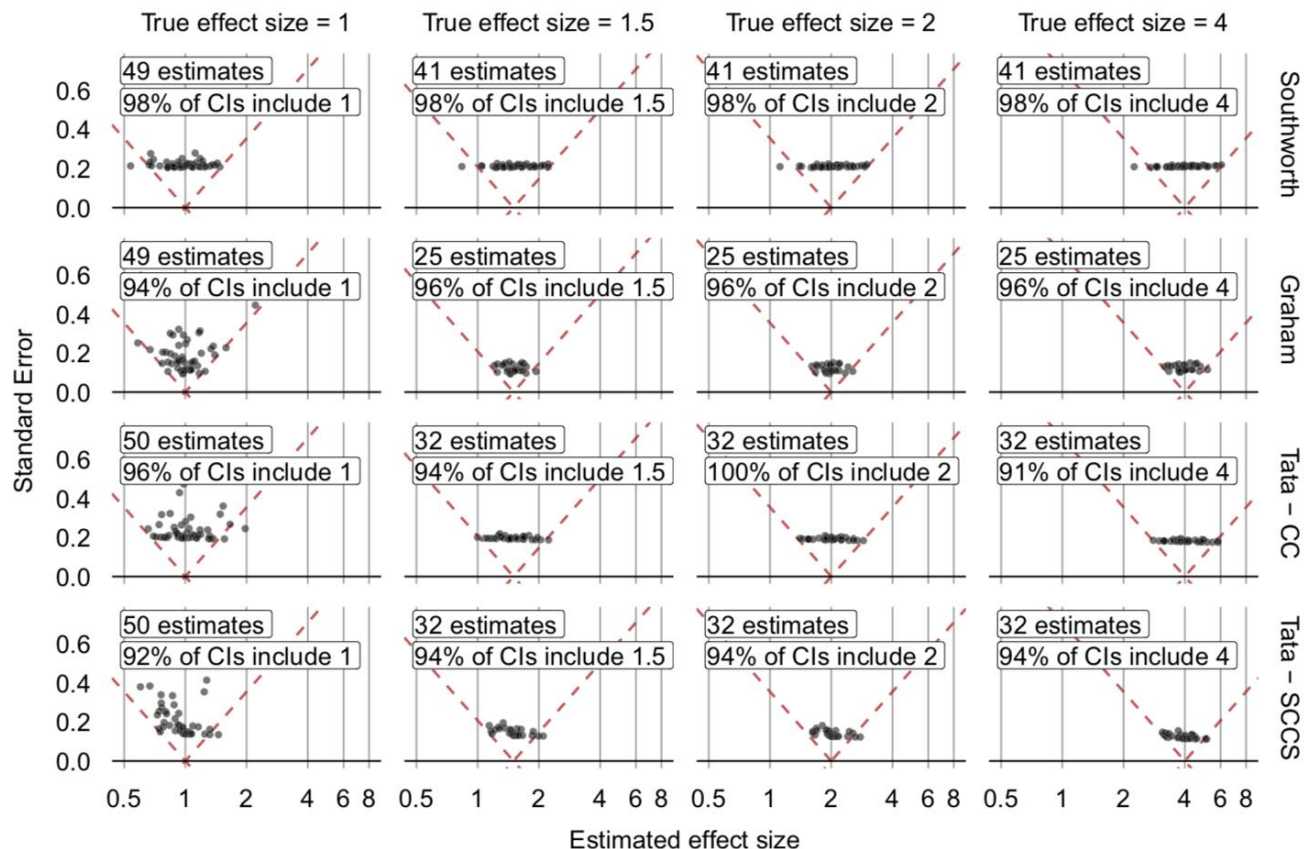




Empirical confidence interval calibration for population-level effect estimation studies in observational healthcare data

Martijn J. Schuemie^{a,b,1}, George Hripcsak^{a,c,d}, Patrick B. Ryan^{a,b,c}, David Madigan^{a,e}, and Marc A. Suchard^{a,f,g,h}

^aObservational Health Data Sciences and Informatics, New York, NY 10032; ^bEpidemiology Analytics, Janssen Research & Development, Titusville, NJ 08560; ^cDepartment of Biomedical Informatics, Columbia University, New York, NY 10032; ^dMedical Informatics Services, New York–Presbyterian Hospital, New York, NY 10032; ^eDepartment of Statistics, Columbia University, New York, NY 10027; ^fDepartment of Biomathematics, University of California, Los Angeles, CA 90095; ^gDepartment of Biostatistics, University of California, Los Angeles, CA 90095; and ^hDepartment of Human Genetics, University of California, Los Angeles, CA 90095

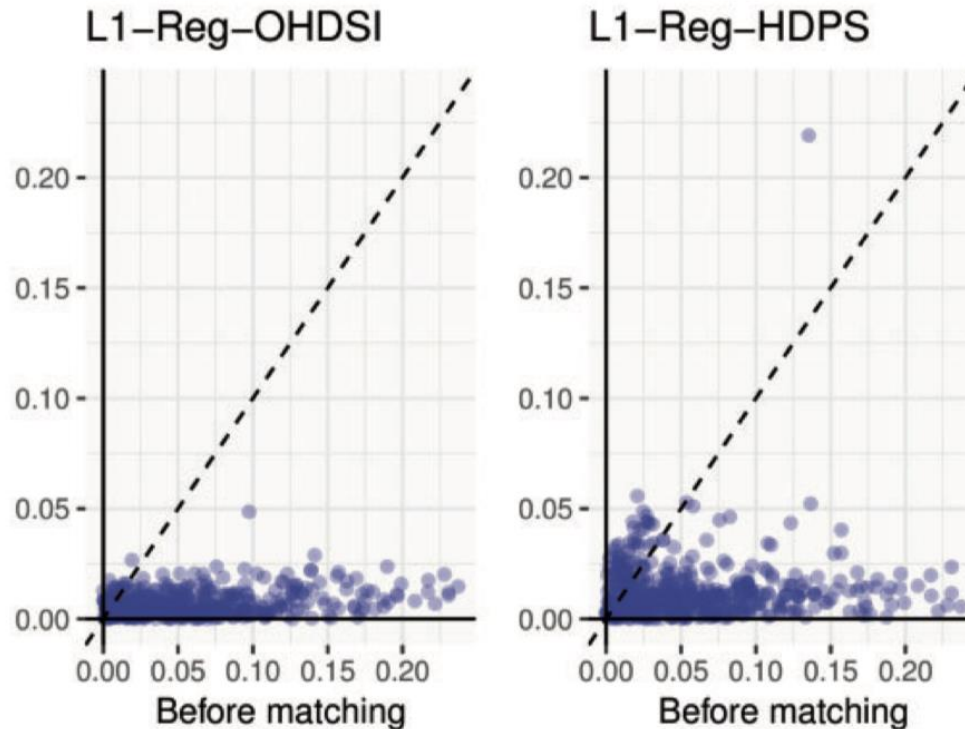




Original article

Evaluating large-scale propensity score performance through real-world and synthetic data experiments

Yuxi Tian,^{1*} Martijn J Schuemie² and Marc A Suchard^{1,3,4}



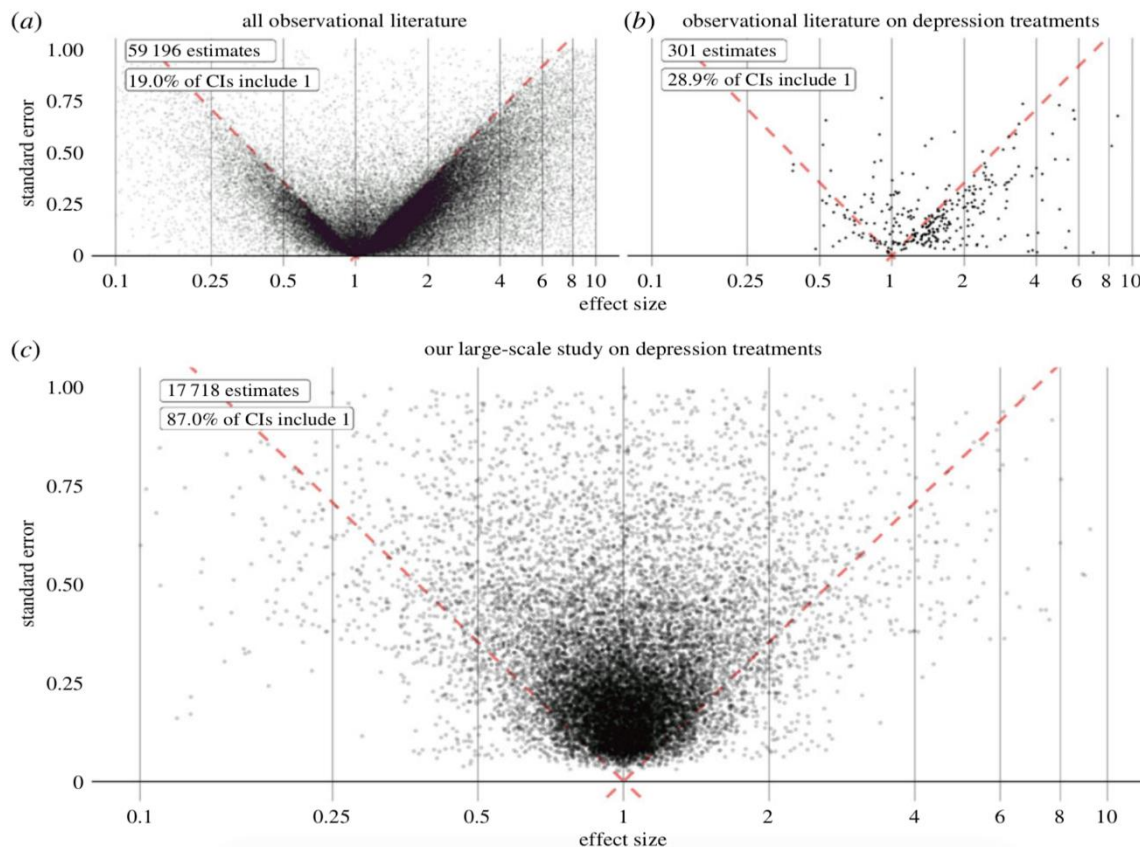


Cite this article: Schuemie MJ, Ryan PB, Hripcsak G, Madigan D, Suchard MA. 2018

Improving reproducibility by using high-throughput observational studies with empirical calibration

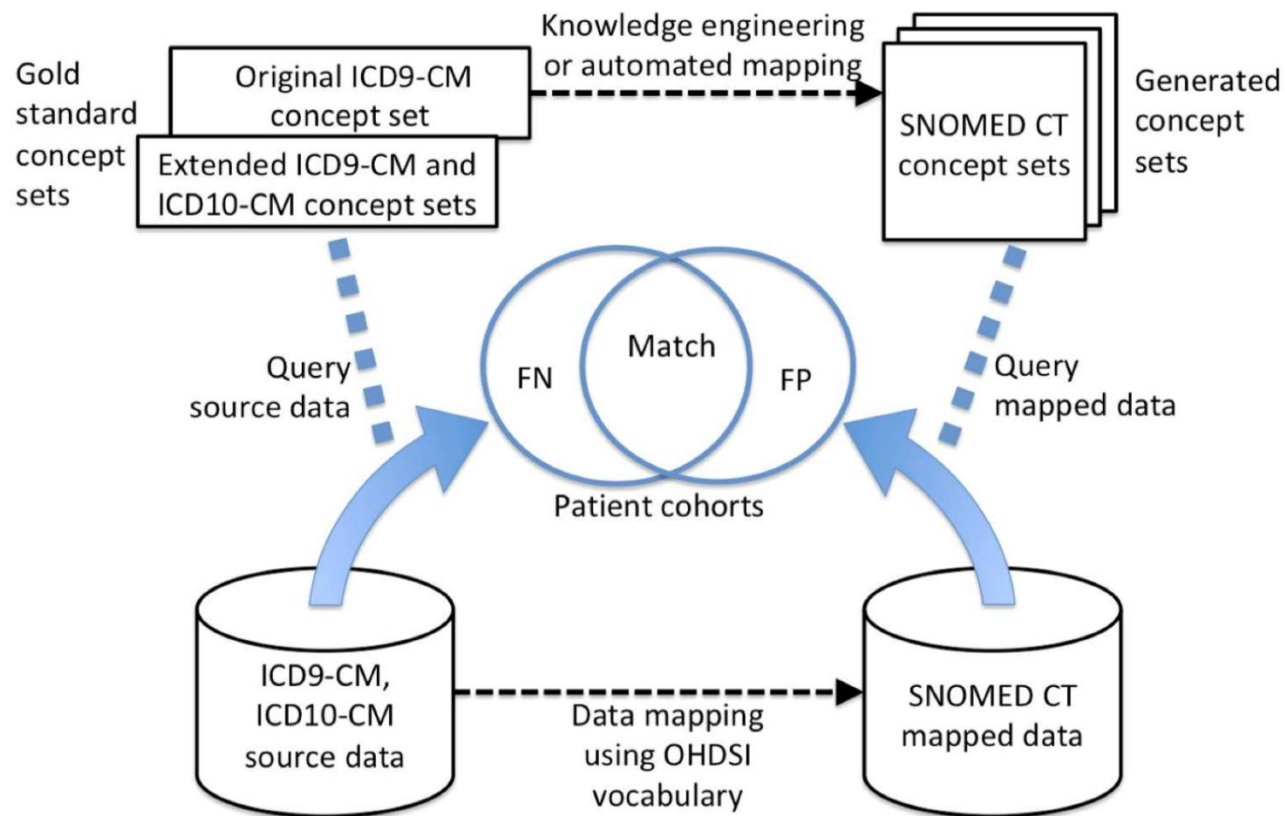
Martijn J. Schuemie^{1,2}, Patrick B. Ryan^{1,2,3}, George Hripcsak^{1,3,4}, David Madigan^{1,5} and Marc A. Suchard^{1,6,7,8}

¹Observational Health Data Sciences and Informatics (OHDSI), New York, NY 10032, USA



Title: Effect of Vocabulary Mapping for Conditions on Phenotype Cohorts

Authors: George Hripcsak^{1,2,3}, Matthew Levine^{1,2}, Ning Shang^{1,2}, Patrick B. Ryan^{1,2,4}



It is possible to achieve just a trivial error rate due to OHDSI SNOMED conversion



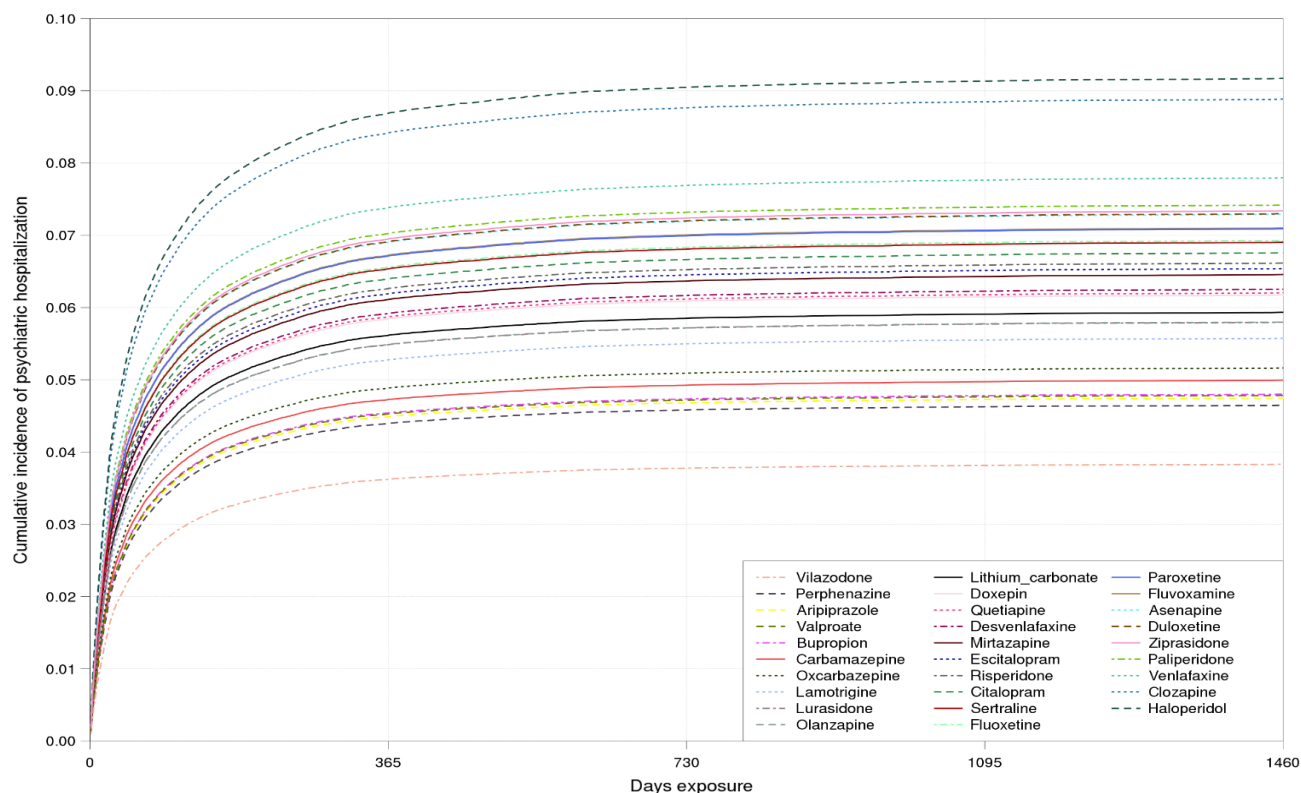
Clinical





Comprehensive comparison of monotherapies for psychiatric hospitalization risk in bipolar disorders

Anastasiya Nestsiarovich¹  | Aurélien J Mazurie² | Nathaniel G Hurwitz³ |
Berit Kerner^{4,5} | Stuart J Nelson^{6,7} | Annette S Crisanti⁸ | Mauricio Tohen⁸  |
Ronald L Krall⁹ | Douglas J Perkins¹ | Christophe G Lambert^{1,7} 



Bipolar disorder treatments efficacy does vary by as much as 2x, and patients end monotherapy after two months



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Database Studies of Treatment-Resistant Depression Should Take Account of Adequate Dosing

Daniel Fife, MD^{a,*}; Clair Blacketer, MPH^a; Jenna Marie Reps, PhD^a; and Patrick Ryan, PhD^a

Table 1. Relationship of Adequate Dose to Number of Dispensings

No. of Dispensings in the Era ^a	CCAE (no. of eras)	CCAE (% of eras with a dispensing $\geq$ minimum effective dose)	MDCD (no. of eras)	MDCD (% of eras with a dispensing $\geq$ minimum effective dose)	MDCR (no. of eras)	MDCR (% of eras with a dispensing $\geq$ minimum effective dose)
1	168,095	58.2	29,561	54.3	12,217	54.5
2	67,805	65.4	10,861	59.5	4,407	60.5
3	36,905	70.8	4,981	64.7	2,060	65.2
4	25,484	72.1	3,287	65.5	1,512	67.0
5	17,492	74.8	1,980	68.1	972	68.7
6	13,698	74.8	1,473	67.5	754	69.6
7	10,015	76.7	1,094	71.0	586	71.3
8	7,862	75.8	878	70.3	461	71.1
9	6,175	78.5	631	72.3	396	67.9
10	5,020	77.2	547	72.6	285	72.6
11	4,037	79.6	448	72.3	242	70.7
12	3,727	79.5	377	69.2	193	64.2
≥ 13	22,724	80.7	2,657	74.6	1,190	66.8
All	389,039	66.0	58,775	59.6	25,275	60.1

^aEra is defined as a sequence of dispensings of an antidepressant medication during an episode of pharmacologically treated depression with no more than 30 days between each dispensing of the medication and the end of the days' supply of the previous dispensing.

Abbreviations: CCAE = Truven MarketScan Commercial Claims and Encounters, MDCCD = Truven MarketScan Multi-State Medicaid, MDCR = Truven MarketScan Medicare Supplemental Beneficiaries.

A substantial proportion of patients on depression therapy never reach the minimum therapeutic dose

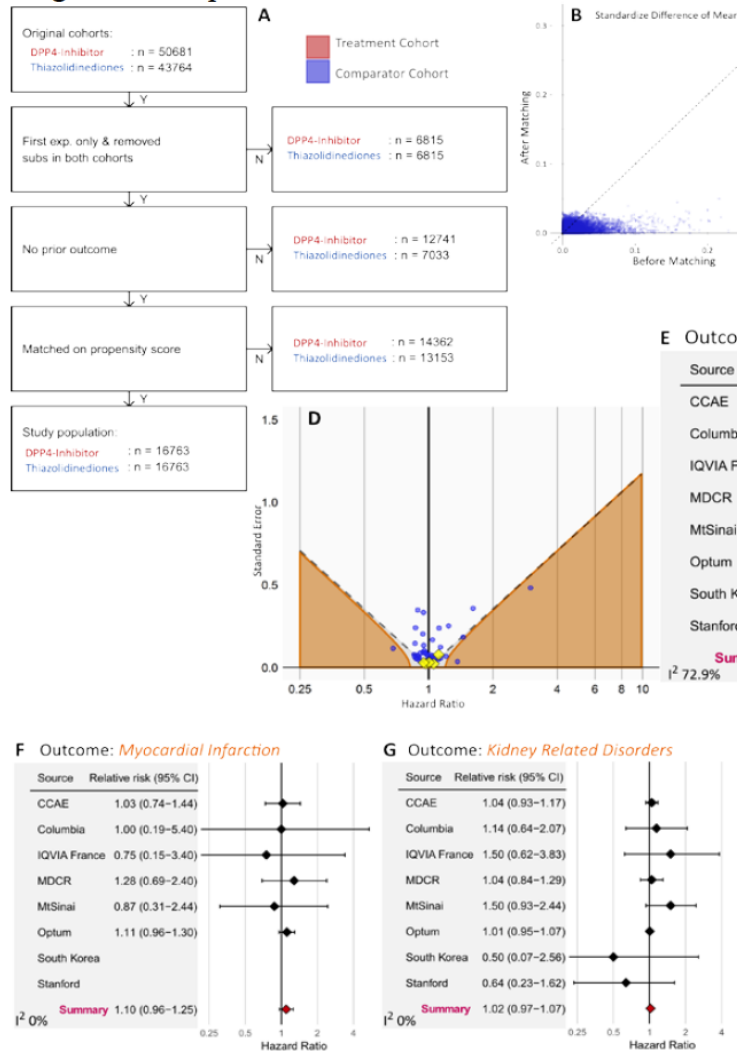
August 24, 2018

Association of Hemoglobin A_{1c} Levels With Use of Sulfonylureas, Dipeptidyl Peptidase 4 Inhibitors, and Thiazolidinediones in Patients With Type 2 Diabetes Treated With Metformin

Analysis From the Observational Health Data Sciences and Informatics Initiative

Rohit Vashisht, PhD^{1,2}; Kenneth Jung, PhD^{1,2}; Alejandro Schuler, MS^{1,2}; Juan M. Banda, PhD^{1,2}; Rae Woong Park, MD, PhD^{1,3,4}; Sanghyung Jin, MS^{1,4}; Li Li, MS, MD⁵; Joel T. Dudley, PhD⁵; Kipp W. Johnson, MD, PhD⁵; Mark M. Shervey, PhD⁵; Hua Xu, PhD^{1,6}; Yonghui Wu, PhD^{1,7}; Karthik Natarajan, PhD^{1,8,9}; George Hripcsak, MD, MS^{1,9}; Peng Jin, MS^{1,9}; Mui Van Zandt, BS^{1,10}; Anthony Reckard, BS^{1,10}; Christian G. Reich, MD^{1,10}; James Weaver, MPH, MS^{1,11}; Martijn J. Schuemie, PhD¹¹; Patrick B. Ryan, PhD^{1,9,11}; Alison Callahan, PhD^{1,2}; Nigam H. Shah, MBBS, PhD^{1,2}

Figure 3. Comparative Effectiveness of DPP4 Inhibitors

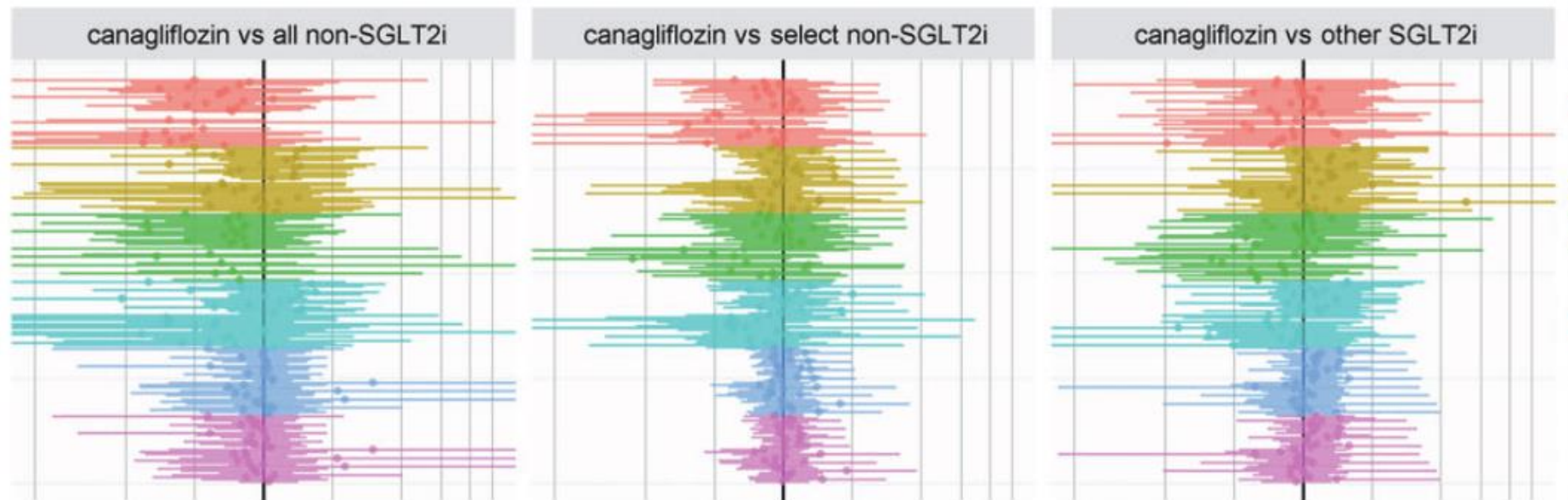


Study efficacy and safety for second line treatment for type 2 diabetes mellitus, found only small differences



Comparative effectiveness of canagliflozin, SGLT2 inhibitors and non-SGLT2 inhibitors on the risk of hospitalization for heart failure and amputation in patients with type 2 diabetes mellitus: A real-world meta-analysis of 4 observational databases (OBSERVE-4D)

Patrick B. Ryan PhD¹  | John B. Buse MD²  | Martijn J. Schuemie PhD¹  |
 Frank DeFalco BA³ | Zhong Yuan MD, PhD¹  | Paul E. Stang PhD¹  | Jesse A. Berlin ScD⁴  |
 Norman Rosenthal MD³





howoften.org



- Incidence of side effects
 - Develop condition for first time after get drug
 - Within time at risk
- Any drug on the world market
- Any condition
- Absolute risk
 - Not causal (Characterization)
- On the Internet



How Often...

How often do patients get a condition after starting a drug?

Which drug are you interested in?

Lisinopril

Which condition are you interested in?

Angioedema

Go »

Clear

What this does

Use this tool to look up the proportion of people starting a drug who are newly diagnosed with a condition within 1 year of starting the drug. You can search for a specific drug-condition incidence by entering your drug and condition of interest in the fields above. Or, you can browse a list of conditions of potential interest by leaving the condition field blank, and you'll be shown conditions listed on the drug's product label.

What this does not do

This tool **does not** demonstrate that a drug causes a condition (i.e., that the condition is a side effect of the drug). Instead, for example, the condition may be part of the reason you are taking the drug, or the condition may just be common in the population.

This tool provides the overall observed risk in a population, but does not provide the attributable risk due to drug exposure. The results provided are raw unadjusted numbers for each diagnosis. The data made available through this site are for informational purposes only and are not a substitute for professional medical advice or services. You should not use this information for comparing drugs or making decisions related to diagnosing or treating a medical or health condition; instead, please consult a physician or healthcare professional in all matters related to your health.



Impact on the research community:
publications on OHDSI or the OMOP
CDM in 2018 via Google Scholar

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Beyond Latin alphabet

의료 빅데이터를 활용한 질병 처방 예측 모델

고승완, 강헌태, 오영택, 박재호, 허의남 - 한국정보과학회 학술발표 ..., 2018 - dbpia.co.kr

요약보건 의료 부문에서 빅데이터 활용의 기대 효과가 증가함에 따라 의료 데이터를 분석해 효과적인 치료 방법도출하는 연구에 대한 관심이 증대되고 있다. 의료 데이터 분석은 주로 어떤 질병에 대한 진단 및 처방 방법을 최적화하는 것에 목적을 두고 있으며, 이를 위해 코호트 ...

(Prediction model of disease prescription using medical big data)

Real World Data を活用する観察研究データベースの考察

木村映善 - 保健医療科学, 2018 - jstage.jst.go.jp

抄録 悉皆的に収集された Real World Data (RWD) を用いた観察研究からエビデンスを導出できるような取り組みが求められている. データベース設計に関する課題として, 標準情報モデルへの統合, 統制用語へのマッピング, 各施設の測定結果などの組織間較正, 患者個体の識別・追跡性の確保 ...

(A Study of Observational Research Data Using Utilization)

비정형 헬스케어 데이터 표준화

신수용 - 한국통신학회지 (정보와통신), 2018 - dbpia.co.kr

최근 전세계적으로 헬스케어 산업에 대한 관심이 부각되고 있고, 그 중에서도 헬스케어 데이터를 딥러닝 등의 기계학습으로 분석하는 의료 AI 산업이 급속히 주목을 받고 있다. 기계학습 기법의 특성상 의료 AI 개발을 위해서는 헬스케어 빅데이터가 반드시 필요하다 ...

(Standardization of Atypical Healthcare Data)

呼吸系统疾病专病队列研究的标准制定与数据共享

孙一鑫, 裴正存, 詹思延 - 中华流行病学杂志, 2018 - html.rhhz.net

目的慢性阻塞性肺疾病, 哮喘, 间质性肺疾病和肺血栓栓塞症是重大呼吸系统疾病, 严重危害我国居民健康. 整合并开展大规模人群队列研究有助于观察疾病的暴露, 发病与转归情况. 本研究针对我国社区与临床队列资源的多源异构现状, 制定呼吸系统疾病专病 ...

(Standard setting and data sharing for the study of respiratory disease specific disease cohort)



Community





Community

- “Can we post your slides from your talk?”
 - Let me look over the deck.
 - Let me delete a few slides and send it back.
 - Let me check with my colleagues.
- OHDSI: Go ahead, it’s already on the Internet.
 - Open science



Community

- Non-traditional research groups
 - Skunkworks, Apple garage
 - Group comes together motivated by the goal
 - Expertise hidden in plain sight



Community

- Infrastructure – what is possible once you have:
 - Data network with a consistent data model
 - Tools
 - (eMERGE)
 - Culture



Community

- Potential collaborator
 - It's a group project and it will be on the Internet
 - We don't know where your name will end up, other than being in the list



Community

- New initiatives
 - So much to be done, need new groups
 - A lot of work
 - Love to run a large famous study



Agenda



2018 Symposium Agenda

Friday, October 12th at the
Bethesda North Marriott

Time	Description
7:30 – 8:00am	Registration with Light Breakfast <i>Grand Ballroom Foyer</i>
8:00 – 9:30am	<u>Welcome: Where's Our Journey</u> <i>Grand Ballroom E-H</i> Speaker: George Hripcsak , MD, MS, Vivian Beaumont Allen Professor and Chair, Biomedical Informatics, Columbia University Irving Medical Center; Director, Medical Informatics Services, NewYork-Presbyterian Hospital/Columbia Campus
9:30 – 11:30am	<u>Plenary Session</u> <i>Grand Ballroom E-H</i> Large-scale Evidence Generator and Evaluation of Network of Databases (LEGEND): Clinical applications in hypertension Speakers: Patrick Ryan , PhD, Senior Director and Head, Epidemiology Analytics, Janssen Research & Development, Adjunct Assistant Professor of Biomedical Informatics, Columbia University Martijn Schuemie , PhD, Director and Research Fellow, Epidemiology Analytics, Janssen Research & Development Marc Suchard , MD, PhD, Professor, Department of Biomathematics, David Geffen School of Medicine, University of California, Los Angeles



11:30 – 1:00pm

OHDSI Collaborator Showcase: Part One

Grand Ballroom Foyer

Software demonstrations and poster session highlighting OHDSI's research and development

Buffet lunch served from 12:30-1:00pm in Grand Ballroom

1:00 – 2:00pm

OHDSI Collaborator Showcase: Part Two – Lightning Talks

Grand Ballroom E-H

Moderator: [Melanie Philofsky](#), RN, MS, Senior Business Analyst/Project Manager, Odysseus Data Services, Inc.

Speakers:

[Iannis Drakos](#), Chief Consultant, Region Zealand

[Kyu-pyo Kim](#), PhD, Associate Professor, Asan Medical Center

[Mary Regina Boland](#), MA, MPhil, PhD, Assistant Professor, University of Pennsylvania

[Fabrício Kury](#), PhD, Postdoctoral Research Scientist, Columbia University

[James Weaver](#), Manager, Epidemiology Analytics, Janssen Research and Development

[Clair Blacketer](#), MPH, PMP, Manager, Epidemiology Analytics, Janssen Research & Development; Co-lead, OHDSI Common Data Model workgroup

[Ross D. Williams](#), MS, PhD Student, Erasmus University Medical Centre

[Kristin Feeney Kostka](#), MPH, Collaborator, OHDSI; Data Science Lead, Deloitte Consulting LLP



Time	Description
2:00 – 3:00pm	<u>OHDSI Collaborator Showcase: Part Three</u> <i>Grand Ballroom Foyer</i> Software demonstrations and poster session highlighting OHDSI's research and development
3:00 – 3:30pm	<u>Progress and Lessons Learned from the FDA BEST Program</u> <i>Grand Ballroom E-H</i> Moderator: Jon Duke , MD, MS, Director, Center for Health Analytics and Informatics, Georgia Tech; Principal Research Scientist, Georgia Tech College of Computing Panelists: Azadeh Shoaibi , PhD, MHS, CBER Sentinel Lead, CBER, US Food and Drug Administration Alan E. Williams , PhD, Associate Director for Regulatory Affairs, Office of Biostatistics and Epidemiology, CBER, US Food and Drug Administration
3:30 – 4:30pm	<u>Global Progress & Perspectives from the OHDSI Community</u> <i>Grand Ballroom E-H</i> Moderator: Hanieh Razzaghi , MPH, Assistant Director, PEDSnet Data Coordinating Center, Children's Hospital of Philadelphia Panelists: Peter Rijnbeek , PhD, Assistant Professor, Erasmus Medical Center Rotterdam; Lead of OHDSI Europe; Co-Lead, OHDSI Patient Level Prediction WG; European Health Data and Evidence Network (EHDEN) Academic Lead Nicole Pratt , PhD, Associate Professor, University of South Australia Rae Woong Park , MD, PhD, Professor, Department of Biomedical Informatics, Ajou University School of Medicine; Lead of OHDSI Korea Mui Van Zandt , Director Product Development, IQVIA; Co-lead of OHDSI China CDM/Vocabulary working group André Ballalai Ferraz , Manager, RWE/RWD and Market Access in LATAM and Emerging Markets, IQVIA



4:30 – 5:30pm	<u>Closing Session: Where's Our Journey Going?</u> Speaker: Patrick Ryan , PhD, Senior Director and Head, Epidemiology Analytics, Janssen Research & Development, Adjunct Assistant Professor of Biomedical Informatics, Columbia University	<i>Grand Ballroom E-H</i>
5:30pm-7:30pm	<u>Networking Reception</u> ○ Titan Award winners announced ○ Best Contribution winners announced ○ Gayageum Performance by Seng Chan You <i>Light refreshments will be served</i>	<i>Grand Ballroom Foyer</i>



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