

Our Journey

*Where The OHDSI Community Has Been
And Where We Are Going*
2024 edition



OHDSI

OBSERVATIONAL HEALTH DATA SCIENCES AND INFORMATICS



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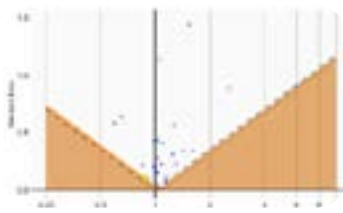
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How Can You Join The Journey?	Inside Back Cover



Project Name	Lead	Status
HADES
Kheiron
ATLAS



Similar risk of kidney failure among patients with blinding diseases who receive ranibizumab, aflibercept, and bevacizumab: an OHDSI Network Study



WELCOME TO THE COMMUNITY

We have evolved the OMOP Common Data Model, regrouping as needed and collaborating with other standards organizations, and producing the best-known clinical data model in the world, to which over 974 million unique patients have had their data converted. Our standardized vocabularies continue to grow, keeping to its promise to exploit



other vocabularies yet filling gap where needed, such as with RxNorm Extension, and opening community contributions.

We have produced new statistical methods with proven reliability advantages and with increasing citation rates from authors who previously shied away. We have produced evidence that has affected hundreds of millions of persons in areas like COVID-19 treatment and vaccination and hypertension treatment, with publications on diabetes that stand to have a large impact, and with fast turn-around on verifying research studies in areas like ophthalmology.

We have increased our reach around the world. OHDSI has a strong presence in North America, Europe and the Asia-Pacific regions, and we have seen exciting progress in both Africa and South America.

I am told that it is very unusual for a large, funded effort like OMOP (years 2009-2013) to live beyond its funding, and OHDSI as OMOP's continuation is a rare success. OHDSI now gets its core funding from diverse sources, and the community amplifies that about ten-fold through volunteer effort. Social media startups spend money to get a foothold until they make themselves indispensable, then they cash in on revenue sources like advertising. OHDSI is not about to place ads, but has been



Welcome to the fourth edition of Our Journey. George Hripcsak, who leads the OHDSI Coordinating Center at Columbia University, shares this welcome letter to all members of the OHDSI community.

OHDSI reached its tenth anniversary this past year. Ten years sounds long but feels short. As a new department chair at Columbia University, I presented my five-year plan for the department, and the other chairs started laughing, saying, "yeah, that's a ten-year plan."

Ten years later, I remembered the meeting and looked back at my old slides, and sure enough, they were right. We did accomplish the goals, but at ten years instead of five. Five years is what it takes to look like you have accomplished something; ten years is what it takes to make a real change, especially when it concerns human behavior.

In this time, we have created a community that identifies itself as OHDSI.



WELCOME TO THE COMMUNITY

working to stabilize its finances, having beneficiaries contribute to the initiative while still amplifying that investment for all OHDSI participants. OHDSI continues to seek government funding, seeing success mainly as related to its common data model. Funding its methods research and clinical studies has been spottier. Reviewers often complain that our proposals are not feasible at the scale we suggest even though LEGEND tested half a million hypotheses five years ago. They admit that our study may be more reliable than evidence currently in the literature but express concern that it still may not be perfect. And they do not particularly see a need to scale evidence generation by a thousand-fold. Therefore, selling OHDSI's vision of reliable, large-scale evidence is critical.



In the next ten years, we hope to achieve financial stability and increase trust in OHDSI. We hope to push the field to use concrete diagnostics to improve study reliability regardless of whether they use OHDSI's methods. We hope to actually increase evidence generation by a thousand-fold. Clinicians should look back at today's product labels with humor and terror, knowing that for every drug they prescribe, they can simply look at the quantified causal effect on every possible side effect and the drug's interactions with all other drugs. So-called evidence-based guidelines should actually become evidence-based rather than expert opinion laced with rare randomized trial results.

We have to work quickly, though, because ten years may sound like a long time, but it is actually quite short.

- George Hripcsak



II. OHDSI Mission and Values



OHDSI Mission

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

OHDSI Vision

A world in which observational research produces a comprehensive understanding of health and disease.

OHDSI 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.



Observational Health Data Sciences and Informatics (OHDSI, pronounced "Odyssey") strives to promote better health decisions and care by generating reliable evidence from standardized health data worldwide. It focuses on large-scale analytics that adhere to empirically proven methodological best practices and promotes collaboration through open science.

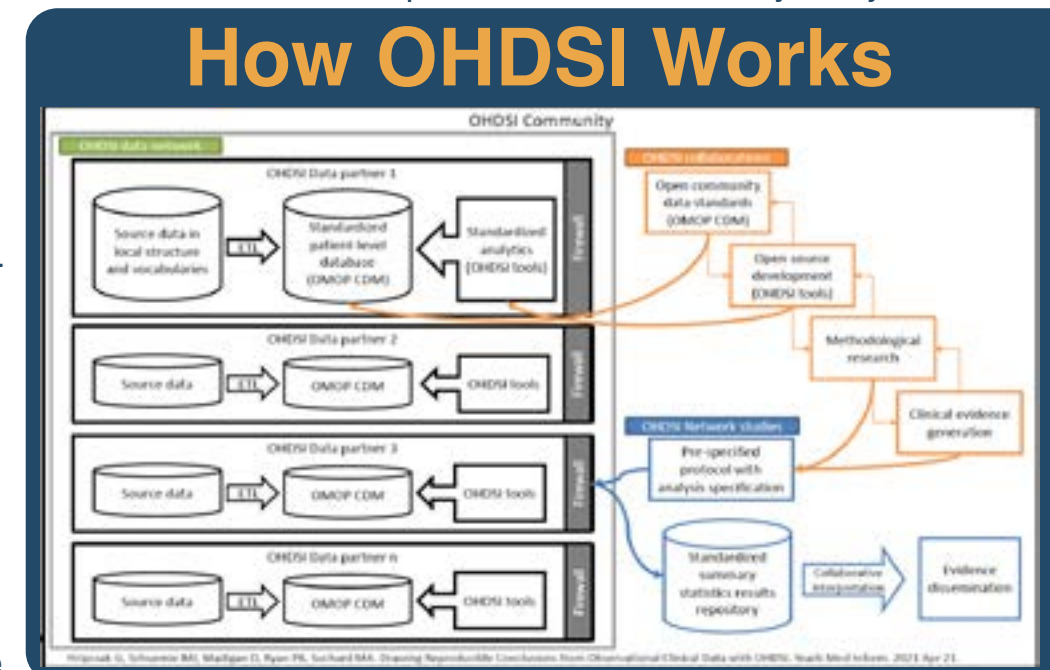


Founded in 2013, OHDSI is a growing collaborative of more than 4,200 researchers from various fields (including biomedical informatics, epidemiology, statistics, computer science, health policy, clinical sciences), representing different stakeholders (including academia, industry, government and regulatory authorities, and health providers) across 83 countries from six continents. OHDSI has created a global distributed data network that applies one open community data standard, the OMOP Common Data Model, and collectively represents more than 974 million patient records around the world. It has also developed open-source standardized analytic tools to help turn these standardized data into reliable evidence.

OHDSI collaborates to establish and evolve shared community data standards, conduct methodological research to identify and evaluate scientific best practices, develop open-source software to codify those best practices into transparent and reproducible tools, and apply these tools and practices to generate clinical evidence.

Researchers across our community conduct network studies by identifying a research question and defining protocols and analysis specifications to answer their question. Data partners across the OHDSI distributed network can opt in to execute the study analysis package, sharing aggregated summary statistics (not individual patient data), which are then collaboratively interpreted before public dissemination.

The OHDSI Evidence Network connects researchers and organizations with health data who are interested in collaborating and contributing to network studies that generate reliable real-world evidence.



The Department of Biomedical Informatics at Columbia University (DBMI) serves as the coordinating center for the OHDSI community.

Located on the Columbia University Irving Medical Center (CUIMC) campus, DBMI is both an academic department and an information services partner to NewYork-Presbyterian Hospital, a major healthcare provider in greater New York.

One of the oldest informatics departments in the United States, faculty and students at DBMI have set the path for design of clinical information systems, methodologies in clinical natural language processing, and machine learning over electronic health record data. Faculty research includes the development and evaluation of innovative information technologies, which has led to enhancements in both health and healthcare.

Both faculty and students work in a highly collaborative environment, applying informatics from the atomic level to global populations.

DBMI is committed to carrying out rigorous and reproducible science, encouraging creativity and diversity in thought, promoting an inclusive and supportive environment, and making an impact in training, informatics research, biomedicine, and patient care.



Photo by Odelia Ghodsizadeh/CUIMC

Our global community always welcomes new collaborators. OHDSI has more than 40 workgroups and regional chapters that present opportunities for members to apply their skills and interests.

OHDSI's research has been presented across various scientific societies, such as American Medical Informatics Association (AMIA), American Statistics Association (ASA/ JSM), and International Society of Pharmacoepidemiology (ISPE), and published in top medical journals, including The Lancet, JACC, JAMA, BMJ, PNAS and JAMIA. It has also informed regulatory agencies, such as the U.S. Food & Drug Administration (FDA) and the European Medicines Agency (EMA).



Please learn more about OHDSI through this publication and **Join The Journey!**

III. OHDSI Collaborators



Map of Collaborators

The OHDSI community brings together volunteers from around the world to establish open community data standards, develop open-source software, conduct methodological research, and apply scientific best practices to answer public health questions by generating reliable clinical evidence.

Our community is ALWAYS seeking new collaborators. Do you want to focus on data standards or methodological research? Are you passionate about open-source development or clinical applications? Do you have data that you want to be part of global network studies? Do you want to join a global community that truly values the benefits of open science? Add a dot to the map below and JOIN THE JOURNEY!

OHDSI By The Numbers

- 4,294 collaborators
- 83 countries
- 21 time zones
- 6 continents
- 1 community

OHDSI Workgroups

OHDSI has a central mission to improve health globally, but there are countless areas where our community can be of service. Work around data, methods, open-source tools, and clinical applications are all pieces of the puzzle. Within OHDSI, there are opportunities to work in any or many of these areas.

Our 30+ workgroups, led by the extraordinary leads shown here, present opportunities for all community members to find a home for their talents and passions. Newcomers and veterans can both make meaningful contributions to our community by collaborating in workgroups. See an area where you want to contribute? Please [Join The Journey!](#)

www.ohdsi.org/workgroups
















ATLAS		Clinical Trials		CDM Survey	
Christopher Knoll	Alexey Manoylenko	Anthony Sena	Mike Hamidi	Zhen Lin	Nicole Gerlanc
CDM Vocabulary	Common Data Model	Dentistry	Early-Stage Researchers		
Anna Ostropolets	Clair Blacketer	Danielle Boyce	Robert Koski	Faaizah Arshad	Ross Williams
Electronic Animal Health Records	Eye Care and Vision Research			FHIR and OMOP	
Manlik Kwong	Wayde Shipman	Sally Baxter	Kerry Goetz	Michelle Hribar	Davera Gabriel
FHIR and OMOP	Gen. AI & Analytics	GIS - Geographic Information System			
Ben Hamlin	Guy Tsafnat	Martijn Schuemie	Robert Miller	Andrew Williams	Kyle Zollo-Venecek

HADES		Health Equity		Healthcare Systems		Industry		Medical Devices	
Martijn Schuemie	Atif Adam	Melanie Philofsky	Paul Dougall	Sarah Seager	Asiyah Lin				
Medical Imaging			Methods Research			Natural Language Processing (NLP)			
Paul Nagy	Seng Chan You	Martijn Schuemie	Marc Suchard	Vipina Keloth	Hua Xu				
Network Data Quality	Oncology	Open-Source Community			Patient-Level Prediction (PLP)				
Clair Blacketer	Asieh Golozar	Adam Black	Paul Nagy	Jenna Reps	Ross Williams				
Perinatal and Reproductive Health				Phenotype Development & Evaluation		Psychiatry			
Alison Callahan	Stephanie Leonard	Louisa Smith	Gowtham Rao	Azza Shoaibi	Dmytry Dymshyts				
Psychiatry	Registry	Rehabilitation			Steering				
Andrew Williams	Tina Parciak	Esther Janssen	Ruud Salles	George Hripcsak	Patrick Ryan				
Surgery and Perioperative Medicine		Themis		Vaccine Vocabulary		OHDSI Workgroups Homepage			
Jenny Lane	Evan Minty	Melanie Philofsky	Oliver He	Asiyah Lin					

Regional Chapters

OHDSI spans 83 nations and six continents, and we collaborate with the intention of building one global community. However, we recognize that many geographic areas often face their own specific challenges. Several teams — both regional chapters and workgroups — have been formed to address these issues, as well as hold networking events and meetings, lead regional studies, and help their regions become valuable collaborators within our universal mission.

Several new regional chapters have been formed over the last three years, including Africa and India. We are excited to see OHDSI enthusiasm spread throughout the world. Thank you to the local leads who bring our community message into different regions of the world.

Africa		Asia-Pacific (APAC)		Australia	China
					
Agnes Kiragga	Cynthia Sung	Mui Van Zandt	Nicole Pratt	Hua Xu	
Europe		India		Japan	
					
Peter Rijnbeek	Swetha Kiranmayi Jakkuv	Vikram Patil	Parthiban Sulus	Tatsuo Hiramatsu	
Latin America		Republic of Korea		Singapore	Taiwan
					
Jose Posada	Rae Woong Park	Seng Chan You	Mengling 'Mornin' Feng	Jason Hsu	

Europe National Nodes

Over the last two years, OHDSI Europe developed National Nodes, which are collections of research institutions within a member country. The Nodes include a broad range of member groups, ranging from research institutes, pharmaceutical and IT companies, and SMEs. They are generally led by academic institutions and are inclusive and open to any organization that wants to share experiences with OHDSI-related work, such as mapping data to the OMOP Common Data Model or performing network studies.

As of September 2024, there are 14 National Nodes, representing 700 members and over 100 data sources.

Node.....	Lead(s)
Belgium	Liesbet Peeters, Annelies Verbiest, Ilse Vermeulen
Denmark	Ismail Gögenur, Martin Høyer Rose, Andreas Weinberger Rosen
Estonia.....	Raivo Kolde, Sulev Reisberg
Finland.....	Eric Fey
Germany	Ines Reinecke, Michele Zoch
Greece	Anastasia Farmaki, Pantelis Natsiavas, Grigoris Papapostolou
Israel	Chen Yanover
Italy	Lucia Sacchi, Matteo Gabetta
Luxembourg.....	Claudine Backes, Andreas Kremer, Maria Quaranta
Netherlands.....	Renske Los, Aniek Markus
Norway.....	Espen Enerly, Siri Larønningen
Portugal.....	Patricia Couceiro, Carmen Nogueira
Spain.....	Miguel Angel Mayer, Talita Duarte Salles
United Kingdom.....	Dani Prieto-Alhambra



National Nodes leads met together during the 2024 Europe Symposium.

EHDEN Celebrates Milestone

EHDEN — the European Health Data & Evidence Network — was launched to address the current challenges throughout Europe of generating insights and evidence from real-world clinical data at scale. Building on OHDSI tools and practices, EHDEN developed a public-private consortium consisting of 25 organizations that successfully implemented its mission: *to provide a new paradigm for the discovery and analysis of health data in Europe, by building a large scale, sustainable federated network of data sources standardised to the OMOP common data model.*

EHDEN's five-year IMI 2 phase ends in 2024, and the program will now transition into the EHDEN Foundation, a long-term, sustainable operation that will continue to promote and foster a strong and growing open science community, supporting studies, studyathons, methodological and technical developments, and research programmes.

OHDSI congratulates all involved with the EHDEN project on a successful first five years, and looks forward to many more years of productive collaboration ahead.

The EHDEN Data Network

After seven open calls and more than 500 applications, **187 data partners from 29 countries** were granted financial support to map their data to the OMOP CDM. This data network is now being used for large network studies in EHDEN, the EHDEN Foundation, OHDSI, and other initiatives. **64 small-to-medium enterprises (SMEs) from 22 countries** completed certification and received the seal to help data partners map their data to the OMOP CDM and install the necessary tools.



25 partners **12** nations



DARWIN EU®

The European Medicines Agency (EMA) and the European Medicines Regulatory Network established a coordination centre to provide timely and reliable evidence on the use, safety and effectiveness of medicines for human use, including vaccines, from real world healthcare databases across the European Union (EU). This capability is called the Data Analysis and Real World Interrogation Network (DARWIN EU®).

The DARWIN EU® data network currently includes 20 data partners across 13 nations — comprising more than 143 million patients — that have been mapped to the OMOP common data model. Multiple OHDSI Titan Award winners can be found leading the DARWIN EU® coordination centre, and many OHDSI tools, methods and practices are present in completed and ongoing studies.

Studies

Category	Description
Off-The-Shelf Studies	These are mainly characterisation questions that can be executed with a generic protocol. This includes studies on disease epidemiology, for example the estimation of the prevalence or incidence of health outcomes in defined time periods and population groups, or drug utilization studies at the population or patient level.
Complex Studies	These are studies requiring development or customisation of specific study designs, protocols, analytics and phenotypes. This includes studies on the safety and effectiveness of medicines and vaccines.
Routine Repeated Analyses	Routine analyses based on Off-The-Shelf or Complex Studies (see above), which are repeated with a pre-specified regularity (e.g. yearly)
Very Complex Studies	Studies which cannot rely only on electronic health care databases, or which require complex and/or novel methodological work

DARWIN EU® Leadership



Peter Rijnbeek
Erasmus MC
Executive Director, Technology Pillar Lead



Dani Prieto-Alhambra
Erasmus MC, Oxford University
Deputy Director, Development Pillar Lead



Katia Verhamme
Erasmus MC
Deputy Director, Study Operations Pillar Lead



Carlos Diaz
Synapse Research Management Partners
Management Pillar Lead



Maxim Moinat
Erasmus MC
Network Operations Pillar Lead

US FDA CBER BEST Initiative

Researchers within the OHDSI community currently provide support to the U.S. Food and Drug Administration (FDA) Biologics Effectiveness and Safety (BEST) Initiative in its mission to conduct safety and effectiveness surveillance of biologic products (vaccines, blood and blood products, tissues and advanced therapeutics).

Specific means of FDA support through this grant include serving in a convening role to 1) develop methods related to using observational data from electronic health records and administrative claims to study the effectiveness and safety of biologics, 2) work collaboratively with FDA staff to plan, develop, coordinate, host and convene meetings and workshops, and 3) educate FDA staff and external stakeholders on the BEST infrastructure, capabilities, and applications that serve FDA and stakeholder needs.

Vaccine Surveillance Methods Research



CBER Best Seminar Series

The CBER BEST Initiative Seminar Series is designed to share and discuss recent research of relevance to ongoing and future surveillance activities of CBER regulated products. The series focuses on safety and effectiveness of biologics including vaccines, blood components, blood-derived products, tissues and advanced therapies.

The seminars provide information on characteristics of biologics, required infrastructure, study designs, and analytic methods utilized for pharmacovigilance and pharmacoepidemiologic studies of biologics. They also cover information regarding potential data sources, informatics challenges and requirements, utilization of real-world data and evidence, and risk-benefit analysis for biologic products.

Seminars from 2024 are listed below. Use the QR code to visit the seminar homepage and learn about upcoming talks or watch previous sessions.

Title: Observational methods for COVID-19 vaccine effectiveness research: an empirical evaluation and target trial emulation
Presenter: Martí Català Sabaté, Medical Statistician and Data Scientist, University of Oxford

Title: A modified self-controlled case series method for event-dependent exposures and high event-related mortality, with application to COVID-19 vaccine safety
Presenter: Yonas Ghebremichael-Weldeselassie, Lecturer of Statistics at School of Mathematics and Statistics, The Open University, UK

Title: Applying Machine Learning in Distributed Networks to Support Activities for Post-Market Surveillance of Medical Products: Opportunities, Challenges, and Considerations
Presenter: Jenna Wong, Assistant Professor in the Department of Population Medicine at Harvard Medical School and Harvard Pilgrim Health Care Institute

Title: Reliability in Observational Research: Assessing Covariate Imbalance in Small Studies
Presenter: George Hripcsak, Vivian Beaumont Allen Professor of Biomedical Informatics, Columbia University

Title: Real-World Effectiveness of BNT162b2 Against Infection and Severe Diseases in Children and Adolescents: causal inference under misclassification in treatment status
Presenter: Yong Chen, Professor & Director of the Center for Health AI and Synthesis of Evidence (CHASE) at the University of Pennsylvania

Title: KEEPER: Standardized structured data from electronic health records as an alternative to chart review for case adjudication and phenotype evaluation
Presenter: Anna Ostropolets, Director, Head of Innovation Lab, Odysseus Data Services

CBER Seminar Series Homepage



Support The Journey

The OHDSI community comprises a global team of volunteers who collaborates together using open-source tools and shares best practices to support our shared mission of generating real-world evidence that promotes better health decisions and better care.

In order to foster growth in our community, the OHDSI Coordinating Center at Columbia University has created a sponsorship program. This program allows both corporations and individuals to make meaningful contributions in support of OHDSI's central coordinating activities. Any amount of support enhances both our community and our mission.

If you are interested, please reach out to sponsorship@ohdsi.org.

How does the Coordinating Center support OHDSI?

- Provides central shared infrastructure and coordinates community activities to enable community collaborations that advance OHDSI's mission
- Leads Steering Workgroup to provide guidance and support to enable the community to collaboratively generate evidence and the scientific work products necessary to generate evidence
- Supports current OHDSI leaders (workgroups, regional chapters, network studies, etc.) to achieve their objectives by communicating ongoing activities and successful accomplishments, encouraging participation and collaboration throughout the community, and empowering future leaders
- Maintains infrastructure and provides support to connect collaborators with collaboration opportunities
- Encourages more visitors to become collaborators
- Provides open access to OHDSI evidence and work products, including:
 - Distributing standardized vocabularies
 - Supporting open-source software with permissive licenses
 - Encouraging open sharing of study design and implementation
 - Maintaining open access to study results

Coordinating Center Responsibilities

Steward open community data standards <ul style="list-style-type: none"> - vocabularies - OMOP CDM - support adoption in large multi-center initiatives - foster external collaborations (HL7) 	Enable open-source development <ul style="list-style-type: none"> - host servers to enable development and continuous tool testing - GitHub repo support - support ATLAS demo - create central infrastructure 	Facilitate methods research & clinical applications <ul style="list-style-type: none"> - host ATLAS collaboration environment - support Evidence Network and ongoing network studies - lead studies and develop tools 	Encourage open sharing & evidence dissemination <ul style="list-style-type: none"> - host OHDSI RShiny servers for open sharing of results (more than 230 Shine applications, including LEGEND) - built results.ohdsi.org 	Foster collaboration & empower community <ul style="list-style-type: none"> - host and fund annual Global Symposium - maintain forums, MS Teams - facilitate weekly community calls, website, all other communications
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Coordinating Center Costs: >\$1M annually

Organizations Involved With OHDSI

OHDSI is a global community of collaborators. Many of the individuals represent organizations who contribute to and benefit from their participation in the OHDSI community. OHDSI is proud to collaborate with the more than 1100 organizations listed below, and looks forward to other organizations joining the journey as well.

2Ca-Braga • Aarhus University • Abbott • AbbVie • Academy of Nutrition and Dietetics • Accenture • ACEP • Actelion Pharmaceuticals Ltd, • Acumen Analytics, Inc. • Aditya Birla Health Services Pvt Ltd • Advantmed India LLP • Advocate Aurora Health • Aetion • Affinity Networks, Inc. • Africa Institute for Health Policy • African Population and Health Research Center • Aga Khan University Hospital • Agenzia Di Tutela Della Salute Della Provincia Di Bergamo • AHRI • Ainigma Technologies • Airlangga University • Ajou University Hospital • Akrivia Health • Albany College of Pharmacy and Health Sciences • Albert Einstein Hospital • Alberta Health Services • Alexion Pharmaceuticals • All Of Us Research Program • Allscripts • Altera Health • AMC Medical Research BV • American Academy of Neurology • American Academy of Ophthalmology • American College of Radiology • American Thrombosis and Hemostasis Network • Americas Medical Services / UHG Brazil • Amgen Canada Inc. • Amgen Inc • Amphora Health • Amsterdam UMC • Analysis Group • Ancora • Andalusian Health Service • Andrija Štampar School Of Public Health • Annexus Health • Answer Digital • Anthem • AOTMIIT • AOU Meyer IRCCS • APDP Diabetes Portugal • Apervita • AP-HM • AP-HP, INSERM, Sorbonne University • APHRC • Aptive Resources • Arcadia Inc • Architectural Medicine LLC • ARDC • Aridhia Informatics Ltd • Arizona State University • arkhn • ARS Toscana • Artexe S.p.A. • Asan Medical Center • ASCO CancerLinQ • Asociación Instituto De Investigación Sanitaria Biocruces Bizkaia • Assistance Publique - Hopitaux De Paris / Aphp • Assistance Publique Hopitaux De Marseille • Association EISBM • ASTAR SICS • Astellas Pharma • AstraZeneca • ASU • Athenahealth • Atrium Wake Forest Baptist Health • AU-EPBRN • AUNA • Auria Tietopalvelu / Varsinais-Suomen sairaanhoitopiiri • AUS Dept of Veterans Affairs • Ausl parma • AUSL Reggio Emilia • AUSL-IRCCS di Reggio Emilia • Austin Health • Avenga • AWS • Axiomedix • Az Damiaan • AZ Delta • Az Klina • AZ Maria Middelaers • Azienda Ospedaliera di Parma • Azienda Ospedaliera Nazionale Ss. Antonio E Biagio E Cesare Arrigo Alessandria • Azienda Ospedaliera Universitaria (Aou) Di Modena • Azienda Ospedaliera Universitaria Verona • Azienda Ospedaliero-Universitaria di Parma • Azienda Unità Sanitaria Locale-Irccs In Reggio Emilia • B2I Healthcare • Bahia Software • Bahir dar University • Balkh University Family of Medicine • Bambino Gesu Children's Hospital • Baroda Medical College, India • Barts Health NHS Trust • Baxter • Bayer AG • Baylor College of Medicine • Baylor Scott and White Health • BC Platforms • BCB Medical Oy • Beijing Safe House • Bendigo Health • Ben-Gurion University • Berlin Institute of Health • BI Pharma • Bill & Melinda Gates Foundation • Biogen • Bioinformatics Institute • BioSci Consulting • BioT • Boehringer Ingelheim Pharmaceuticals Inc. • Bonad • Booz Allen Hamilton • Bordeaux Hospital • Boston Medical Center • Boston University • Bradford Teaching Hospitals NHS Foundation Trust • Brazilian MOH • Brigham and Women's Hospital • Bristol-Myers Squibb • Brown Center for Biomedical Infoamtics • Brown University • BSMU • Bucheon Hospital • Buddhimed Technologies • Caliber • Campbell University School of Osteopathic Medicine • Canadian Institute for Health Information • Cancer Registry of Norway • Cancer Treatment Centers of America • Cancerdatanet GmbH • Canterbury Christ Church University • Cappelmini • Cardiff University • CareDx • Careggi University Hospital • CareQuest Institute for Oral Health • Carilion Clinic • Carnegie Mellon University • Carnegie Mellon in Qatar • Casa di Cura Privata del Policlinico • Case Western Reserve University • Catholic University of Korea Seoul St. Mary's Hospital • Catholic University of Korea Yeouido St. Mary's Hospital • CBWCHC • CCHO FZ LLC • CDPHP • Cedars-Sinai Medical Center • Cegedim Health Data • Center for Surgical Science Zealands University hospital Denmark • Centers for Disease Control and Prevention • Central South University • Centre for Big Data Research in Health, UNSW • Centre for Health Analytics, Melbourne Children's Campus • Centre for Health Informatics, University of Calgary • Centre for Prevention of Stroke and Dementia, Nuffield Department of Clinical Neurosciences, University of Oxford • Centre Hospitalier Universitaire De Lille • Centre Hospitalier Universitaire De Toulouse • Centro Clínico Champalimaud • Centro de Hemoterapia y Hemodonacion de Castilla y Leon • Centro Hospitalar e Universitário de Coimbra • cepobia • Cerner • Cerner Envia • CGD HEALTH PTY LTD. • CH ACTL EPIDEMIOLOGY • Cha University Bundang Medical Center • Charité - Universitätsmedizin Berlin • CHCO (USA) • Cherokee Health Systems • Chevron Health and Medical • Children's National • Childrens Clinical University hospital • Children's Hospital Colorado • Children's Hospital of Philadelphia • CHLA (USA) • Chonnam National University Hospital • Christie • CHU Montpellier • CIDACS - Centre for Health Data Integration and Knowledge • Cidacs/Fiocruz • Cidacs-IGM-Fiocruz • CIHI • Cincinnati Children's Hospital Medical Center • CINTESIS • CIPHEROME, Inc. • City Credit Capital UK Ltd. • Cityblock Health • Claflin University • Claim Clarity • Clarivate Analytics • Clemson University • Clinica Alemana de Santiago • Clinical Architecture • Clinical Center of Serbia • Clinical Centre of Nis • Clinical Data Interchange Standards Consortium (CDISC) • Clinical Practice Research Datalink (CPRD) • Clinical Study Support, Inc. • Cloud Senang • Cobracom, LLC • Cochrane Singapore • CODATA • Cognizant • collaborate.eu • College of Science & Technology • Columbia University • Columbia University Irving Medical Center • Comac-Medical • CommonSpirit Health • Community Pharmacy • Consentimento • ConcertAI • ConvergeHEALTH by Deloitte • Cooperative Health • Copperline Professional Solutions / Renaissance Computing Institute, UNC Chapel Hill • Cornell University • Covance • COVARIANCE P.C. • Covera Health • CPRD • CRHFEEI • Critical Path Institute • CRO Aviano • Croatian Institute of Public Health • Cultural Agents • CuriMeta, Inc. • cwdata • D'Inves72igaciones Médiques • D4L data4life gGmbH • Daccude • Daegu Catholic University Hospital • Daiichi Sankyo Europe GmbH • Dana-Farber Cancer Institute • Danylo Halatskyi LNMU • Dartmouth Health • DASA • Data Analytics Centre • Danish Medicines Agency • Data Integration Centre University Hospital Carl Gustav Carus Dresden • Data InterOps • data4life • Databricks • DataRiver S.r.l. • Datasus Ambulatory • David Griffin School of Medicine at University of California, Los Angeles • De La Salle University • Dedalus • Deepthinkhealth Inc • Defense Health Agency • Delft University of Technology • Dell Medical School • Deloitte Consulting LLP • Democritus University of Thrace and Athena Research CEnter • Department of Preventive Medicine, Yonsei University • DFCl • DHC • DHS Los Angeles • Digital China Health Technologies Company (China) • Digital Health China Technologies Co., LTD • Digital Scientists • Digulab Ltd. • DKW • DNAnexus • Doctors with Africa • Dongguk University Ilsan Hospital • Dresden University Of Technology • DRG • Drug Safety Research Unit • DS-I Africa: eLwazi (Open Data Source Platform) based at University of Cape Town • Duke Clinical Research Institute • Duke University • Duke-NUS Medical School • EAU • Eau Claire Cooperative Health Center • EBMT (EU) • edenceHealth NV • Edinburgh Cancer Center • EGCUT • EHDEN • Einstein College of Medicine • EISBM • El Camino Health • Elevance Health • Eli Lilly & Company • Elmergib University • Elsevier • Emory University • Epher, Inc • Epic Systems • Equipe Zorgbedrijven & Erasmus MC • Erasmus University Medical Center • Eric Cox Consulting LLC • Essex Management • European Health Management Association, Westminster University in Tashkent • European Medicines Agency • Evidentl Pty Ltd • Evidera • Evidnet • Ewha Womans University Mokdong Hospital • Exactis Innovation • Excelra • F. Hoffmann-La Roche AG • Fairview Health Services • Federal University of Santa Catarina • FeelBetter • FemTec Health Inc. • FIBH120 • FIIBAP • FinnGen • Finnish Cancer Registry • Finnish Institute of Health and Welfare • Fiocruz • Fisicaid • FITec • Flatiron Health • Fondazione IRCCS Ca' Granda Ospedale • Fondazione IRCCS Istituto Nazionale Dei Tumori • Fondazione IRCCS Istituto Neurologico Carlo Besta • Fondazione IRCCS Policlinico San Matteo • Fondazione Poliambulanza • Fondazione Toscana Gabriele Monasterio • Foundation for Advancing Science, Technology, Education and Research (FASTER) • Fourier Intelligence • Fraunhofer Institute for Digital Medicine MEVIS • Fred Hutch Cancer Center • Freenome • Freyr Ltd • Fudan University • Fujitsu • Funcional Health Tech • Fundación Hospital Ríoja Salud • FUS • G42 Healthcare • GA4GH • Gacheon Gil Hospital • Gangbuk Samsung Hospital • Gangdong Sacred Heart Hospital • Gangnam Severance Hospital • Gastro Health • Gates Medical Research Institute • Gates Ventures • GE Healthcare • Gedeon Richter Plc. • Geisinger • Genentech • General Hospital Of Kavala • Geneva Tumor Registry, University of Geneva • Genome BC • Genomics England • George Mason University • George Washington University • Georgetown • Georgia Institute of Technology • Georgia Tech • Georgia Tech Research Institute • Gerencia Asistencial Atención Primaria Madrid • German Center for Diabetes Research (DZD) • Germantown Academy • Getrude's Childrens Hospital • Gilead Sciences • GlaxoSmithKline • Global Value Web Technologies Pvt. Ltd. • Glsmed Learning Health • GMCK • Google • Gotthardt Healthgroup AG • Government of the Northwest Territories • Gray & Associates • Great Ormond Street Hospital NHS Foundation Trust • GRUPO AUNA • Gunma Kokusai Academy • GVW technologies • H2O.ai • Hackensack Meridian Health • Hainan Institute of Real World Data • Hallym University College of Medicine • Hamad Medical Corporation Ambulance Service • Hanover Medical School (Germany) • Hanyang University Hospital • Hartford HealthCare • Harvard Medical School • Harvard Pilgrim Health Care Institute • Harvey Walsh Ltd • Hasselt University • Haute Autorité de Santé • HCSC • HD Labs (Hilltop Digital Lab Ltd) • HDR UK • Health Compiler Inc • Health Data Research UK • Health Insurance Review and Assessment Service • Healthark Insights • Healthcare Innovation Catalysts • Healthcare Triangle Inc • Healthcare • HealthPartners • HealthVerity • Hebei Mental Health Center • Heliant Ltd • Helix • Helix Biogen Institute • Helsinki University Hospital • Helwan University • Hengrui Pharmaceuticals • Hennepin Healthcare Research Institute • Herbarium • Hierarchia D.O.O. On Behalf Of University Hospital Centre Zagreb • HIKE HEALTH • Hilltop Digital Lab Ltd • Himformatics • Hinge Health • HITLAB • HKU • HL7 • HM Hospitals • HMAI • HMAR • Holmusk • Holon Institute of Technology • Hopital Universitaire de Bruxelles - Institut Jules Bordet • Hospital Universidad Del Norte • HORIANA • Hospital Authority • Hospital District Of Southwest Finland (Varsinais-Suomen Sairaanhoidopiiri) • Hospital do Espírito Santo de Évora • Hospital Israelita Albert Einstein • Hospital U. Fundación Alcorcón • Hospital Universitario 12 de Octubre • Hulafe (Spain) • Humana • Humanitas Mirasole s.p.a. • Humanized Health Consulting, LLC • Hus Datalake Ecoreform Poc • Hwasun Chonnam National University Hospital • IBM T.J. Watson Research Center • Icahn School of Medicine at Mount Sinai • ICIPE • ICON • ICVS (Portugal) • IDIAP Jordi Gole • Idisba • Idival • iHealth Data Sciences LLC • IHHN • IIAS • IIHMR, Bangalore • IIIT Guwahati • IISER • IKNL • Imam Abdulrahman Bin Faisal University • IMASIS • IME • Imosphere Ltd • Imperial College London • Imperial College Of Science Technology And Medicine • INABICERTH • Incheon Sejong Hospital • InCRyptable Consulting Group • Independence Blue Cross • Indian Society for Clinical Research • Indiana University School Of Medicine • Indiana University, Indianapolis • Infinite Computer Solutions • Infosys Limited • Inha University Hospital • Inje University Seoul Paik Hospital • INKL • innovaccer • Innovative Medical Research SA • Inova Health • Insight Health • INSPIRE EAST

AFRICA • Institute for Evidence-Based Health (ISBE) • Institute for Implementation Science and Health • Institute for Medical Research/Durham VA • Institute of Applied Biosciences, Centre for Research and Technology Hellas • Institute of Medical Bioinformatics and Systems Medicine • Instituto de Investigacion Hospital 12 de Octubre • Int'l Uni of Health And Welfare • Integra Connect • Integraal Kankercentrum Nederland • Intermountain Healthcare • International Society for Pharmacoepidemiology • International University of Health and Welfare • InterSystems • IOMED Medical Solutions • IPRO • IQVIA • IRCCS Azienda Ospedaliero-Universitaria di Bologna • IRCCS Istituto Romagnolo per lo Studio dei Tumori (IRST) • IRCCS Policlinico San Donato • IRCCS San Matteo Pavia • IRST (Italy) • ISBST & National School of Computer Sciences, Tunisia • Islamia University of Bahawalpur • Istanbul University Istanbul Faculty of Medicine • Istanbul University-Cerrahpasa • Istituto nazionale dei tumori • ISU • Italian College of General Practice and Primary Care (SIMG) • ITClinical • ITTM S.A. • J. Craig Venter Institute • Jackson Laboratory • Jacobi Medical Center • Janssen Pharmaceuticals • Janssen Research & Development LLC • Jayne Koskinas Ted Giovanis Foundation • Jiangxi Province • JIBB Enterprises LLC • Johns Hopkins School of Medicine • Johns Hopkins University • Johns Hopkins University School of Medicine • Johnson & Johnson • Joint Clinical Research Centre • JSS Academy of Higher Education & Research, Mysuru • Juntendo Uni SOM • Kabale University • Kainos • Kaiser • Kaiser & Prusse • Kaiser Permanente Riverside Medical Center • KAIST • Kangwon National University Hospital • Karolinska Institutet • KAUST • Keio University • Kent and Medway Medical School • Khoo Teck Puat Hospital • KI Research Institute • Kilimanjaro Christian Medical University College of Management and Development for Health • Kilimanjaro Clinical Research Institute • King Abdulaziz University • King Saud University Medical City • King's College London • Kliničko-Bolnički Centar Zvezdara • Knight Cancer Institute • Koc University • Konkuk University Hospital • Konyang University Hospital • Kootenai Health • Korea Advanced Inst of Sci and Tech • Korea University Anam Hospital • Korea University Ansan Hospital • Korea University Guro Hospital • Korfe Bu Teaching Hospital • Kyoto University • Kyunghee University Hospital • Kyungpook National University Hospital • Kyushu University Hospital, Japan • La Trobe University • Lancashire Teaching Hospitals NHS Foundation Trust • LBI Digital Health and Patient Safety • Lean Business Services • Leeds Teaching Hospitals NHS Trust • Leiden MC • Leukemia and Lymphoma Society • Lifebit • Lifeline • LIH (Luxembourg) • Limics • LinkDoc • LMU Munich University Clinic • LMU of Munich • Loma Linda University • Los Angeles County Department of Health Services: Women's Health Innovation • Loyola University (NOLA) • LSHTM • LTS Computing LLC • Lund University • Lundbeck • Lynxcare Clinical Informatics NV • M2GEN • Maastricht University Medical Centre • Maggiore Policlinico • Mahidol University • Maine Medical Center Research Institute • MaineHealth • Management Sciences for Health • Manipal college of Pharmaceutical Sciences, MAHE • Marina Salud S.A. • Mass General Brigham • Mathematica • Mayo Clinic • McGill University • MCRI • MD Partners, Inc. • MDV (Japan) • MEBM CARE • Medaman BV • Medcase • Mederrata Inc • Medexprim • Medibloc • Medical College of Wisconsin • Medical Device Innovation Consortium (MDIC) • Medical Engineering Institute, Inc. • Medical University of Graz • Medical University of South Carolina • Medical University of Vienna • Medicalscan Ltd • MedMana • medondo • MedStar Health Research Institute • Meharry Medical College • Melbourne University • Memorial Sloan Kettering Cancer Center • Merative • Mercer • Merck & Co. • MGH/MGB CHOeRUS • Michigan Department of Health and Human Services • Michigan Medicine • Microsoft Corporation • Military University Of Technology • Minderoo Foundation • Ministry Of Health Singapore • Minneapolis VAMC • Misoinfo • MIT • MITRE Corporation • MITYUNG INFOTECH (P) LTD. • MLCommons • Moffitt Cancer Institute • Moh • Momentum AD • Monash University • Monash University Malaysia • Montefiore Health System • Mount Sinai School of Medicine • Mountains of the Moon University • Moxe Health • MS Forschungs- und ProjektentwicklungsgGmbH • MS Urban Research Center • MSD • MSFF-gGmbH • MTG Research and Development Lab • MTPPI • MU Vienna • Murdoch Children's Research Institute • Myongji Hospital • Myriad Genetics Inc • NACHC • Nanfang Hospital • Nanjing Audit University • Nanjing Medical University • Nanyang Technological University • NATGO DATA GROUP, INC • National and Kapodistrian University of Athens • National Cancer Center • National Cancer Center Hospital East • National Cancer Hospital East • National Cancer Institute • National Center for Advancing Translational Sciences (NCATS) • National Health Insurance Corporation Ilsan Hospital • National Institute Health Research UK • National Institute of Public Health (Japan) • National Marrow Donor Program • National Organization of Rare Disorders • National Organisation of Hospital (SG_NUH) • National University of Singapore • Navigating Cancer • NCQA • NEC SWS • Nemours • NeoGenomics • NESToC • Netherlands Comprehensive Cancer Organisation (IKNL) • Network Health • network.bio • New York Genome Center • New Zealand Ministry of Health • NextGen Healthcare • NHIRD • NHMRC Clinical Trials Centre, University of Sydney • NHS • NICE • Nicklaus Children's Health System • NIH All of Us Research Program • NIP • NJ Department of Health • Northeastern University • Northeastern University - Roux Institute • Northshore University Health System • Northside Hospital • Northumbria Healthcare NHS Foundation Trust • Northwell Health • Northwestern Medicine, Feinberg School of Medicine • Northwestern University • Norwegian Center For E-health Research • Novartis • Novartis India • Novo Nordisk Inc. • NSI • ntdata • Nuance Communications • Nuffield Health (UK) • NYU Langone Health • OAKS Consulting s.r.o. • Odysseus Data Services • OHSU • Okayama University • Oklahoma U • OMNY Health • Oncoclinicas • Open Evidence • OPEN Health • Oppo Guangdong Mobile Communication Co., Ltd. • Optima • Optimum Patient Care Limited • Optum • Oracle Corp • Oregon Health & Science University • Oregon State University • Oslo University Hospital • OSU Medical Center • Ottawa Hospital Research Institute • Outcomes Insights • P.G.M.D. Consulting Srl • p95 • Palo Alto VA medical center • Parc de Salut Mar Barcelona • Pareto Intelligence • Parexel International • Paris Saclay Cancer Cluster (PSCC) • Paxata • PCCI • Pedianet • PEDSnet • Peking Union Medical College Hospital • Peking University • Penn Medicine • Penn State College of Medicine • Penn State University • Peter MacCallum Cancer Foundation • Pfizer • Pharma-covigilance Program of India • PHC-Medicom • PHI Digital Healthcare • Philips Research • PhysioNet • PicnicHealth • Pirkanmaa Hospital District • Plateforme De Données De Santé • Plinth Analytics • Policlinico di Milano • Policlinico San Donato S.P.A. • Pontificia Universidad Católica de Chile • Pontificia Universidad Javeriana - Bogota, Colombia • PortoPiccolo Group • Portuguese Institute of Oncology of Porto • Precision Data • Premier Healthcare • Principia Health Sciences, Inc • Prisma Health • Promptly Health Analytics • Providence Global Center • PSMAR (Barcelona) • PSSJD • PUCPR • Purdue University • Pusan National University Hospital • Qassim University • Quang Ninh Department of Health • Queen Mary University Of London • Queensland Health • Quinten • RAACAI • Rambam Health Care • Rambam Medical Center • RCGP (UK) • Reading University • REDCap Cloud • Regeneron • Regenstrief Institute • Reliant Medical Group • Rice University • Rigshospitalet • RIVM • Robot Bacon • Roche • Roivant • Rotterdam School of Management, Erasmus University • Royal Children's Hospital • Royal Surrey Hospital • RTI Health Solutions • RTI International • Ruijin Hospital, Shanghai Jiao Tong University School of Medicine • rumor.ml • Rush UMC • Rutgers University • RWJ Barnabas • SA Health • Saarlant University Hospita • Sage Bionetworks • SAIL Databank • Saint Louis University School of Medicine • Samsung Seoul Hospital • Samvit Solutions • San Diego State University • Sanata Dharma University • Sanford Health • Sanofi • University of Rome • SAS • Saudi Food and Drug Authority • Save the Children International • SBSHSL • Scibite • SciForce Solutions • SEA Healthcare • Secretaria Municipal da Saúde da Cidade de São Paulo • sem4 • SemanticClarity • Semantix • Semmelweis Egyetem • Sensyne Health • Sentara Healthcare • Seoul National University Boramae Hospital • Seoul National University Bundang Hospital • SERMAS & FIIBAP • Servicio de Salud Araucania Sur • Servicio Navarro de Salud Osasunbidea • Seven Bridges • Severance Hospital • Shanghai Chest Hospital • Shenyang Pharmaceutical University • Shri Jagannath Medical College and Hospital • Shuanghe Hospital • SICS - A*STAR • SiData+ • Siemens Health Services • Sigma Ingeniería • Sigmadata Consulting Services • SIMG (Italy) • Singapore Health Services Pte Ltd • Siriraj Hospital • Six Aims LLC • SKM • SLUHN • Smartanalyst India Pvt Ltd • SMS-SP • SNOMED CT • Snowflake • SoftServe Inc • soft-tech • Soonchunhyang University Medical Center • Sorbonne University • South Western Sydney Local Health District • Spectrum Health • Spence • SpinSys • Spok • St Jude Children's Research Hospital • St. Luke's (Idaho) • Stanford Healthcare • Stanford School of Medicine • Stanford University • STATINMED • Stephens Family Clinical Research Institute • Stichting Integraal Kankercentrum Nederland • STIZON • Stony Brook Medicine • Stony Brook University • Sun Yat-sen University • Sunnybrook Research Institute • Swansea University • Swiss Re • Syapse • Sydney LHD • Sydney Local Health District • Symmetric Health Solutions • Sysmap • Taibah University • Taipei Medical University • Taipei Municipal Wanfang Hospital • Takeda • Talosix • Tampere University • Tan Tock Seng Hospital • Tariab Modares University • Tata Consultancy Services • Technical University Sofia • Technological University Dublin • Tehran University of Medical Sciences • Temote Systems • Tempus • Texas Childrens Hospital • Texas State University • Texas Zephyr Research • TFS HealthScience • The Christie NHS Foundation Trust • The Fifth Affiliated Hospital of Sun Yat-sen University • The Hospital District of Southwest Finland • The Hospital for Sick Children • The Hyve • The Royal Children's Hospital • Thomas Jefferson University • Tianjin Anding Hospital • Tianjin Medical University • TietoEVRY • Timformatie • Tokyo University • Touro College of Pharmacy • TrakPop Inc. • tranSMART • TrialSpark • Trio Health • Triomics • TU Dresden • Tufts Medical Center • Tulane • Tuva Health • TVHS VA/ VUMC • U Aberdeen • U Alabama at Birmingham • U Alcalá • U Arizona • U Arizona, College of Medicine-Phoenix • U Arkansas • U Basel • U British Columbia • U Calgary • U California Los Angeles • U California San Diego • U California San Francisco • U Cambridge • U Canterbury • U Cape Town • U Chicago • U chinese academy of social society • U Cincinnati • U Colorado Anschutz Medical Campus • U Colorado School of Medicine • U Copenhagen • U Dbreccen • U Deusto • U Dundee • U Edinburgh • U Florida • U Florida College of Medicine • U Florida School of Dentistry • U Galway • U Georgia • U Gothenburg • U Hong Kong • U IL Chicago • U Ilorin • U Iowa • U Iowa College of Pharmacy • U Kansas • U Kansas Medical Center • U Kent • U Kentucky • U Limerick • U Liverpool • U Louisville • U Lübeck, Germany • U Macau • U Maine • U Manchester • U Maryland • U Maryland Baltimore • U Mass Memorial MC • U Melbourne • U Miami • U Michigan School of Dentistry • U Michigan, Ann Arbor • U Minho • U Minnesota • U Mississippi MC • U Missouri-Columbia • U Missouri-Kansas City • U Nebraska Medical Center • U New England • U New Hampshire • U New Mexico • U New South Wales • U North Carolina at Chapel Hill • U Nottingham • U Oslo • U Oxford • U Pavia • U Pécs • U Pennsylvania • U Pittsburg • U Porto • U Rochester • U Rochester Medical Center • U Rwanda • U San Francisco • U São Paulo Medical School • U South Australia • U South Carolina • U South Carolina College of Pharmacy • U Southern California • U Southern California Keck School of Medicine • U Sydney • U Tartu • U Tennessee Health Science Center • U Texas at Austin • U Texas Health Science Center at Houston • U Texas Southwestern Medical Center • U the Philippines Manila • U Toronto • U Tsukuba • U Twente • U Utah • U Utah College of Nursing • U Vermont • U Victoria • U Virginia • U Washington • U Wisconsin-Madison • U Witwatersrand • U.S. Navy • UBS Vila Dalva • UBuffalo • UCB • UCI • UCL • UFRN • Uganda Cancer Institute • UH Geneva • UHasselt • UHG (USA) • UIO • UiT - The Arctic University • UK Biobank • UK-CRIS • UKER • Ulsan University Hospital • Ultragenic Research and Technologies • UMass Chan Medical School • UMC New Orleans • UMC Utrecht • UMessina • UMMC • UMMMS • Unicamp • Unidade Local De Saúde De Matosinhos Epe • Unified Patient Network • UNIMED DO BRASIL • UNITED HEALTH GROUP • BRAZIL • United Health Group Brasil • United States Air Force • Universidad Autonoma del Caribe • Universidad del Desarrollo • universidad politecnica de madrid • Università degli studi di Brescia • Universitaria Integrata Verona • Universität Leipzig • Universitätsmedizin Greifswald • Université De Bordeaux • Université De Genève • University Blanquerna • University College London • University Health Network • University Hospital of Parma • University hospital Basel • University Hospital for Tumors, Sestre milosrdnice University Hospital Center • University hospital of Parma • University hospital of Rennes • University Hospital of the Saarland • University Hospital Southampton • University Hospitals Bristol and Weston NHS Trust • Universitätsmedizin Greifswald • UNM Comprehensive Cancer Center • UNSW Sydney • US Department of Defense • US Department of Veterans Affairs • US Food & Drug Administration • US National Cancer Institute • US National Institutes of Health • US National Library of Medicine • USAID • USC • UT Southwestern Medical Center • Utah Health Workforce Information Center • Utrecht University • UWC • UZ Brussel • Vali D'Hebrón Hospital Campus • Vanderbilt University • Vanderbilt University Medical Center • VCU • VDH • Vector Institute • Ventech Solutions, Inc • Veradigm • VeraTech for Health • Verily Life Sciences • Vertex Pharmaceuticals • Veterinary Terminology Services Lab at Va Md College of Veterinary Medicine • Virginia Tech • VHA • VHBHC Institute • Virginia Commonwealth University • Virginia Tech University • VIRTUSA • Vivante Health Software • Vivent Health • Vrije Universiteit Amsterdam • VUMC • Wake Forest • Wanfang Hospital • Washington University • Weill Cornell Medical Center • Wellstack • Wemedo AG • WHO Uppsala Monitoring Centre • William Beaumont University Hospitals • Winship Cancer Institute of Emory University • WMichigan USOM • Wondersgroup • Wonju Severance Hospital • Wonkwang University Hospital • WVU • XuanWu Hospital • Yale School of Medicine • Yale University • Yongjin Severance Hospital • Yonsei University • Yuimedi, Inc. • Zebra Health Net • ZEG Berlin GmbH • zhejianglab • Ziekenhuis Oost-Limburg • ZNA • Zoadigm • ZOL (Belgium) • ZS Associates

Testimonials From The

There is something unique about the OHDSI organization and how they support the community, which motivates the community to work as a whole. We know that with greater diversity and inclusiveness, there is greater creativity and innovation. The whole is always greater and bigger than the total sum of individuals.



Asiyah Lin

Senior Data Scientist Consultant, Axle Informatics

While my time in the OHDSI community is relatively brief, the environment struck a chord with me immediately. What stands out is how the community welcomes expertise from myriad backgrounds. Whether you're a seasoned researcher, a data scientist, a clinician, or even someone just starting in healthcare analytics, OHDSI is a platform



where different levels of familiarity converge to nurture actionable knowledge. Engaging with the various workgroups, events, and projects provides an avenue for personal and professional growth.

Atif Adam

Associate Director of Epidemiology, IQVIA

The fact that the community is open to everyone and anyone means that the opportunities to lead, step forward or even just listen from afar is all possible and so for me to be part of this ever-evolving community means I can bring my ideas and thought leadership with me.



Sarah Seager

Associate Partner, Infosys Consulting

A nice thing about OHDSI is the speed you can move from novice to intermediate and how people provide you with trust to perform analysis but also support you in doing so. You're never left on an island, there is always a boat and someone willing to sail with you.



Simply put, my PhD would have been impossible without the OHDSI tool-stack and the community.

Ross Williams

Assistant Professor, Erasmus MC

OHDSI Community

OHDSI's mission, vision and values align with my views and desires to produce reliable, real-world evidence to inform decisions on their healthcare. I didn't set out to become a leader in the OHDSI community. "Pay it forward" is one of my favorite mottos and I enjoy sharing knowledge, mentoring, and teaching. OHDSI is such an open and welcoming community, it just came naturally to share what I have learned with others.



Melanie Philofsky

Senior Business & Data Analyst with Odysseus Data Services, Inc.



Connecting with the international OHDSI community has enabled us to use standardized data formats that are synchronized globally, which is fundamental for international collaboration. Additionally, we can utilize the high-quality and efficient data analysis tools developed by OHDSI, significantly enhancing our research efficiency and quality.

Jason Hsu

Assistant Professor, Taipei Medical University

Collaborator
Spotlight
Homepage



OHDSI has been amazing for giving me ideas on what to work on throughout my PhD journey, including class projects and my thesis. I have floated in and out of several working groups to see where there might be potential project ideas or mentors for my research.



As an informatics student, one of the huge barriers is access to a source of significant data that is fit for purpose. The OHDSI community is a great resource and is very collaborative.

Kerry Goetz

Associate Director, National Eye Institute's Office of Data Science and Health Informatics

The Titan Awards

The Titan Awards, first introduced in 2018, recognize OHDSI collaborators (or collaborating institutions) for their contributions towards OHDSI's mission.

Each year, community members nominate individuals or institutions they feel have made significant contributions towards advancing OHDSI's mission, vision and values. Once nominations are submitted, the OHDSI Titan Award Committee selects the recipients, and the honorees are announced at the annual Global Symposium.

The award categories, past recipients and 2024 Titan nominees can be found in this section.

Data Standards

This Titan Award recognizes extraordinary contributions by an individual, organization, or team in development or evaluation in community data standards, including OMOP common data model and standardized vocabularies

2023 – Gowtham Rao and Azza Shoaibi, Janssen Research and Development

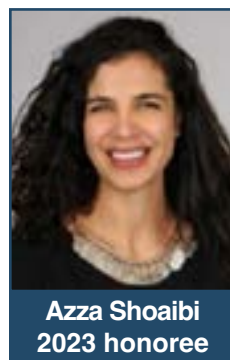
2022 – Melanie Philofsky, Odysseus Data Services
2021 – Maxim Moinat, The Hyve/ Erasmus University Medical Center

2020 – Clair Blacketer, Janssen Research and Development
2019 – Oncology Workgroup (Michael Gurley, Northwestern University; Rimma Belenkaya, Memorial Sloan Kettering Cancer Center; Robert Miller, Tufts CTSI)

2018 – Vocabulary team (Christian Reich, IQVIA; Anna Ostropolets, Columbia University; Dmitry Dymshyts, Odysseus Data Services)



Gowtham Rao
2023 honoree



Azza Shoaibi
2023 honoree

Methods Research

This Titan Award recognizes extraordinary contributions by an individual, organization, or team in development or evaluation in analytical methods for clinical characterization, population-level effect estimation, or patient-level prediction

2023 – Jiayi (Jessie) Tong, University of Pennsylvania

2022 – Fan Bu, University of California, Los Angeles
2021 – Yong Chen, University of Pennsylvania
2020 – Nicolas Thurin, Université de Bordeaux
2019 – Jenna Repts, Janssen Research and Development
2018 – Martijn Schuemie, Janssen Research and Development; Marc Suchard, University of California, Los Angeles



Jiayi (Jessie) Tong
2023 honoree



Open-Source Development

This Titan Award recognizes extraordinary contributions by an individual in design, development, testing, and deployment of open-source software to enable observational analyses

2023 – Katy Sadowski, Boehringer Ingelheim

2022 – Egill Fridgeirsson, Erasmus MC; James Gilbert, Janssen Research and Development
2021 – Adam Black, Odysseus Data Services
2020 – Anthony Sena, Janssen Research and Development
2019 – Pavel Grafkin, Odysseus Data Services
2018 – Christopher Knoll, Janssen Research and Development



Katy Sadowski
2023 honoree

Clinical Applications

This Titan Award recognizes extraordinary contributions by an individual, organization, or team in generating clinical evidence that improves health by informing better health decisions and better care

2023 – Center for Surgical Science (led by Ismail Gögenur)

2022 – Xintong Li, University of Oxford
2021 – Asieh Golozar, Odysseus Data Services
2020 – Jenny Lane, University of Oxford
2019 – Oxford Study-A-Thon (Dani Prieto-Alhambra, University of Oxford; Edward Burn, University of Oxford; Jamie Weaver, Janssen Research and Development; Ross Williams, Erasmus University Medical Center)
2018 – Seng Chan You, Ajou University



Center for Surgical Science • 2023 honoree



2023 Titan Award honorees (not pictured: Nicole Pratt)

OHDSI COLLABORATORS
**Community
 Collaboration**

This Titan Award recognizes an individual for their collaborative spirit in helping their fellow community members reach their goals.

2023 – Cynthia Sung, Bill & Melinda Gates Medical Research Institute



Cynthia Sung
2023 honoree

2022 – Ajit Londhe, Boehringer Ingelheim

2021 – Erica Voss, Janssen Research and Development

2020 – Talita Duarte-Salles, IDIAPJGol

2019 – Andrew Williams, Tufts Medical Center

2018 – Kristin Kostka, Deloitte; Mui Van Zandt, IQVIA

**Community
 Support**

This Titan Award recognizes an individual, team, or organization for their contributions to ensuring the sustainability of the OHDSI community.

2023 – Gyeol Song, IQVIA



Gyeol Song
2023 honoree

2022 – Craig Sachson, Columbia University

2021 – Faaizah Arshad, UCLA; Ross Williams, Erasmus University Medical Center

2020 – COVID-19 Support Team, Erasmus University Medical Center

2019 – James Wiggins, Amazon Web Services

2018 – Lee Evans, LTS Computing LLC

IV.

**Collaborative
 Events &
 Activities**



**Community
 Leadership**

This Titan Award recognizes an individual for their leadership in advancing the OHDSI mission.

2023 – Nicole Pratt, University of South Australia



Nicole Pratt
2023 honoree

2022 – Paul Nagy, Johns Hopkins University

2021 – Mui Van Zandt, IQVIA

2020 – Dani Prieto-Alhambra, University of Oxford

2019 – Peter Rijnbeek, Erasmus University Medical Center

2018 – Rae Woong Park, Ajou University School of Medicine

**Congratulations to
 our 2024 nominees!**

Alexander Davydov • Andrew Kanter • Anna Ostropolets • Anthony Sena • April Olympians Team • Asieh Golozar • Ben Martin • Benjamin Viernes • Christopher Mecoli • Cindy Cai • Clair Blacketer • Cynthia Sung • Daniel Morales • Danielle Boyce • DARWIN EU Development Team • Elisse Katzman • Evanette Burrows • Eye Care and Vision Research Workgroup • Frank DeFalco • George Hripcsak • Greg Klebanov • Henrik John • Hsin Yi Chen • J Swetha Kiranmayi • Jack Janetzki • James Weaver • Jared Houghtaling • Jen Park • Joel Swerdel • John Gresh • Jung Ho Kim • Justin Manjourides • Kyle Zollo-Venecek • Liesbet Peeters • Linying Zhang • Louis Hendricks • Maarten van Kessel • Manlik Kwong • Marc Suchard • Marta Pineda-Moncusi • Marti Catala Sabate • Martijn Schuemie • Martin Lavalley • Maxim Moinat • Michael Gurley • Michael Matheny • Michel Walravens • Michelle Hribar • Minnesota EHR Consortium Health Trends Across Communities Project Team • Montse Camprubi • Mengling 'Mornin' Feng • Natthawut 'Max' Adulyanukosol • OHDSI APAC ETL Team • O-HDSI Standardized Vocabularies Team • Oleg Zhuk • Parthiban Sular • Polina Talapova • Qi Yang • Renske Los • Rich Boyce • Robert Koski • Robert Miller • Roger Carlson • Scott DuVall • Thamir Alshammary • Theresa Burkard • Thomas Falconer • Tom Seinen • Vishnu Chandrabalan • Vlad Korsik • Will Kelly • Zhen Lin

The OHDSI Symposium

There is nothing quite like an OHDSI symposium.

From events held in the U.S., Europe or Asia, our annual symposia are among the most anticipated events of the year. Plenary talks, tutorials, workshops and the collaborator showcase create opportunities to share research, learn from each other, and collaborate on future opportunities.

These events also allow our global community an opportunity to connect face-to-face. Whether it is to share scientific breakthroughs, build massive Lego sets or dance on stage together, each symposium brings our community together and sets new paths for collaboration.

Oct. 20, 2015 • Washington, D.C.

Sept. 23-24, 2016 • Washington, D.C.



Oct. 18-20, 2017 • Bethesda, Md.

Mar. 23-24, 2018 • Rotterdam, Neth.



Oct. 11-13, 2018 • Bethesda, Md.

Mar. 29-30, 2019 • Rotterdam, Neth.



June 27-29, 2019 • Guangzhou, China

Sept. 15-17, 2019 • Bethesda, Md.



Dec. 12-14, 2019 • Gwangju, Korea

June 24-26, 2022 • Rotterdam, Neth.



Oct. 14-16, 2022 • Bethesda, Md.

July 13-14, 2023 • Sydney, Australia



July 1-3, 2023 • Rotterdam, Neth.

Oct. 20-22, 2023 • East Brunswick, N.J.



Nov. 12-13, 2023 • Taipei, Taiwan

June 1-3, 2024 • Rotterdam, Neth.



Relive #OHDSI2024



This annual publication is produced prior to each year's global symposium, so we can't share images or outcomes from the 2024 event yet. However, OHDSI2024 promises to be a memorable one, including talks around 'Clinical Insights from LEGEND-T2DM' and the 'Value Proposition for Participating in OHDSI Network Studies like LEGEND-T2DM', five tutorials, more than 130 posters/software demos and more.

Check out the agenda below, and use the QR code after the event to find recordings of the talks and tutorials, posters and all other materials!

Tutorials

An Introduction to the Journey from Data to Evidence Using OHDSI

Faculty: Daniel Prieto-Alhambra, Jenna Reps, Mui Van Zandt, Erica Voss, Linyiing Zhang

Conducting 'Off-The-Shelf' Characterization Studies Using DARWIN EU® Tools and the OMOP CDM

Faculty: Edward Burn, Dani Prieto-Alhambra, Martí Català Sabaté, Maarten van Kessel

Developing and Evaluating Your Extract, Transform, Load (ETL) Process to the OMOP Common Data Model

Faculty: Clair Blacketer, Melanie Philofsky, Katy Sadowski

So, You Think You Want To Run an OHDSI Network Study?

Faculty: Yong Chen, Nicole Pratt, Anthony Sena, Andrew Williams, Seng Chan You

Using the OHDSI Standardized Vocabularies for Research

Faculty: Anna Ostropolets, Vlad Korsik, Azza Shoabi, Polina Talapova, Oleg Zhuk

Presentations

State of the OHDSI Community

Presenters: George Hripcsak, Amber Reed

Clinical Insights from LEGEND-T2DM

Presenters: Arya Aminorroaya, Phyllis Thangaraj, Hannah Yang, Daniel Morales, Aline Pedrosa

Value Proposition for Participating in OHDSI Network Studies

Presenters: Clair Blacketer, Scott Duvall, Talita Duarte-Salles, Thanh-Phuc Phan, Atif Adam

Panel: JACC-OHDSI Partnership

Presenters: Harlan Krumholz, Seng Chan You, Yuan Lu, Nicole Pratt, Marc Suchard

Showcase Lightning Talks

Presenters: Kathleen Mullen, Joel Swerdel, Sujin Gan, Edward Burn, Jiayi Tong, Dazheng Zhang, Samuel Patnoe, Hsin Yi Chen

Collaborator Showcase

120 posters
16 software demos

Closing Talk

Presenter: Patrick Ryan

OHDSI Community Calls

The weekly OHDSI community call brings our global network together to share research, discuss various topics around observational health, keep apprised on community updates, learn about recent OHDSI research, open-source tools or best practices within the community, meet potential collaborators, and plenty more. Our weekly calls, led by Craig Sachson, take place on Tuesdays at 11 am ET. They are recorded and posted to both OHDSI.org and our YouTube channel.

This section highlights many of the meeting topics over the last year; please check out ohdsi.org/community-calls to learn more about these interactive community gatherings.

Sept. 5: DARWIN EU[®] Progress and Roadmap



Peter Rijnbeek
Professor of Medical Informatics and Chair, Department of Medical Informatics, Erasmus MC



Katia Verhamme
Associate Professor of Use and Analysis of Observational Data, Department of Medical Informatics, Erasmus MC



Ed Burn
Senior Researcher in Epidemiology and Health Economics, University of Oxford

Sept. 19 • OHDSI Journal Club: 11th Revision of the ENCaPP Guide on Methodological Standards in Pharmacoepidemiology



Catherine Cohet
Pharmacoepidemiology Senior Specialist, Wellcome, Data Analytics & Methods Data Team, Luxembourg Medicines Agency



Niklas Norén
Chief Science Officer, Janssen, Seattle



Xintong Li
PhD Student in Medical Statistics and Clinical Epidemiology, University of Oxford



Luis Pinheiro
Senior Epidemiology Team, Luxembourg Medicines Agency



Kim López Güell
PhD Student in Medical Statistics and Clinical Epidemiology, University of Oxford



Albert Prats-Urbe
Senior Clinical Researcher and Public Health Specialist, Universitat de València



Daniel Morales
Senior Pharmacoepidemiologist, Luxembourg Medicines Agency



Dani Prieto-Alhambra
Senior Head - Health Data Science, Biostatistics Research Centre and Professor, University of Oxford and Erasmus MC

Jan 23: 2023 UK Study-a-Thon Lessons Learned



Dani Prieto-Alhambra
Professor of Pharmaco- and Device Epidemiology, Oxford University



Jennifer Lane
NIHR Clinical Lecturer in Trauma and Orthopaedic Surgery, Barts Bone and Joint Health, Queen Mary Univ. of London



Katherine Donegan
Head of Epidemiology, MHRA



Annika Jodicke
Senior Researcher in Pharmacoepidemiology, University of Oxford

Jan 30: Introduction to Phenotype Phebruary



Azza Shoaibi
Director, Observational Health Data Analytics, Janssen Research and Development



Anna Ostropelets
Associate Director, Observational Health Data Analytics, Janssen Research and Development



Jamie Weaver
Associate Director, Observational Health Data Analytics, Janssen Research and Development

March 5: Vocabulary Release Update



Alexander Davydov
Director (Lead of Medical Ontologies), Odysseus Data Services



Oleg Zhuk
Vocabulary Technical Lead, Odysseus Data Services



Anna Ostropelets
Associate Director, Observational Health Data Analytics, Janssen Research and Development



Christian Reich
CEO, Odysseus Data Services

This call will also include a closing presentation on Phenotype Phebruary 2024.

Thank you to everybody who joined in this community activity!

March 26: Recent OHDSI Publications



Tathagata Bhattacharjee • University of London
NDPPE Analysis: a pan-African integrated suite of services for harmonising longitudinal population health data using OHDSI tools • *Frontiers in Digital Health*



Sulev Reisberg • University of Tartu
Transforming Estonian Health Data to the Observational Medical Outcomes Partnership (OMOP) Common Data Model Extension • *Journal of Imaging Informatics in Medicine*



Fan Bu • University of Michigan
Bayesian safety surveillance with adaptive data correction • *Statistics in Medicine*



Jen Wooyeon Park • Johns Hopkins University
Development of Medical Imaging Toxic Standardization for Imaging-Based Observational Research (IMOP Common Data Model Extension) • *Journal of Imaging Informatics in Medicine*

Christian Reich • Odysseus
OHDSI Standardized Vocabulary—a large-scale centralized reference ontology for international data harmonization • *JMIR*

April 16: Tools to Evaluate ETL



Frank DeFalco
Senior Director, Observational Health Data Analytics, Janssen Research & Development



Katy Sadowski
Senior Associate Director, Boehringer Ingelheim



Clair Blacketer
Director, Janssen Research & Development



Melanie Philofsky
Senior Business Analyst and Product Manager, Celgeneus Data Services, Inc.

April Olympians Week 3 Update

May 7: DevCon Review



Paul Nagy
Johns Hopkins University, Team: Data Science Division



Vishnu Chandrabalan
Lancaster University, Team: Collaboration - The new way of working



Roger Carlson
Spectra Health, Team: Working Smarter to the Benefit of All & Beyond



Adam Black
Erasmus MC, Team: OHDSI 10th Anniversary Update



Lee Evans
UTS Computing LLC, Team: Frontiers Update



Frank DeFalco
Janssen Research & Development, Team: Research Around the World



Katy Sadowski
Boehringer Ingelheim, Team: Science Career Update

May 14: 10-Minute Tutorials



Martí Català Sabaté
Medical Statistics/Data Science, University of Oxford



Kim López Güell
PhD Student, University of Oxford



Maarten van Kessel
Software Developer, Erasmus MC



Louisa Smith
Assistant Professor, Northampton University

Drug Utilization

Cohort Survival

Treatment Patterns

All of Us Research

May 21: Open Network Studies



Atif Adam
Associate Director of Epidemiology, IQVIA



Chungsoo Kim
Postdoctoral Associate, Yale University



Linying Zhang
Assistant Professor of Biostatistics, Washington University School of Medicine in St. Louis



Daniel Morales
Wellcome Trust Clinical Research Fellow, University of Dundee

June 11: European Symposium Review



Peter Rijnbeek
Professor of Medical Informatics and Chair of the Department of Medical Informatics, Erasmus MC



Maxim Moinat
Scientific Researcher, Erasmus MC



Cesar Barboza Gutierrez
Software Developer, Erasmus MC



Liesbet Peeters
Assistant Professor of Biomedical Data Sciences, UHasselt

June 18: Application of LLMs in RWE Generation



Yilu Fang
PhD Student, Columbia University



João Almeida
Assistant Professor, Chief Information Security Officer, University of Aveiro



Martijn Schuemie
Research Fellow, Epidemiology Analytics, Janssen Research and Development

July 16: HowOften Initiative & Early Results



Hsin Yi "Cindy" Chen
MD-PhD Student, Columbia University Department of Biomedical Informatics



Azza Shoaibi
Director, Observational Health Data Analytics, Janssen Research and Development



Elise Ruan
Clinical Informatics Fellow, NewYork-Presbyterian Hospital/Columbia University



George Hripcsak
Professor of Biomedical Informatics, Columbia University

July 30: Patient-Level Prediction



Jenna Reps
Johnson & Johnson



Chen Yanover
KI Research Institute



Henrik John
Erasmus MC



Alexander Saelmans
Erasmus MC



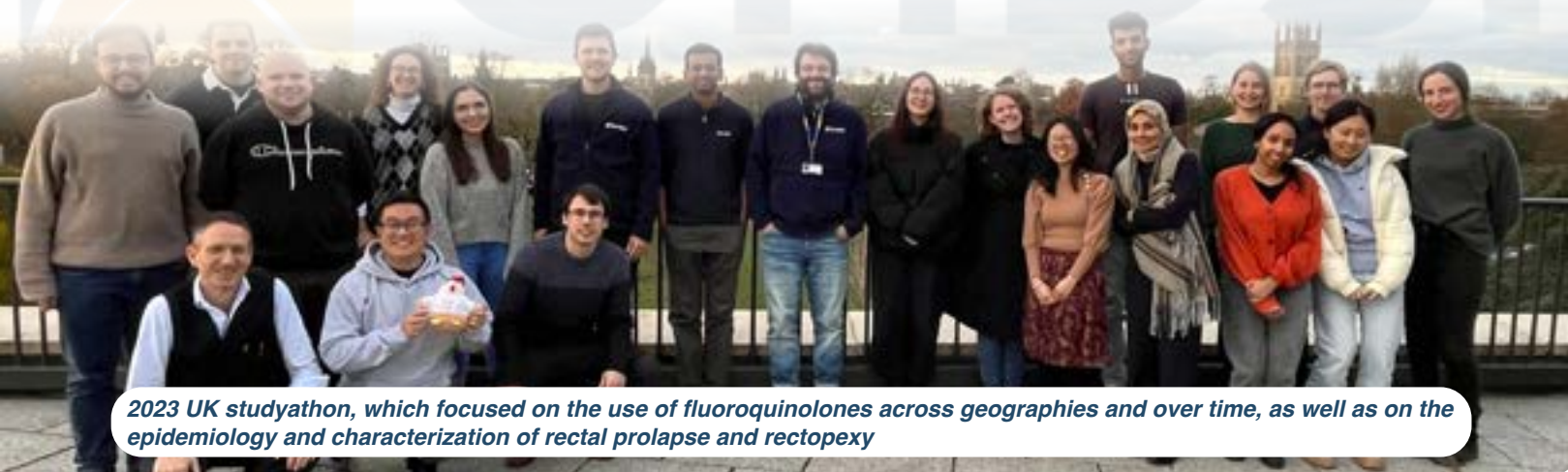
Egill Friðgeirsson
Erasmus MC



Ross Williams
Erasmus MC

How Can You Join Our Calls?

If you are a part of the OHDSI Teams environment, you will receive a weekly calendar invite that includes the upcoming agenda. If you don't have access, the link is on our Community Calls page, which features all recordings and updates from past calls. Weekly calls are currently held on Tuesdays at 11 am ET. Learn more at our website: www.ohdsi.org/community-calls



2023 UK studyathon, which focused on the use of fluoroquinolones across geographies and over time, as well as on the epidemiology and characterization of rectal prolapse and rectopexy



2022 Oxford/EHDEN studyathon, which focused on Long COVID/PASC

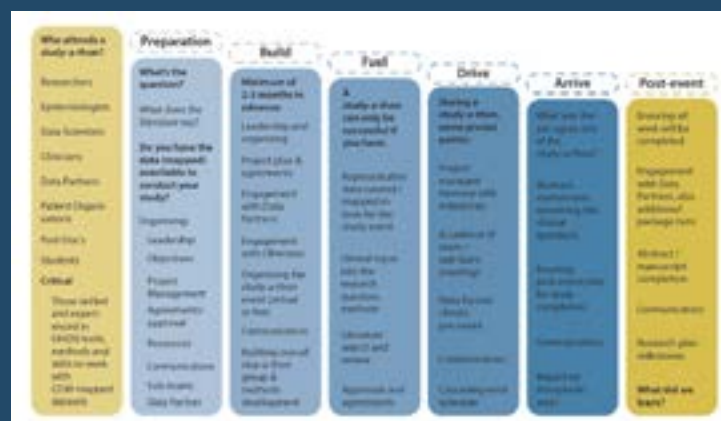
OHDSI Studyathons & Other Events

How does OHDSI go about *empowering a community to collaboratively generate the evidence that promotes better health decisions and better care?*

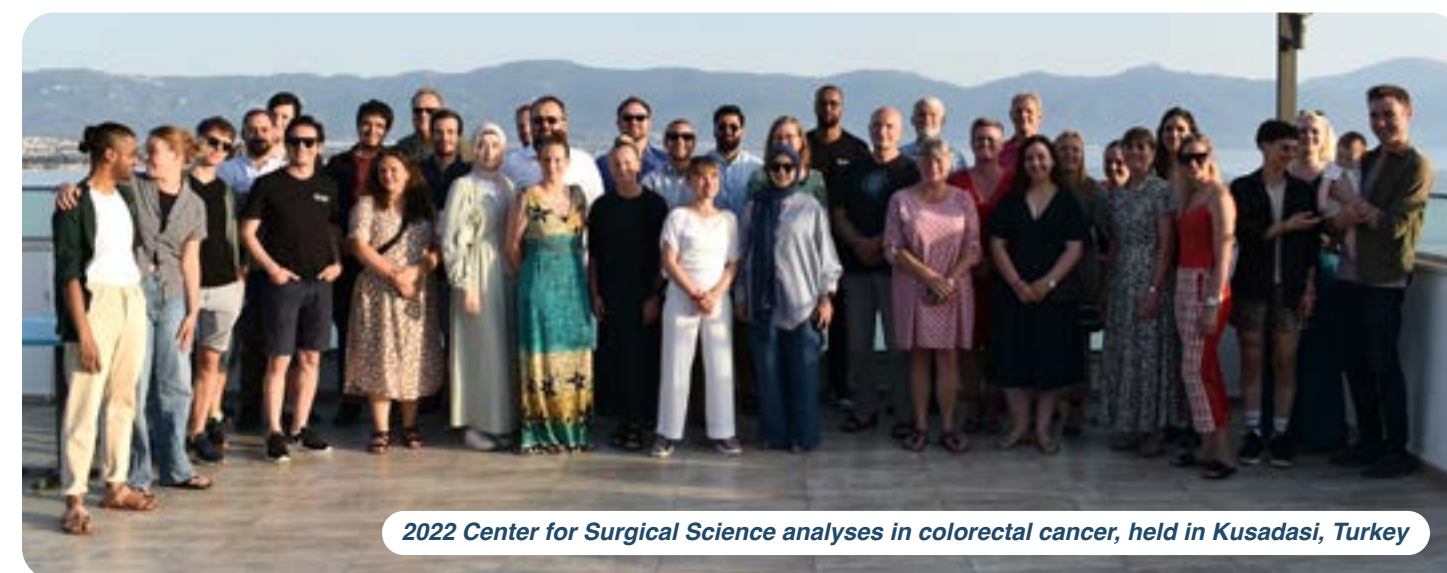
We do it by innovating on what it means to do collaborative research.

The premise of the studyathon is simple: bring together a diverse group of researchers aligned on a common question and focus together on collaboratively designing research protocols, executing analyses across databases, and interpreting results over an intense but fun-filled few days.

OHDSI collaborators have held multiple study-a-thons on a wide array of topics, including orthopedic surgery, rheumatoid arthritis, colorectal cancer, cardiovascular prediction, prostate cancer, and COVID-19. Each event has demonstrated our collective ability to accomplish in a short time what may be unimaginable alone, and it has provided further reinforcement of the power of community and the value of multi-disciplinary collaboration.



Outline flow of a study-a-thon. Graphic was shared in "Evaluating a novel approach to stimulate open science collaborations: a case series of "study-a-thon" events within the OHDSI and European IMI communities" • Jamia Open, Volume 5, Issue 4, December 2022, ooac100, <https://doi.org/10.1093/jamiaopen/ooac100>.



2022 Center for Surgical Science analyses in colorectal cancer, held in Kusadasi, Turkey



2022 Sweden EHDEN studyathon, which focused on pharmacovigilance



2022 Korea Datathon

Phenotype Phebruary

“Phenotype Phebruary” is a community-wide initiative to advance the field of phenotyping in observational studies. Now in its third year, the most recent Phenotype Phebruary focused on assessing consistency in phenotype definition components, phenotype representation structure, and phenotype validation methods.

By the end of this past Phebruary, collaborators identified and reviewed 93 clinical studies, developed an ATLAS and CohortDiagnostics demo, built and publicly shared 30 cohort definitions, and created three shiny apps with full cohort diagnostics on results.ohdsi.org. The team also put together over 8,000 incidence rates. Work continued afterwards within the OHDSI forums and during calls within the Phenotype Development & Evaluation workgroup.

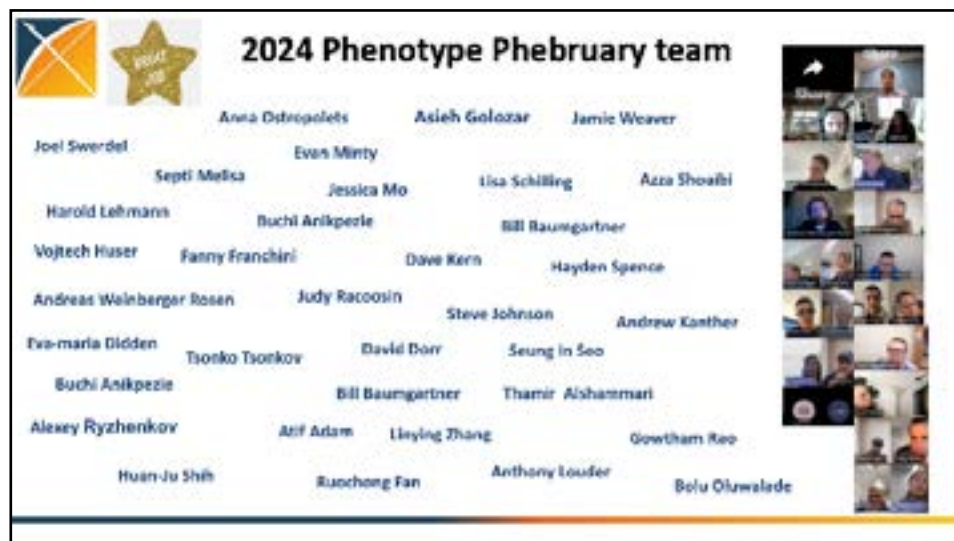
Interested to learn more? Check out videos and updates from the event homepage:

ohdsi.org/phenotype-phebruary-2024

Community members voted to focus efforts on four specific phenotypes:

- Alzheimer’s Disease
- Lung Cancer
- Major Depression Disorder
- Pulmonary Hypertension

Under the leadership of Azza Shoaibi, Anna Ostropolets, Gowtham Rao and James Weaver, a team of 40+ collaborators worked on systematic literature searches and synthesis, replication using ATLAS and other OHDSI tools, and summarizations of variations in population characteristics like incidence rates.



Phenotype Phebruary

- 4 condition phenotypes discussed
- 93 clinical studies identified and reviewed
- 1 Atlas and CohortDiagnostics demo
- 30 Cohort definitions built and publicly shared
- 3 shiny apps with full cohort diagnostics on results.ohdsi.org
- 8784 Incidence rate estimates
- 40 collaborators interacted in the posts, conducted literature review, built cohorts, or attended calls
- 1 AMIA submission accepted for oral presentation

By The Numbers

April Olympians

April Olympians was born out of the need to create a comprehensive community resource library that would serve as a central repository for conventions related to data transformation to the OMOP Common Data Model. Three key working groups—CDM, THEMIS, and Data Quality (DQ)—came together with a shared goal: to develop this resource in a way that maximizes productivity and engagement.

By the end of April, the collaborative effort had produced a robust knowledge base of CDM conventions. Over 80 GitHub issues were closed, thanks to the dedication of 20 consistent contributors from the OHDSI community. The resulting THEMIS convention library is now a valuable resource for the entire community.

April Olympians not only achieved its immediate goal of creating a THEMIS convention library but also strengthened our understanding of what makes collaborative science work.

Team Science Drove April Olympians Success

In order to achieve the goals set by the April Olympians organizers, community volunteers joined one of three specialized teams that were assigned key tasks.



Hunters

Focused on identifying and collecting ratified CDM conventions



Writers

Tasked with documenting these conventions for the resource library



Builders

Responsible for constructing the actual library

Lessons in Team Science

April Olympians provided valuable insights into effective team science. Some key takeaways include:

Do:

- Prepare comprehensive materials to engage participants.
- Be responsive to maintain momentum.
- Break tasks into small, manageable chunks.
- Test permissions and ensure everyone has the necessary access.
- Empower participants to foster a sense of ownership.
- Recognize contributions to encourage ongoing participation.

Don't:

- Use intimidating language that could deter participation.
- Overschedule meetings; allow time for more asynchronous work.
- Create overly complex task descriptions that could raise barriers to entry.

Thank You, Organizers, Leads & Contributors!



Clair Blacketer



Melanie Philofsky



Erica Voss



Evanette Burrows



Jiawei Qian



Katy Sadowski



Maxim Moinat

Meghan Pettine
Lloyd Shipman
Adam Bouras
Dave Jarvis

Solmaz Eradat
Brooke Lawler
Ben Martin
Andrew Kanter

Alvaro Alvarez
Agnes Wojciechowski
Masha Khitrin

DevCon

The third annual OHDSI DevCon was held in April, and it served as an opportunity to connect our global open-source community and discuss ways we can collaborate and continue enhancing the future of OHDSI open-source software. Virtual presentations, panel discussions and ecosystem updates provided leaders in our open-source community a forum to share some of the exciting recent developments within our community.

Videos from the DevCon presentation can be accessed via the QR code below. Presentations from both the 2022 and 2023 DevCon are also available on the website or our YouTube channel. We hope you can join us for our 2025 event!

DevCon 2024 Agenda

Introduction (Adam Black and Paul Nagy)

ETL Developers' Panel & Lightning Talks (Katy Sadowski)

OHDSI/OMOP — The hard way is the easy way! (Vishnu V Chandrabalan)

Moving OMOP to the Cloud With DBT and Snowflake (Roger Carlson)

Use cases for ORMs in OMOP (Georgina Kennedy)

Carrot: code-free OMOP ETL without full data access (Sam Cox)

Rabbit-in-a-blender – an ETL pipeline to transform your EMR data into OMOP (Pieter-jan Lammertyn)

DARWIN EU® Developers Update

CDMConnector (Adam Black)

PatientProfiles (Mike Du)

CohortCharacteristics (Martí Català Sabaté)

CohortSurvival (Kim López Güell)

OHDSI Ecosystem Updates

Techology Advisory Board (Frank DeFalco)

Strategus Update (Anthony Sena)

Broadsea Update (Lee Evans)

Kheiron Training Program Update (Paul Nagy)

JACKALOPE PLUS The Power of ML for Healthcare Data Mapping & Management (Denys Kaduk)

An Introduction to Knowledge Graphs using PheKnowLator and OMOP2OBO with Example Applications in Drug Surveillance and Computational Phenotyping (Tiffany Callahan)

V.

Educational Resources

Watch the DevCon Presentations



Educational Resources

How do I learn more about OMOP, OHDSI tools, methods or best practices?

That is a very common question for those both starting their journey and those who have been traveling with OHDSI for years. There is always something new to learn, and there are always plenty who are willing to teach. OHDSI has a plethora of community-developed learning resources that we will share in this section.

On these pages, we will highlight the many tutorial options that have taken place around the world, most of which remain available on the OHDSI YouTube channel (youtube.com/c/OHDSI) or on the OHDSI website (ohdsi.org).

Tutorials

The OHDSI YouTube Channel (see QR code below) has posted numerous tutorials over the last decade, several of which have received thousands of views. Tutorials are often held at our annual symposia in the United States, Europe and Asia, but they can also be held in national events, such as ones in both Japan and Thailand this past year.

Tutorials are also often held during our weekly community calls (see pages 32-33), including a network study series from last year that is highlighted below. Many of our open-source leads have provided popular “10-Minute Tutorials” to highlight new or improved open-source tools developed for community research.

The next page will showcase the tutorials taking place at the 2024 Global Symposium. These will be posted to our YouTube channel shortly after the event.



S.O.S. Network Study Tutorials

The OHDSI community has the researchers, data, methods and motivation to lead network studies that can inform critical healthcare questions. The simple understanding of how to put it all together, however, can be both challenging and intimidating.

Our community tackled that challenge in 2023 with a nine-part series (see right) on how to lead a network study, so you can see the process from initiation to dissemination. Check out the full series on OHDSI.org/sos-challenge or our YouTube channel.

Weekly Series

- Initiating a Network Study
- Data Diagnostics
- Phenotype Development
- Phenotype Evaluation
- Creating Analysis Specifications
- Network Execution
- Study Diagnostics
- Evidence Synthesis
- Interpreting the Results

OHDSI YouTube Channel



OHDSI2024 Tutorial Offerings

The 2024 OHDSI Global Symposium featured five tutorials that will remain part of our community's educational resources.

Those early in the journey will want to check out the introductory tutorial (right), a four-hour session that provides a high-level overview of our community research.

We also held four advanced tutorials (below) on different focuses, ranging from vocabularies to open-source tools and ETL. Thank you to all our volunteer faculty for leading these sessions!



An Introduction to the Journey from Data to Evidence Using OHDSI

The journey from data to evidence can be challenging alone but is greatly enabled through community collaboration. In this half-day tutorial, we will introduce newcomers to OHDSI. Specifically, about the tools, practices, and open-science approach to evidence generation that the OHDSI community has developed and evolved over the past decade.



Conducting 'Off-The-Shelf' Characterization Studies Using DARWIN EU® Tools and the OMOP CDM

In this tutorial, students will learn from leaders in the DARWIN EU team about how to execute characterization analyses against their OMOP CDM instance using DARWIN EU packages, including how to define inputs to the standardized analytics and how to interpret standardized results. Students will also learn how DARWIN EU tools relate to and connect with OHDSI's broader open-source analytics ecosystem.



Developing and Evaluating Your Extract, Transform, Load (ETL) Process to the OMOP Common Data Model

In this tutorial, students will learn about the tools and practices developed by the OHDSI community to support the journey to establish and maintain an ETL to standardize your data to OMOP CDM and enable standardized evidence generation across a data network.



So, You Think You Want To Run an OHDSI Network Study?

In this tutorial, students will learn about the steps along the journey to turn your research question into reliable evidence and how to lead an OHDSI network study. The OHDSI community has developed open-source standardized analytics tools that can be executed across a network of OMOP CDM databases and processes to facilitate collaborations between researchers throughout the evidence generation process from design through implementation and dissemination.



Using the OHDSI Standardized Vocabularies for Research

In this tutorial, students will learn how to take advantage of the OHDSI standardized vocabularies as an analytic tool to support your research, including searching for relevant clinical concepts, navigating concept relationships, creating Conceptsets and understanding source codes that map within these expressions. Students will also learn where the OHDSI standardized vocabularies is used throughout OHDSI's standardized analytic tools.



The EHDEN Academy

The EHDEN Academy is a free, online educational resource for professionals in the domains of real-world data and real-world evidence. The Academy operates on a global scale and has engaged more than 5,200 active learners from more than 100 countries.

Its primary mission is to enhance the application and understanding of tools and methods that improve patient care globally through open science educational resources. Consequently, the Academy serves as a crucial training node for the wider OHDSI community, aligning with and directly contributing to its educational strategy.

Visit the
EHDEN
Academy



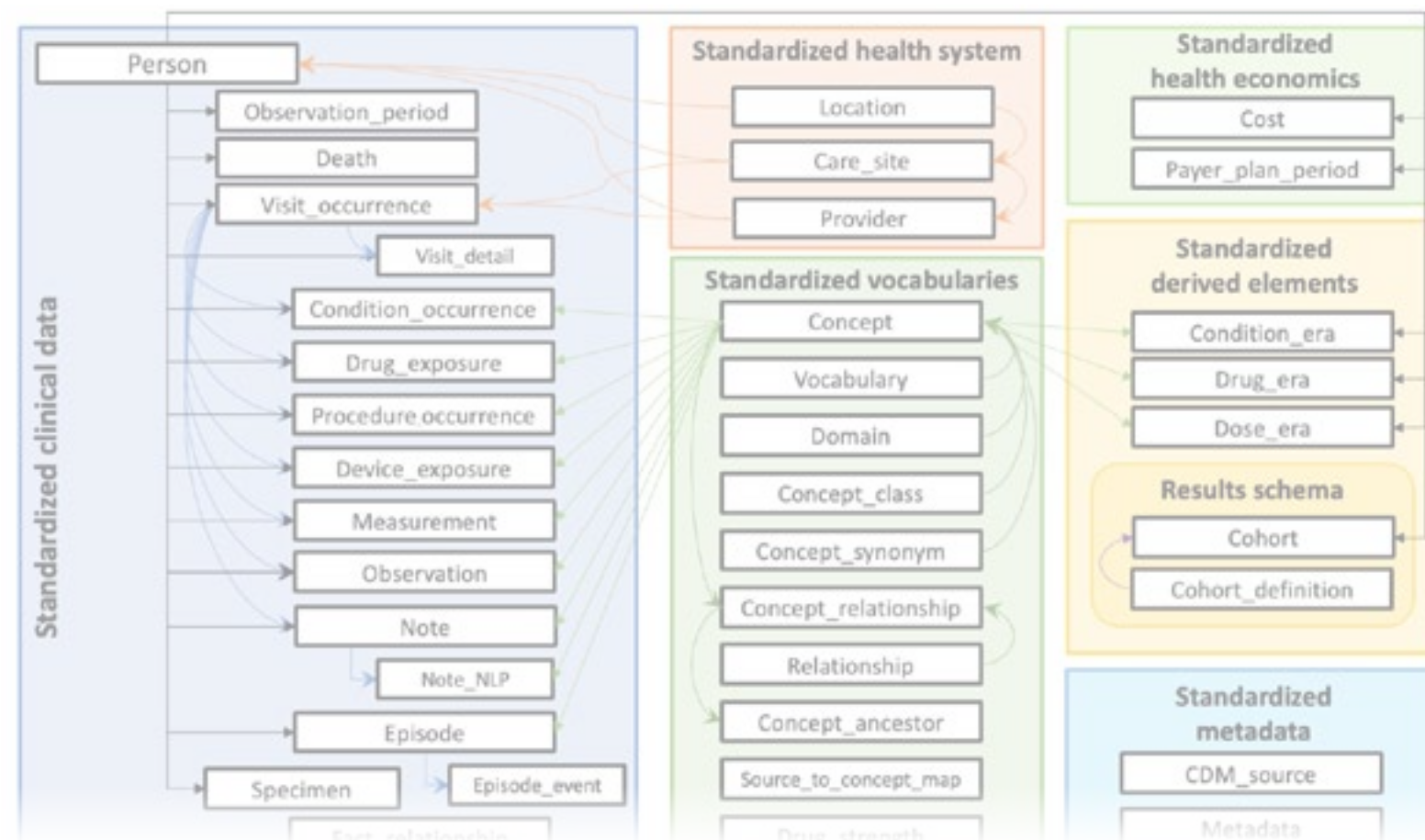
Current EHDEN Academy Courses

- Getting Started
- EHDEN Foundation
- Patient Organisations: Introduction to Real World Data & Real World Research
- OMOP CDM and Standardised Vocabularies
- ATLAS
- Infrastructure
- ETL Learning Pathway: Data Partner & SME Real World Use Cases
- 10-Minute Tutorial: PheValuator
- 10-Minute Tutorial: ATHENA
- Introduction to Usagi & Code Mappings for an ETL
- OHDSI-in-a-Box
- Open Science & FAIR Principles
- Introduction to Data Quality
- Phenotype Definition, Characterisation and Evaluation
- Population-level Effect Estimation
- Patient-level Prediction
- R for Patient-level Prediction
- Applied Cost-Effectiveness Modeling with R
- Assessing healthcare using outcomes that matter to patients
- Creating Cohort Definition (OHDSI 2022 Tutorial)
- OMOP Common Data Model/Vocabulary (OHDSI 2022 Tutorial)
- The Phenotyping Problem (1-hour session)
- Health Technology Assessment

EHDEN Academy Student Map



VI. Data Standards



OMOP Common Data Model

The Observational Medical Outcomes Partnership (OMOP) Common Data Model (CDM) is an open community data standard, designed to standardize the structure and content of observational data and to enable efficient analyses that can produce reliable evidence.

OMOP CDM By The Numbers

37 tables

- 17 to standardize clinical data
- 10 to standardize vocabularies

394 fields

- 193 with `_id` to standardize identification
- 101 with `_concept_id` to standardize content
- 43 with `_source_value` to preserve original data

1 Open Community Data Standard

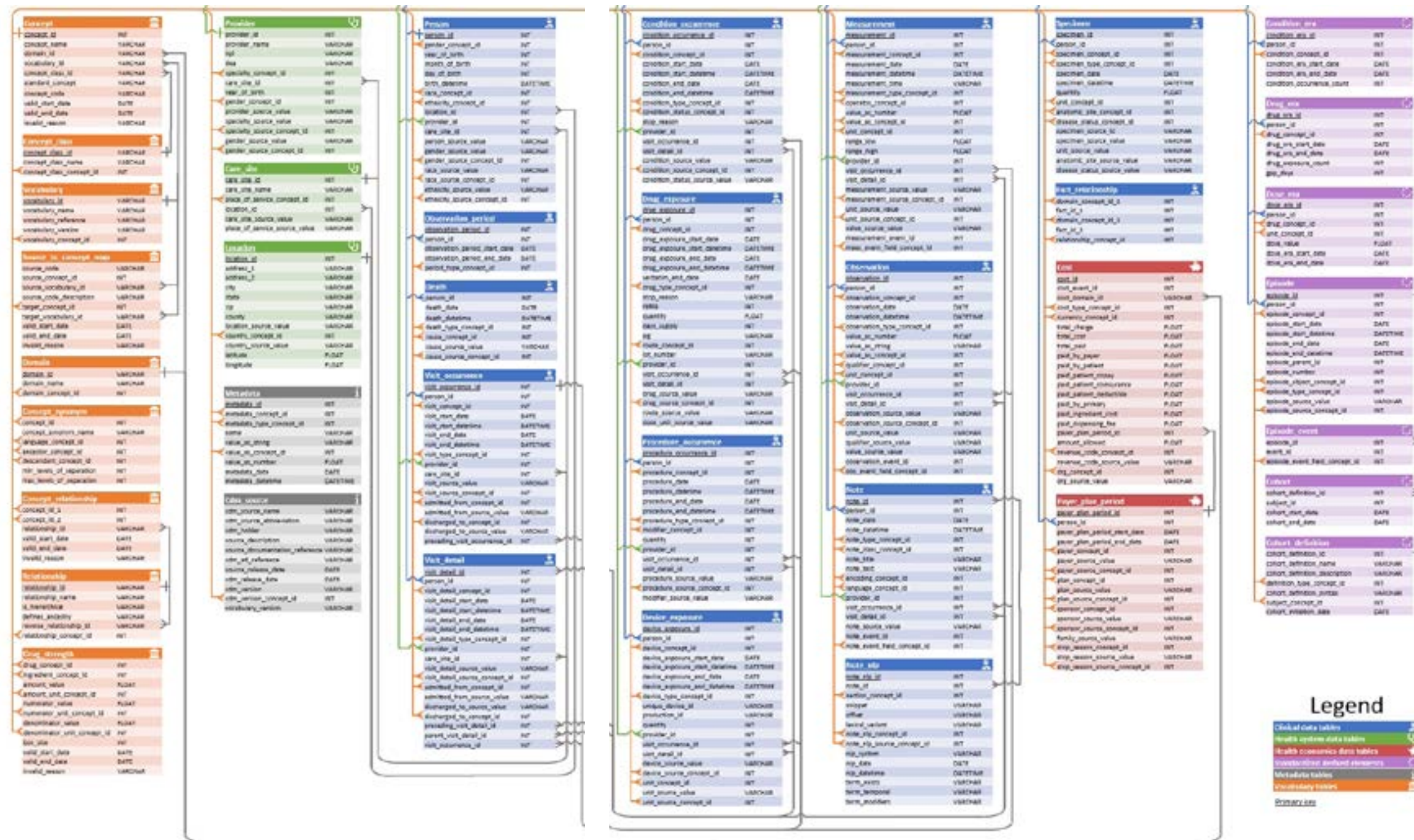
OMOP Common Data Model 5.4

figure courtesy of Renske Los and Martijn Schuemie



“The OMOP Common Data Model serves as the foundation of all our work in the OHDSI community, and I’m proud that our open community data standard has been so widely adopted and so extensively used to generate reliable evidence.”

- Clair Blacketer
2020 Titan Award for Data Standards recipient



OMOP CDM Data Sources

The OMOP Common Data Model is an open community data standard, freely available to anyone who would like to standardize their patient-level data into a format that makes it easier to perform analyses and generate reliable evidence. OHDSI prides itself on stewarding the OMOP Common Data Model as a community resource, and actively encourages its adoption through various workgroups, open-source tool development, and educational sessions, and collaborative support.

There are currently 544 data sources that come from 54 different countries which have been standardized to the OMOP Common Data Model. These data sources contain a range of patient-level observations from various data capture processes within routine clinical care, including electronic health records, administrative claims, registries, hospital systems, genomics and biobanks. Together, these data sources conservatively cover more than 974 million unique patient records, representing approximately 12% of the world's population.

- Australia (16)**
AOA National Joint Replacement Registry
AU-ePBRN (Australian Electronic practice based research network)
AUS Department of Veterans Affairs
Austin Health
IQVIA Australia LPD
Melbourne Childrens Hospital
NPS MedicineWise
Pharmaceutical Benefits Scheme 10% extract
Primary Care GP data (Patron)
Royal Melbourne Hospital and Western Health
Hospital Admissions
South Western Sydney LHD
Sydney Childrens Hospital
Sydney Local Health District (LHD)
University of New South Wales & SPHERE
Maridulu Budyari Gumal
University of Queensland - Queensland Health
University of South Australia
- Austria (1)**
Medical University of Vienna
- Belgium (17)**
Az Damiiaan Oostende
AZ Delta
AZ Klina
AZ Maria Middelares
Icometrix
IQVIA Belgium LPD
LynxCare
Medaman
Onze-Lieve-Vrouwziekenhuis Aalst-Asse-
Ninove
THIN BE
Universitaire Ziekenhuizen KU Leuven
University Hospital Antwerp
University MS Center
UZ Brussel
UZ Leuven
VZW AZ Groeninge
Ziekenhuis Oost-Limburg
- Bosnia and Herzegovina (2)**
E-MEDIT D.O.O. & Hospital Travnik
Public institution Travnik Hospital EHR
- Brazil (4)**
Centre of Health Data and Knowledge
Integration - Cidacs
DataSUS Ambulatory
Hospital Israelita Albert Einstein
IQVIA Brazil
- Bulgaria (2)**
National Scientific Programme "E-Health in Bulgaria"
SAT Health
- Cameroon (1)**
Data Science Without Borders (DSWB) Project,
Douala General Hospital -Respiratory disease unit
- Canada (3)**
IQVIA Canada EMR
Provincial Health Services Authority (British Columbia)
The Hospital for Sick Children
- China (9)**
Beijing Anding Psychiatry Hospital
Beijing Smindu Medical Science & Technology CO., Ltd.
Beijing-Tianjin-Hebei (Jing-Jin-Ji) Psychiatric Database
Hebei Province Psychiatry Hospital
Jiangsu Province People's Hospital
Nanfang Hospital COVID-19 Research Database (NFHCRD)
Tianjin Anding Psychiatry Hospital
Wonders Information
Yinzhou Healthcare
- Colombia (1)**
Hospital Universidad del Norte
- Croatia (8)**
Bács-Kiskun Megyei Kórház a Szegedi Tudományegyetem Általános Orvostudományi Kar Oktató Kórháza
- Clinical Hospital Dubrava**
Croatian National Healthcare Information Systeem
Hierchia & University Hospital Centre Zagreb
IGEA d.o.o. & University Hospital Center
Sestre milosrdnice
IN2 d.o.o. & Clinical Hospital Center Osijek
MCS Grupa d.o.o. & Health Care Center of Primorje-Gorski Kotar County
Szabolcs-Szatmár-Bereg Megyei Kórházak és Egyetemi Oktatókórház
- Czechia (3)**
Czech Myeloma Group
Institute of Rheumatology
OAKS Consulting s.r.o.
- Denmark (4)**
Aarhus University Hospital Database
Center for Surgical Science (CSS)
Rigshospitalet, Copenhagen University
DALY-CARE
University of Southern Denmark
- Estonia (3)**
Estonian Biobank
Estonian Genome Center at the University of Tartu (EGCUT)
University of Tartu
- Ethiopia (2)**
Northwest Ethiopia health facility linked community based study
Data Science Without Borders (DSWB) Project,
AHRI & Hararge Health Demographic Surveillance System
- Finland (11)**
Auria Clinical Informatics
BCB Medical Ltd.
Finnish Clinical Biobank Tampere
Finnish Hematology Registry/ HUS
Finnish Institute for Health and Welfare (THL)
Hospital District of Helsinki and Uusimaa
Hospital District of Southwest Finland
HUS DataLake eCareforMe POC
Pirkanmaa Hospital District
PSHP Oncology
University of Turku (Prostate Cancer Registry of South West Finland)
- France (15)**
APHP-EDS
Assistance Publique - Hopitaux de Marseille
Assistance Publique - Hôpitaux de Paris (AP-HP)
Bordeaux University Hospital
CEGEDIM HEALTH DATA
Centre Hospitalier Universitaire de Lille
Centre Hospitalier Universitaire de Montpellier
Centre Hospitalier Universitaire de Toulouse
Codoc
IQVIA France DA
IQVIA France LPD
Lille University Hospital
PHAST
SND5
THIN FR
- Georgia (1)**
Telavi Regional Hospital
- Germany (13)**
CancerDataNet GmbH
Charité - Universitätsmedizin Berlin
European Rare Kidney Disease Registry (ERKReg)
German Cancer Society (DKG)
GermanOncology
Hanover Medical School, Germany
InGef - Institute for Applied Health Research Berlin GmbH
IQVIA Germany DA
Krebsregister Rheinland-Pfalz
MS Forschungs- und Projektentwicklungs-gGmbH
UKER
University Medicine Dresden
University of Ulm, ZIBMT
- Greece (6)**
Diagnostic & Therapeutic Center Of Athens
"Hygieia" Single Member Societe Anonyme
- Digital Health Solutions SA**
General Hospital of Kavala
Greek National E-prescription Databank
Innovative Medical Research SA
Papageorgiou General Hospital
- Hungary (5)**
Bács-Kiskun Megyei Kórház a Szegedi Tudományegyetem Általános Orvostudományi Kar Oktató Kórháza
National Institute of Health Insurance Fund
Management Hungary
Sermelweis University
Szabolcs-Szatmár-Bereg Megyei Kórházak és Egyetemi Oktatókórház
University of Pécs
- India (1)**
Buddhimed Technologies
- Ireland (1)**
Trinity St James's Cancer Institute, Dublin
- Israel (12)**
Assuta Medical Centers Ltd.
Barzilai Medical Center
Bnai Zion Medical Research Foundation and Infrastructure Development Health Services
Beni-Zion Medical Center
Galilee Medical Center
Hadassah OBGYN
Hillel Yaffe Medical Center
Kineret (Ministry of Health medical center network)
Lowcise
Shamir Medical Center
The Directorate of Government Medical Centers at the Israeli Ministry Of Health
Tzafon medical center
- Italy (34)**
Agenzia regionale di sanità della Toscana (ARS)
AO Card. G. Panico - Center for Neurodegenerative Diseases and Aging Brain
ASL Roma 1
ASSIT Papa Giovanni XXIII
ATIS Bergamo
AUSL Reggio Emilia
Azienda Ospedaliera SS Antonio e Biagio e Cesare Arrigo
Azienda Ospedaliera Universitaria Integrata Verona
Azienda Ospedaliera Universitaria San Luigi Gonzaga
Azienda Ospedaliero-Universitaria di Modena
Azienda Unità Sanitaria Locale-IRCCS in Reggio Emilia
Bambino Gesù Children's Hospital
Basilicata Cancer Registry
Casa di Cura Privata del Policlinico (CCPP)
Fondazione Casa Sollievo della Sofferenza
Fondazione IRCCS Ca' Granda Ospedale Maggiore Policlinico
Fondazione IRCCS Istituto Neurologico Carlo Besta
Fondazione IRCCS Policlinico San Matteo
Fondazione Istituto Nazionale dei Tumori
Fondazione Poliambulanza Istituto Ospedaliero
FONDAZIONE TOSCANA GABRIELE
MONASTERIO PER LA RICERCA MEDICA E DI SANITA PUBBLICA (FTGM)
Grande Ospedale Metropolitano "Bianchi-Metacrinò-Morelli"
Inspire-srl
IQVIA Italy LPD
IRCCS Azienda Ospedaliero-Universitaria di Bologna Policlinico di Sant'Orsola
IRCCS Policlinico San Donato
ISMETT
Modena Oncology Center - Azienda Ospedaliera Modena
Monastario Foundation (ARCA)
Pediarenet
Società Italiana di Medicina Generale e delle cure Primarie (SIMG)
THIN IT
University Hospital of Parma
- Japan (4)**
IQVIA Japan Claims
- IQVIA Japan HIS**
MDV (Medical Data Vision)
- Kenya (4)**
APHRC COVID-19 SERO SURVEY
ALPHA Network DB
INDEPTH Core Microdataset
INSPIRE network COVID-19 PEACH database
- Luxembourg (1)**
Registre National du Cancer du Luxembourg
- Malawi (1)**
INSPIRE network COVID-19 PEACH database
- Montenegro (1)**
Clinical Center of Montenegro
- New Zealand (1)**
University of Canterbury
- Netherlands (17)**
Amsterdam UMC
EBMT: The European Society for Blood and Marrow Transplantation
European Clinical Research Alliance on Infectious Diseases (ECRAID) and University Medical Center Utrecht (UMCU)
Harm Slijper
IKNL
Integrated Primary Care Information (IPC)
Lage Landen Foundation
National Intensive Care Evaluation foundation
Netherlands Cancer Registry
NICE
Pharmo
POS-VAP
Pulse
PulseHandWrist
Stichting Vumc
STIZON
VieCuri Medisch Centrum
- Norway (2)**
The Norwegian Cancer Registry
University Of Oslo
- Philippines (1)**
UP-PGH Integrated Surgical Information System
- Portugal (12)**
APDP
Centro Clínico Académico a Braga, Associação (2CA-Braga)
Centro Hospitalar Universitário de Coimbra (CHUC)
CUF
EGAS MONIZ HEALTH ALLIANCE
Hospital da Luz Learning Health
Hospital Distrital de Santarém (HDS)
Hospital do Espírito Santo de Evora
Instituto de Medicina Molecular
Prompty Patient-reported Outcomes Database
Registo Portugues de Doentes Reumáticos
Unidade Local de Saúde de Matosinhos
- Republic of Korea (64)**
Ajou University Hospital
Asan Medical Center
Bucheon Sejong Hospital
Catholic Kwandong University International ST. Mary's Hospital
Cha University Bundang Medical Center
Chonnam National University Hwasun Hospital
Chonnam National University Hospital
Chungnam National University Hospital
Chungnam National University Sejong Hospital
Daegu Catholic University Medical Center
Dankook University Hospital
Dongguk University Medical Center
Ewha Womans University Medical Center (Mokdong)
Ewha Womans University Medical Center (Seoul)
Gachon University Gil Medical Center/Gachon University Gil Medical Center
Gangnam Severance Hospital
Gangneung Asan Hospital
Gyeongsang National University Changwon Hospital
Gyeongsang National University Hospital
- Hanyang University Seoul Hospital**
Health Insurance Review & Assessment Service
Incheon Sejong Hospital
Inha University Hospital
Jeonbuk National University Hospital
Kangbuk Samsung Hospital
Kangdong Sacred Heart Hospital
Kangwon National University Hospital
Keimyung University Daegu Dongsan Hospital
Keimyung University Dongsan Medical Center
Konkuk University Medical Center
Konyang University Hospital
Korea Institute of Radiological & Medical Sciences
Korea University Anam Hospital
Korea University Ansan Hospital
Korea University Guro Hospital
Kyung Hee University Hospital At Gangdong
Kyung Hee University Medical Center
Kyungpook National University Chilgok Hospital
Kyungpook National University Hospital
Myongji Hospital
Myongji Hospital (Jecheon)
National Cancer Center
National Health Insurance Service
National Health Insurance Service Ilsan Hospital
Presbyterian Medical Center
Pusan National University Hospital
Samsung Medical Center
Seoul National University Hospital
Seoul National University Hospital Severance Hospital
SMG-SNU Boramae Medical Center
Soonchunhyang University Hospital (Bucheon)
Soonchunhyang University Hospital (Chonan)
Soonchunhyang University Hospital (Gumi)
Soonchunhyang University Hospital(Seoul)
The Catholic Univ. of Korea, Eunpyeong ST. Mary's Hospital
The Catholic University of Korea, Seoul ST. Mary's Hospital
The Catholic University of Korea, ST. Vincent's Hospital
The Catholic University of Korea, Uijeongbu ST. Mary's Hospital
The Catholic University of Korea, Yeouido ST. Mary's Hospital
Ulsan University Hospital
Wonju Severance Christian Hospital
Wonkwong University Hospital
Yongin Severance Hospital
- Romania (1)**
Thin Ro
- Rwanda (1)**
LAISDAR Network Rwanda
- Saudi Arabia (1)**
Saudi Food and Drug Authority
- Scotland (3)**
DataLoch
HIC Dundee
South East Scotland Database
- Senegal (1)**
Data Science Without Borders (DSWB) Project,
IRESSEF-Advanced HIV Disease
- Serbia (5)**
Clinical-hospital center Zvezdara
Kliničko-bolnički centar Zvezdara (Clinical-hospital center Zvezdara)
Primary Healthcare Center Zemun
University Clinical Center of Niš
University Clinical Center of Serbia
- Singapore (3)**
Growing Up in Singapore Towards healthy Outcomes (GUSTO)
Khoo Teck Puat Hospital (SG_KTPH)
National University Hospital Singapore
- South Africa (2)**
National Income Dynamics Study (NIDS)
Health & Aging in Africa
- Spain (40)**
Agencia Española de Medicamentos y Productos Sanitarios, AEMPS
BIFAP (Base de datos para la Investigación Farmacoepidemiológica en el Ámbito Público)
BIOCROCUS BIZKAIA HEALTH RESEARCH INSTITUTE
Consellería de Sanidade
Consorci Corporació Sanitària Parc Tauli Consorci Mar Parc de Salut de Barcelona (PSMAR)
CORPORACIÓ SANITARIA PARC TAULI FISABIO-HSRU
Fundació Institut d'Investigació Sanitària Illes Balears
Fundació Institut d'Investigacions Mèdiques (FIMIM)
Fundación de Investigación Biomedica del Hospital Universitario 12 de Octubre
Fundación para la Investigación Biomedica INCLIVA
Fundación para la Investigación del Hospital Universitario La Fe de la Comunidad Valenciana (HULAFE)
Fundación para la Investigación e Innovación Biosanitaria en Atención Primaria (FIIBAP)
Healthcare Service of the Principality of Asturias
Helios Healthcare Spain, S.L.U.
HM Hospitals
Hospital del Mar (HMAR)
Hospital de la Santa Creu i Sant Pau
Hospital Sant Joan de Déu
Hospital Universitario 12 de Octubre
- Sweden (4)**
Stockholm CREATinine Measurements Project
Gothenburg University
MEB KI
Swibreg
- Switzerland (6)**
CancerDataNet
Data2time
Geneva Cancer Registry
HUG and SCQM
Institute of Social and Preventive Medicine, University of Bern
Vaud Cancer Registry
- Taiwan (6)**
NHIRD
Shuang Ho Hospital
Taichung Veterans General Hospital EHR
Taipei Medical University Clinical Research Database (TMUCRD)
Taipei Medical University Hospital
Wanfang Hospital
- Thailand (1)**
Siriraj Hospital EHR
- Turkey (4)**
Bayindir Healthcare Group
HIS
Istanbul University Istanbul Faculty of Medicine
IUC Cerrahpaşa TIP Fakültesi
- Uganda (2)**
Iganga Mental Health primary data
Kagando Mental Health primary data
- Ukraine (1)**
National Cancer Institute
- United Kingdom (26)**
Akrivia Health
Barts Health NHS Trust
Clinical Practice Research Datalink (CPRD GOLD)
Clinical Practice Research Datalink Aurum (CPRD Aurum)
Connected Bradford
DataLoch
GOSH
Harvey Walsh Ltd
Health Informatics Centre
King's College London
Leeds Teaching Hospitals
OPEN Health
Optimum Patient Care Limited
Queen Mary University of London
Royal College of General Practitioners
Research and Surveillance Centre
SAIL Databank
SciBite TERMite
THIN UK
UCL
UK Biobank
UK Integrated Medical Record Database
- (IMRD) THIN**
UK National Neonatal Research Database
UKORIS
University College London CALIBER
University College London Hospitals
University of Edinburgh
- United States (154)**
1up health
Advocate Aurora Health & University of Madison Health Non-Muscle Invasive Bladder Cancer
Advocate Aurora Health COVID Database
Aetna Medical and Pharmacy Data Warehouse
All of Us Research Program
ALAMED (University of Southern California)
Atrium - Wake Forest Baptist Health
Axiom Health
Baylor Medicine EHR
Blue Health Intelligence
Boston Medical Center
Brown University - Rhode Island HIE
C-Path
Carilion Clinic
Case Western
Cerner HealthFacts
Cherokee Health Systems
Children's Hospital of Colorado
Children's Hospital of Los Angeles
Children's Hospital of Philadelphia
Children's National
Cincinnati Children's Hospital Medical Center
Columbia University Irving Medical Center
Covenant Physician Partners
CRHFEI
Dana-Farber Cancer Institute
DARTNet Institute: CER2 Study
Decision Resources Group (DRG)
Department of Health Services - Los Angeles
Duke University
Eau Claire Cooperative Health Center
Emory Enterprise Research Repository
Fairview Health System EHR
Flatiron - OSCER
Geisinger Health System
George Washington University
Georgetown University ARIA
Georgia Tech Research Institute
GeniOMOP
Harvard University Mass General Brigham
HealthPartners Institute
HealthVerity
Helix Clinico-Genomics Database
Helix Research Network
Merative MarketScan(R) Commercial Claims (CCAE)
Merative MarketScan(R) Medicare Supplemental Database (MDCR)
Merative MarketScan(R) Multi-State Medicaid Database (MDCD)
Icahn School of Medicine at Mount Sinai
Indiana University School of Medicine / Regenstrief Institute
Inova Health System
IQVIA US Ambulatory EMR
IQVIA US Hospital Charge Data Master (CDM)
IQVIA US Oncology EMR
IQVIA US Open Claims
IQVIA US PharMetrics Plus
Johns Hopkins University
Keck Medicine of University of Southern California
Loyola University New Orleans
Lurie
Maine Medical Center
Marietta Eye Clinic EHR
Mayo Clinic
Medical University of South Carolina
Medicare Research Identifiable Files
MedStar Health
Memorial Sloan Kettering Cancer Center
Momentum AD
Montefiore Medical Center (Albert Einstein College of Medicine)
N3C
Newours Children's Health System
NeuroBlu Behavioral Health Database
NorthShore University HealthSystem
Northwestern Medical Enterprise Data Warehouse (NMEWDW)
NYC-CDRN
NYU Langone
- OCHIN (Oregon Community Health Information Network)**
Ochsner Medical Center
Oklahoma University
One Fact Foundation Payless Health
Optum® De-Identified Clinformatics(R) Data Mart Database - SES & DOD
Optum® de-identified Electronic Health Record Dataset (PANTHER)
Oregon Health & Science University
Pareto Intelligence
PEDSnet
Penn State
Premier Healthcare Database
QueensCare - Los Angeles
Reliant Medical Group
Rhode Island Quality Institute
Rush University Medical Center
Rutgers
Shriners Children's
Spectrum Health West Michigan
Stanford medicine Research data Repository (STARR)
Stony Brook
Surveillance, Epidemiology, and End Results Program (SEER): B-Cell
TCC - Los Angeles
The Healthcare Cost and Utilization Project (HCUP), Nationwide Inpatient Sample (NIS)
The National Health and Nutrition Examination Survey (NHANES)
The Ohio State University Medical Center
TrialSpark
Tufts MC Research Data Warehouse (TRDW)
Tulane
UMass Memorial Medical Center
UNC Chapel Hill
University Medical Center New Orleans
University of Alabama at Birmingham
University of Arkansas
University of Buffalo
University of California Health
University of California, Davis
University of California, Irvine
University of California, Los Angeles
University of California, Riverside
University of California, San Diego
University of California, San Francisco
University of Chicago
University of Cincinnati
University of Colorado
University of Colorado, Anschutz Medical Center
University of Illinois Chicago
University of Iowa
University of Kentucky
University of Miami
University of Michigan
University of Minnesota
University of Mississippi Medical Center
University of Nebraska Medical Center
University of New Mexico Health Sciences Center
University of North Carolina, Chapel Hill
University of Pennsylvania
University of Pittsburgh
University of Pittsburgh - Banner
University of Rochester
University of Texas Houston
University of Texas Medical Branch
University of Texas Southwestern Medical Center
University of Utah
University of Virginia
University of Washington
Wake Forest University
Washington State
US Department of Defense
US Department of Veterans Affairs
UT Physicians
Vanderbilt University
Veradigm Health Insights Data - Allscripts
Veradigm Health Insights Data - Practice Fusion
Virginia Commonwealth University
Wake Forest University
WashU St. Louis
Weill Cornell Medicine/NewYork-Presbyterian Hospital (East Campus)
West Virginia University
Winship Cancer Institute of Emory University
Zus Health



- INFOBANCO12**
Information System of Parc de Salut Mar (IMASIS)
Institut Català d'Oncologia
Instituto Aragonés de Ciencias de la Salud (IACS)
IQVIA Spain LPD
Marina Salud (Hospital de Denia)
Parc Sanitari Sant Joan de Déu
Pedro Mallol
Research Institute - Hospital de la Santa Creu i Sant Pau
Rioja Salud
Servicio Cántabro de Salud and IDIVAL
Servei Català de la Salut
Servicio Madrileño de Salud
Servicio Navarro de Salud Osasunbidea (SNS-O)
The Information System for Research in Primary Care
The Information System for Research in Primary Care - Hospitalization Linked Data (SIDAP-H)
Vall d'Hebron Hospital Campus
Vall d'Hebron Hospital Campus
Virgen Macarena University Hospital
- Sweden (4)**
Stockholm CREATinine Measurements Project
Gothenburg University
MEB KI
Swibreg
- Switzerland (6)**
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HUG and SCQM
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Siriraj Hospital EHR
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HIS
Istanbul University Istanbul Faculty of Medicine
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- Uganda (2)**
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Barts Health NHS Trust
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Clinical Practice Research Datalink Aurum (CPRD Aurum)
Connected Bradford
DataLoch
GOSH
Harvey Walsh Ltd
Health Informatics Centre
King's College London
Leeds Teaching Hospitals
OPEN Health
Optimum Patient Care Limited
Queen Mary University of London
Royal College of General Practitioners
Research and Surveillance Centre
SAIL Databank
SciBite TERMite
THIN UK
UCL
UK Biobank
UK Integrated Medical Record Database
- (IMRD) THIN**
UK National Neonatal Research Database
UKORIS
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Baylor Medicine EHR
Blue Health Intelligence
Boston Medical Center
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C-Path
Carilion Clinic
Case Western
Cerner HealthFacts
Cherokee Health Systems
Children's Hospital of Colorado
Children's Hospital of Los Angeles
Children's Hospital of Philadelphia
Children's National
Cincinnati Children's Hospital Medical Center
Columbia University Irving Medical Center
Covenant Physician Partners
CRHFEI
Dana-Farber Cancer Institute
DARTNet Institute: CER2 Study
Decision Resources Group (DRG)
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Duke University
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Emory Enterprise Research Repository
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Flatiron - OSCER
Geisinger Health System
George Washington University
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Georgia Tech Research Institute
GeniOMOP
Harvard University Mass General Brigham
HealthPartners Institute
HealthVerity
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Merative MarketScan(R) Multi-State Medicaid Database (MDCD)
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IQVIA US Open Claims
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Loyola University New Orleans
Lurie
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Marietta Eye Clinic EHR
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NorthShore University HealthSystem
Northwestern Medical Enterprise Data Warehouse (NMEWDW)
NYC-CDRN
NYU Langone
- OCHIN (Oregon Community Health Information Network)**
Ochsner Medical Center
Oklahoma University
One Fact Foundation Payless Health
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PEDSnet
Penn State
Premier Healthcare Database
QueensCare - Los Angeles
Reliant Medical Group
Rhode Island Quality Institute
Rush University Medical Center
Rutgers
Shriners Children's
Spectrum Health West Michigan
Stanford medicine Research data Repository (STARR)
Stony Brook
Surveillance, Epidemiology, and End Results Program (SEER): B-Cell
TCC - Los Angeles
The Healthcare Cost and Utilization Project (HCUP), Nationwide Inpatient Sample (NIS)
The National Health and Nutrition Examination Survey (NHANES)
The Ohio State University Medical Center
TrialSpark
Tufts MC Research Data Warehouse (TRDW)
Tulane
UMass Memorial Medical Center
UNC Chapel Hill
University Medical Center New Orleans
University of Alabama at Birmingham
University of Arkansas
University of Buffalo
University of California Health
University of California, Davis
University of California, Irvine
University of California, Los Angeles
University of California, Riverside
University of California, San Diego
University of California, San Francisco
University of Chicago
University of Cincinnati
University of Colorado
University of Colorado, Anschutz Medical Center
University of Illinois Chicago
University of Iowa
University of Kentucky
University of Miami
University of Michigan
University of Minnesota
University of Mississippi Medical Center
University of Nebraska Medical Center
University of New Mexico Health Sciences Center
University of North Carolina, Chapel Hill
University of Pennsylvania
University of Pittsburgh
University of Pittsburgh - Banner
University of Rochester
University of Texas Houston
University of Texas Medical Branch
University of Texas Southwestern Medical Center
University of Utah
University of Virginia
University of Washington
Wake Forest University
Washington State
US Department of Defense
US Department of Veterans Affairs
UT Physicians
Vanderbilt University
Veradigm Health Insights Data - Allscripts
Veradigm Health Insights Data - Practice Fusion
Virginia Commonwealth University
Wake Forest University
WashU St. Louis
Weill Cornell Medicine/NewYork-Presbyterian Hospital (East Campus)
West Virginia University
Winship Cancer Institute of Emory University
Zus Health

OHDSI Evidence Network

In the last few pages, you learned about the OMOP Common Data Model, our foundational tool which standardizes patient-level data. You saw the reach of OMOP, which connects nearly one billion patients across six different continents in a way no other community can match.

However, if we aren't using this data to make an impact, we are wasting an incredible resource.

That is why we are building the OHDSI Evidence Network. We are giving researchers faster access to real-world data. This has been a priority over the last year, and it will remain one for the foreseeable future. We share a responsibility to empower network studies so they can generate reliable real-world evidence.

Several OMOP data sources have already joined the Evidence Network, and a few shared their experience in these pages. We encourage you to join them and help shape the future of healthcare decision-making.

The OHDSI Evidence Network is a collaborative initiative designed to improve health outcomes globally by uniting data partner organizations and researchers dedicated to generating evidence to support health decisions.

By joining this network, data partners have the opportunity to participate in studies that enhance data quality, improve vocabulary representation, and address the challenges of studying rare conditions and exposures. The network fosters standardized methodologies and rapid cycle analyses, all supported by the OMOP CDM. With a strong commitment to privacy and ethical standards, OHDSI ensures that personal information remains confidential while allowing partners full control over their participation in research projects.

Becoming a part of the OHDSI Evidence Network offers numerous benefits. Data partners participate in a collaborative environment that enriches evidence generation and supports diverse representation in health data. The network provides valuable opportunities for funding, career development, and business partnerships, creating a supportive ecosystem for all members.

By joining the OHDSI Evidence Network, data partners not only amplify their own research capabilities but also contribute to a collective mission aimed at transforming health care and improving patient outcomes around the world.

To join, simply generate a database profile and share it with the OHDSI Coordinating Center by following the instructions found on the GitHub below.



If you have questions, please fill out our interest form below. A community member will reach out to support your efforts.



Testimonials From Collaborators Who Have Joined The OHDSI Evidence Network



Joining the OHDSI Evidence Network was important to me because it allows us to increase the diversity of patient populations represented in the network, particularly from the Midwest U.S., which is currently under-represented. I believe that the methods developed by OHDSI can enhance care and improve patient health within my local healthcare system. The process to join was straightforward, thanks to OHDSI's collaborative and open-source community, with ample support through documentation, forums, and workgroup calls. By being part of the network, I hope to engage more data partners so we can tackle challenging clinical problems together, such as rare diseases and rare adverse drug reactions, which are often impossible to address with a single database.

Linying Zhang

Assistant Professor of Biostatistics at the Institute for Informatics, Data Science, & Biostatistics
Washington University School of Medicine in St. Louis



HealthPartners Institute was motivated to join the OHDSI Evidence Network to collaborate with organizations around the world and contribute to research that can promote better health and improve care – both locally and on a global scale. Prior to joining, we secured leadership buy-in, IRB approval, and limited funding to support our participation. We felt very supported throughout the process of joining the Evidence Network, and the OHDSI staff were helpful and responsive to questions we had along the way. We look forward to building relationships with other members and participating in workgroups to make meaningful contributions to research in the future.

Sam Patnoe

Senior Programmer Analyst, Research Informatics
HealthPartners Institute



The OHDSI community is a well-organized and highly welcoming community of experts who have helped me grow throughout my career. I was honored to bring European data into the OHDSI Evidence Network because of the importance of a diverse patient population for our global studies. As expected, the support and guidance I received from the community made the process both simple and fulfilling. Heliant Health, along with its data partners in the Balkans region, looks forward to joining this critical initiative and generate the necessary evidence to improve healthcare.

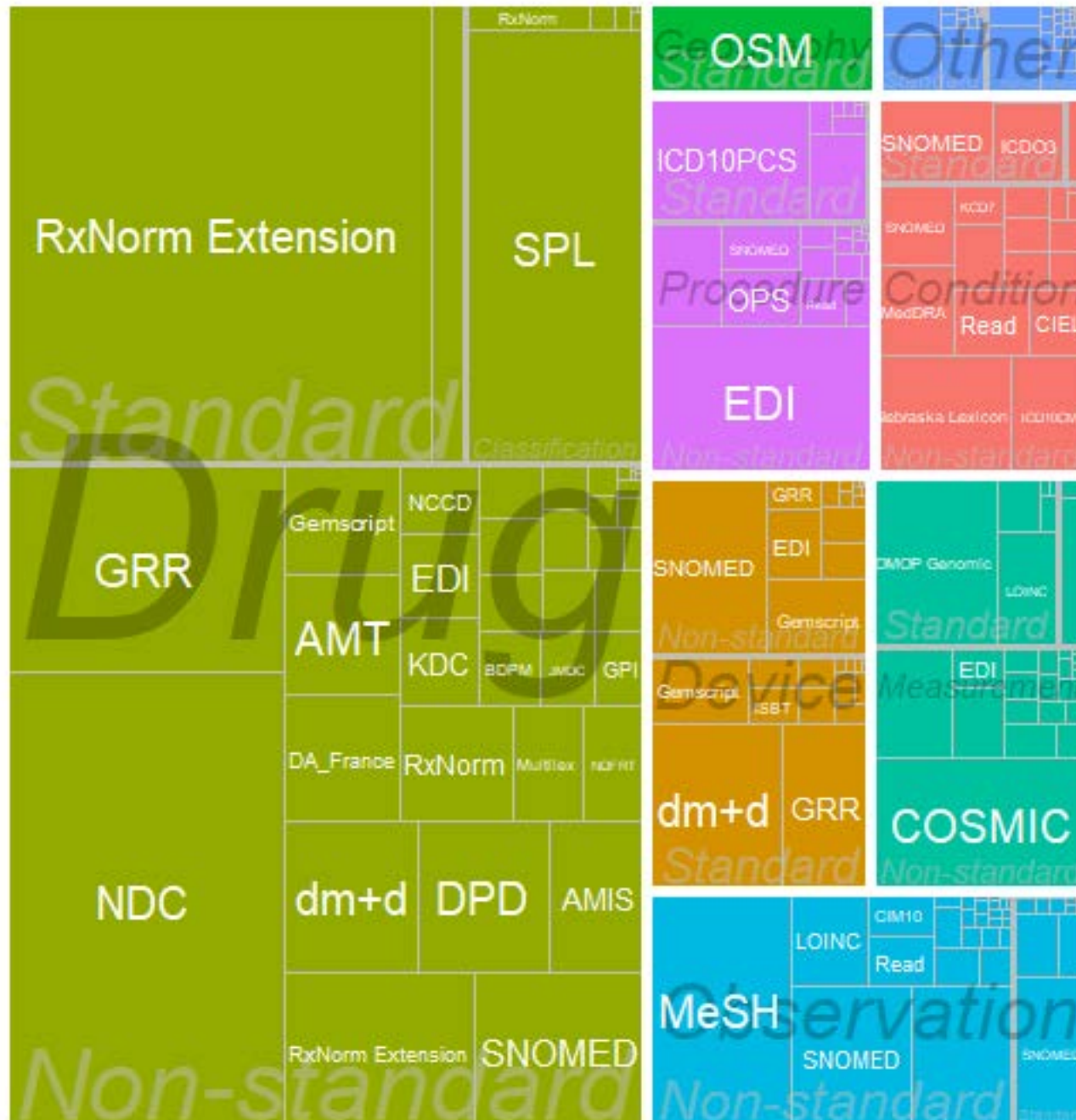
Filip Maljković

Core tech lead
Heliant Health

OHDSI Standardized Vocabularies

The OHDSI vocabularies allow organization and standardization of medical terms to be used across the various clinical domains of the OMOP common data model, and enables standardized analytics that leverage the knowledge base when constructing exposure and outcome phenotypes and other features within characterization, population-level effect estimation, and patient-level prediction studies.

You can download the OHDSI Standardized Vocabularies at athena.ohdsi.org.



This treemap shows all concepts in the OHDSI vocabularies, organized by domain (color) and vocabularies (boxes sized by the number of concepts).

OHDSI Vocabularies By The Numbers

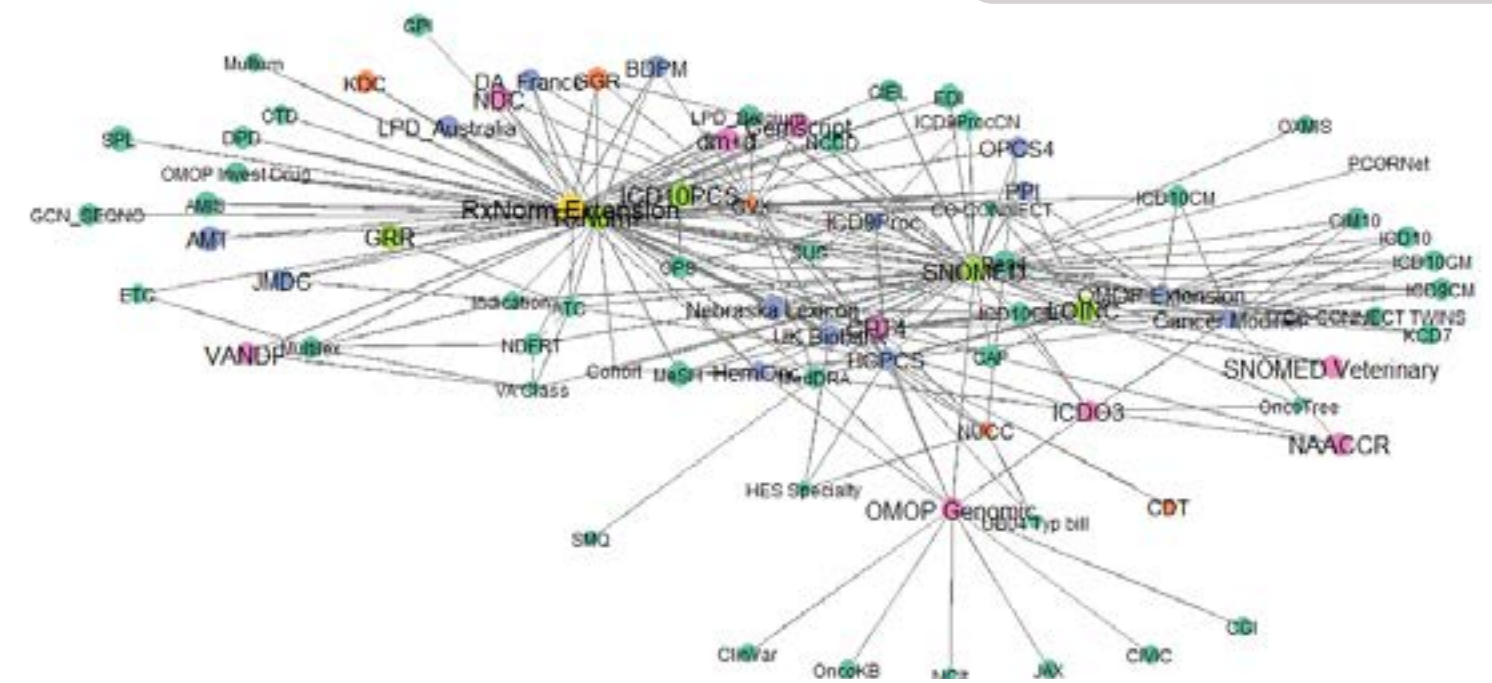
as of August 2024 release

- 11,561,982 concepts
 - 3,720,296 standard concepts
 - 883,766 classification concepts
- 86,668,674 concept relationships
- 99,192,928 ancestral relationships
- 143 vocabularies
- 5,009,796 concept synonyms
- 43 domains

1 Shared Resource to Enable Data Standards

This network diagram shows the relationships between vocabularies. Nodes are vocabularies, sized by the number of concepts. Edges show connections between concepts within vocabularies.

Want to learn more about the OHDSI vocabularies?
 Read: book.ohdsi.org
 Download: athena.ohdsi.org
 Learn: academy.ehden.edu



“If we really want to achieve global collaboration, we need more than just standardizing data format. We have to establish a shared understanding of data meaning and speak the same language when expressing clinical ideas. The OHDSI vocabularies is a community resource that makes it possible to work to reach this common goal.”

- **Christian Reich**
 2018 Titan Award recipient for Data Standards

OHDSI Standardized Vocabularies Improvement Initiative

Continuous improvement of our standardized vocabularies has been a community effort over the last year. Recent focuses have included contributions, versioning, and building a roadmap with emphasis on vocabularies most commonly used.

We thank our Vocabulary Team for its leadership in this journey. Learn more about recent developments on these pages.

2024-25 Vocabulary Roadmap



Scholarship Meets Application

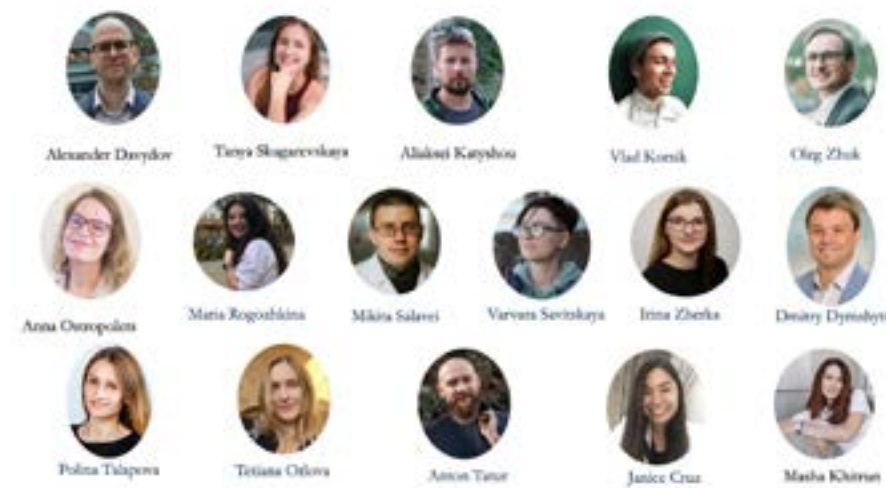
We published principles for standardized vocabularies and have developed quality compliance checks to monitor progress

Requirement	Definition
Standard concepts	Unique concepts of fully pre-coordinated medical entities, to be stated as fact, no negations of facts, no reference to the past, and no flavors of fact (unknown, not reported, etc.)
Concept domains	Assignment of concepts to domain categories (condition, drug, vitc, etc.)
Comprehensiveness	In each domain, standard concepts must cover all possible entities and mappings from terms and codes used in databases around the world
Publication	Prevalent hierarchical organizing concepts
Efficiency	Computationally efficient data model
The use cases	Storing and analyzing patient-level data for evidence generation

JAMIA
Publication
Quality Management System



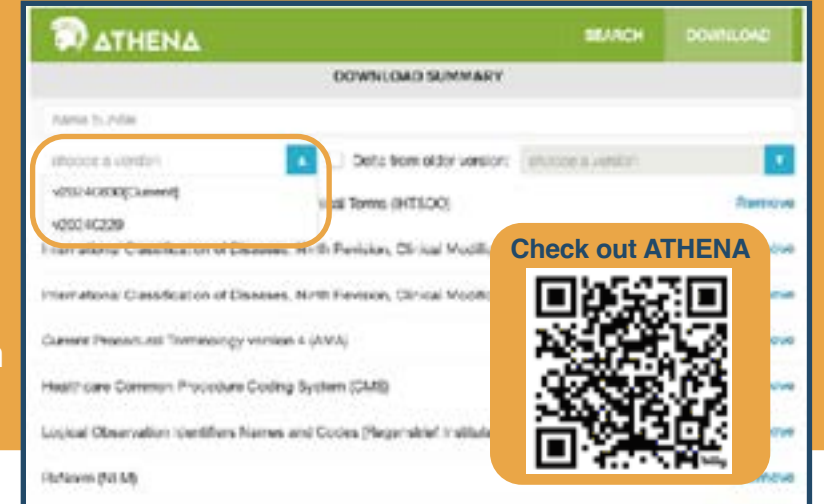
Thank You, Vocabulary Team!



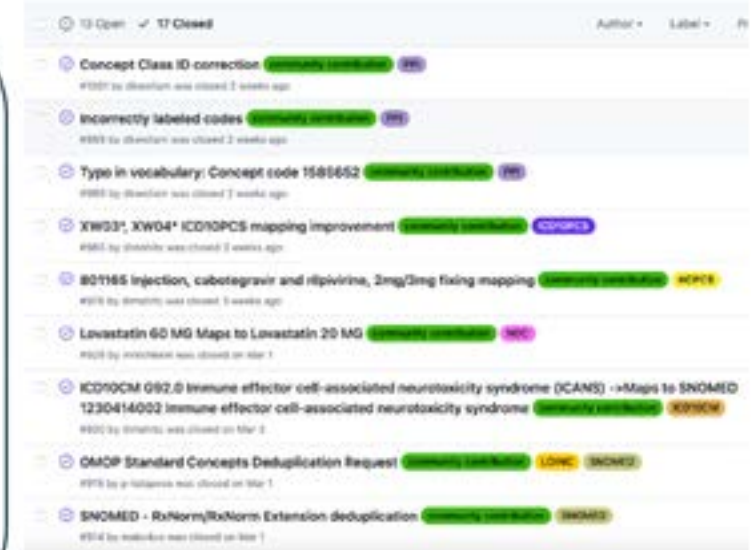
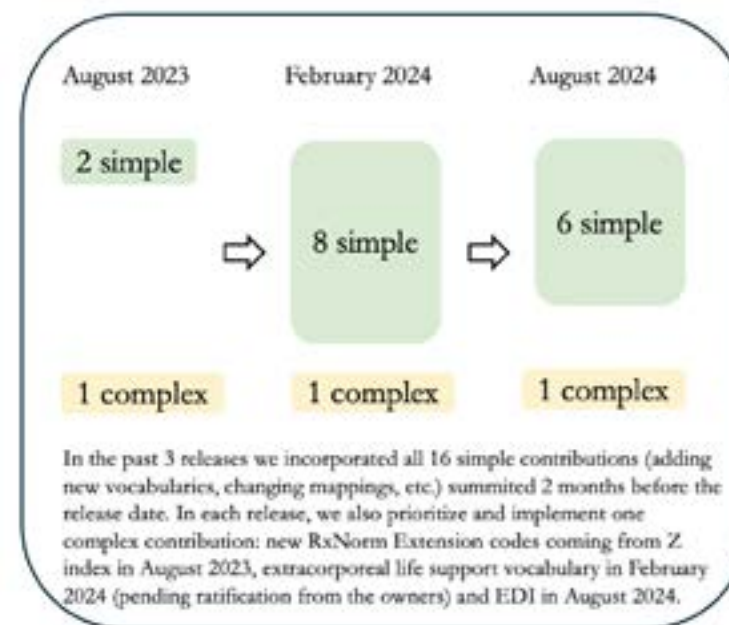
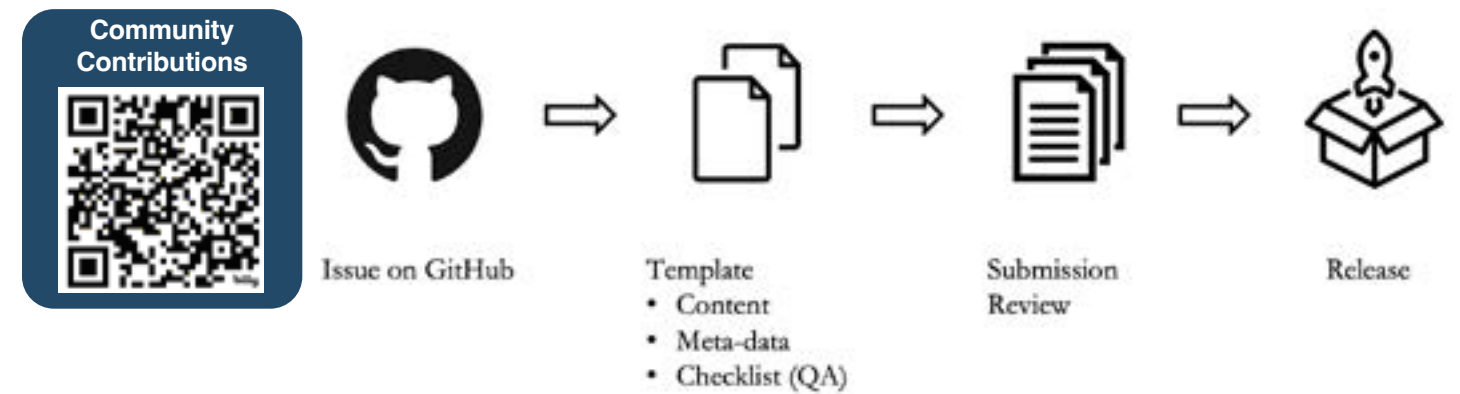
Community-Inspired Development

One of the most commonly requested features in the landscape assessment was enabling users to download different versions of the vocabularies.

The feature now is available on athena.ohdsi.org.



Community Contributions



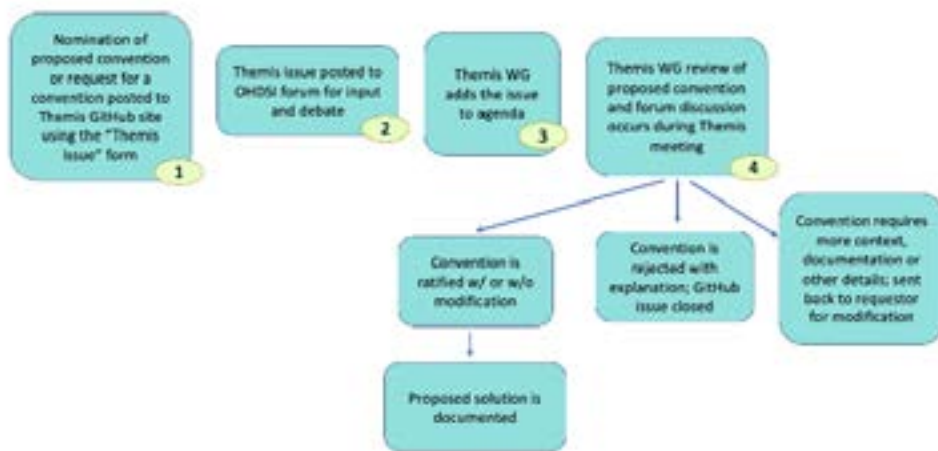
Themis Conventions

The Themis Repository contains all ratified conventions for the OHDSI community and was established during the April Olympians activity highlighted on page 37. Throughout this month-long event, the Olympians successfully added 25 ratified Themis conventions to the newly launched website; you can see the various convention categories below.

However, our work continues. The Themis workgroup remains actively engaged in reviewing issues, discussing proposals, and adjudicating conventions. Our goal is to guide the OHDSI community on how to accurately insert data into the OMOP CDM in cases of ambiguity.

This ongoing effort supports the creation of a structurally standardized and semantically harmonized data model, ultimately contributing to the production of reliable real-world evidence to inform patient care. All are welcome to join Themis!

Topic Processing



Find the conventions on the Themis homepage



General Conventions: Person Exclusion, Gender Identity, Providers with Multiple Addresses, Records with Values, Patient Reported Data, Events Outside of the Observation Period, Observation Periods for EHR data

CDM Tables: Care Site, Condition Occurrence, Death, Drug Exposure, Location, Measurement, Observation Period, Person, Provider, Visit Occurrence

Tag Browser: Address, Birthdate, Dates, Gender, Gender Identity, Labs, Lab Values, Location, Measurement, Negative, Observation Period, Patient Reported, Person, Place of Service, Provider Quantity, Sex, Themis, Value as Number, Year of Birth



"Themis makes decisions for the good of the whole community. We must compromise. Don't let perfect be the enemy of great. And interoperability between different OMOP CDMs is great!"

- Melanie Philofsky

2022 Titan Award recipient for Data Standards

OMOP and FHIR

When the OMOP CDM and FHIR (a healthcare data exchange standard) work together, they improve healthcare data sharing and research. OMOP organizes large amounts of patient data from different sources, while FHIR ensures secure and standardized data exchange between systems. Combining the two allows researchers and healthcare providers to access and use patient data more efficiently, improving precision medicine, personalized treatments, and overall patient care. It also enhances collaboration across hospitals, research institutions, and healthcare technologies, leading to better outcomes and innovations in medical care.

At OHDSI, we are FHIR-ed up!

In 2021, HL7 and OHDSI established a memorandum of agreement together. Under this cooperative agreement, a focused effort was launched to align the FHIR and OMOP models to support consistent data transformation for implementations using either model.

We have made exciting progress over the last year, starting with a successful connection at the 2023 OHDSI Global Symposium. During that event, attendees used two different software applications to transform FHIR data to OMOP, and vice versa.

The OMOP + FHIR workgroup has made steady progress to achieve its 2024 objectives. In cooperation with the HL7 Vulcan FHIR Accelerator, new leaders joined weekly efforts to advance standards that leverage both FHIR and OMOP, adding HL7 experts with diverse backgrounds to the blended leadership group.

Representatives from more than 60 organizations have attended bi-weekly meetings focused on development of an implementation guide detailing standard concept mapping for transforming FHIR to OMOP for core data elements. With the OMOP + FHIR WG, Vulcan is sponsoring co-development of an implementation guide for high-value transformations for common, core EHR clinical content from FHIR to OMOP. The resulting guide will address:

- Need to consistently and effectively transform FHIR EHR data onto the OMOP CDM
- Decreased site data transformation costs
- Increasing the quality & consistency of the data produced using the specification

Additionally, in collaboration with the HL7 Health Equity Working Group, the OMOP + FHIR WG leads



launched a project to update the OMOP CDM to align it with new conventions for Gender Identity and administrative sex represented by the HL7 Gender Harmony Implementation Guide and United States Core Data for Interoperability (USCDI) standards.



VII.

Open-Source Software

HADES

HADES is a set of open source R packages for large scale analytics, including population characterization, population-level causal effect estimation, and patient-level prediction.

The packages offer R functions that together can be used to perform an observational study through the full journey from data to evidence, including data manipulation, statistical modeling, and results generation with supporting statistics, tables and figures.

Each package includes functions for specifying and subsequently executing multiple analyses efficiently. HADES supports best practices for use of observational data as learned from previous and ongoing research, such as transparency and reproducibility, as well as measuring of the operating characteristics of methods in a particular context and subsequent empirical calibration of estimates produced by the methods.

Learn more about the individual HADES packages in this section.

Population-Level Estimation

CohortMethod

CohortMethod is an R package for performing new-user cohort studies in an observational database in the OMOP Common Data Model.

SelfControlledCaseSeries

SelfControlledCaseSeries is an R package for performing Self-Controlled Case Series (SCCS) analyses in an observational database in the OMOP Common Data Model.

EvidenceSynthesis

This R package contains routines for combining causal effect estimates and study diagnostics across multiple data sites in a distributed study. This includes functions for performing meta-analysis and forest plots.

SelfControlledCohort

This package provides a method to estimate risk by comparing time exposed with time unexposed among the exposed cohort.

Characterization/Patient-Level Prediction

Characterization

Characterization is an R package for performing characterization of a target and a comparator cohort.

EnsemblePatientLevelPrediction

EnsemblePatientLevelPrediction is an R package for building and validating ensemble patient-level predictive models using data in the OMOP Common Data Model format. The package expands the OHDSI R PatientLevelPrediction package to enable ensemble learning.

CohortIncidence

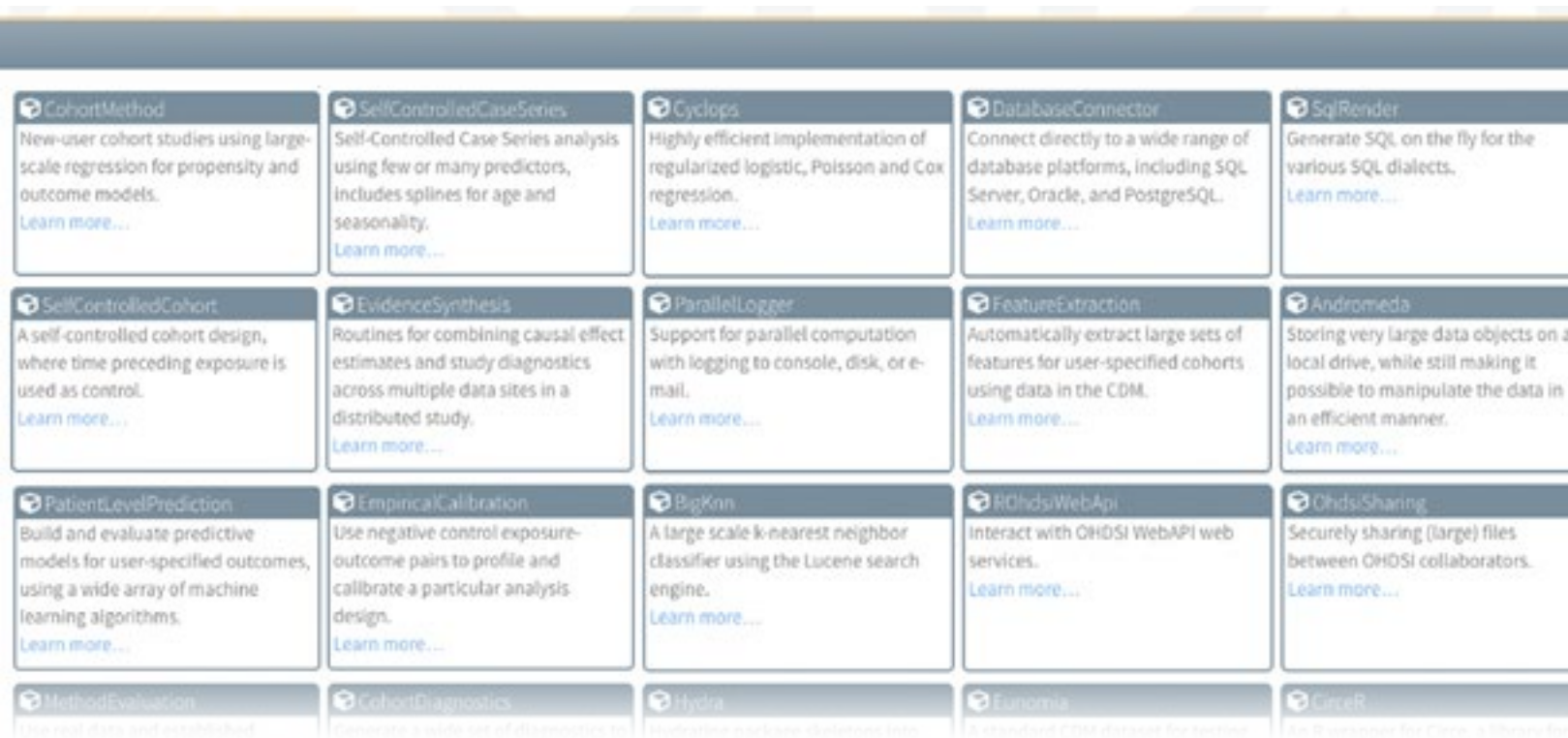
CohortIncidence is an R package and Java library for calculating incidence rates on the OMOP CDM.

PatientLevelPrediction

PatientLevelPrediction is an R package for building and validating patient-level predictive models using data in the OMOP Common Data Model format.

DeepPatientLevelPrediction

DeepPatientLevelPrediction is an R package for building and validating deep learning patient-level predictive models using data in the OMOP Common Data Model format and OHDSI PatientLevelPrediction framework.



Cohort Construction

Capr

The goal of Capr, pronounced 'kay-pr' like the edible flower, is to provide a language for expressing OHDSI Cohort definitions in R code. OHDSI defines a cohort as "a set of persons who satisfy one or more inclusion criteria for a duration of time" and provides a standardized approach for defining them (Circe-be). Capr exposes the standardized approach to cohort building through a programmatic interface in R which is particularly helpful when creating a large number of similar cohorts. Capr version 2 introduces a new user interface designed for readability with the goal that Capr code being a human readable description of a cohort while also being executable on an OMOP Common Data Model.

CirceR

CirceR, a R-wrapper for Circe, is a library for creating queries for the OMOP Common Data Model. These queries are used in cohort definitions (CohortExpression) as well as custom features (CriteriaFeature). This package provides convenient wrappers for Circe functions, and includes the necessary Java dependencies.

CohortDiagnostics

CohortDiagnostics is an R utility package for the development and evaluation of phenotype algorithms for OMOP CDM compliant data sets. This package provides a standard, end to end, set of analytics for understanding patient capture including data generation and result exploration through an R Shiny interface. Analytics computed include cohort characteristics, record counts, index event misclassification, captured observation windows and basic incidence proportions for age, gender and calendar year. Through the identification of errors, CohortDiagnostics enables the comparison of multiple candidate cohort definitions across one or more data sources, facilitating reproducible research.

CohortExplorer

This software tool is designed to extract data from a randomized subset of individuals within a cohort and make it available for exploration in a 'Shiny' application environment. It retrieves date-stamped, event-level records from one or more data sources that represent patient data in the OMOP data model format. This tool features a user-friendly interface that enables users to efficiently explore the extracted profiles, thereby facilitating applications, such as reviewing structured profiles. The output of this R-package is a self-contained R shiny that contains person-level data for review.

CohortGenerator

This R package contains functions for generating cohorts using data in the CDM.

Knowledge-Enhanced Electronic Profile Review (KEEPER)

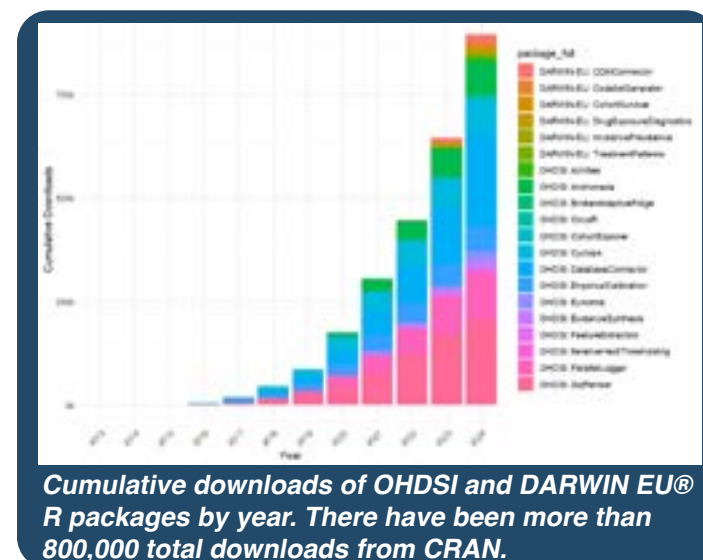
KEEPER is an R package for reviewing patient profiles for phenotype validation.

PheValuator

The goal of PheValuator is to produce a large cohort of subjects each with a predicted probability for a specified health outcome of interest (HOI). This is achieved by developing a diagnostic predictive model for the HOI using the PatientLevelPrediction (PLP) R package and applying the model to a large, randomly selected population. These subjects can be used to test one or more phenotype algorithms.

PhenotypeLibrary

The OHDSI community has developed a publicly accessible, version-controlled Phenotype Library to guide real-world evidence towards the FAIR principles: Findability, Accessibility, Reproducibility, and Interoperability. This library aims to foster the submission and retrieval of high-quality cohort definitions, cataloging of metadata, attribution and promotion of discovery and reuse in scientific research. Within the OHDSI Phenotype Library (OHDSI PL), each entry represents a unique cohort definition identifiable by a stable, externally referenceable ID. Comprehensive metadata about each cohort definition is cataloged and made searchable for researchers. Content in the library is subject to version control, with each version is assigned a specific DOI.



Evidence Quality

Achilles

Automated Characterization of Health Information at Large-Scale Longitudinal Evidence Systems (ACHILLES) Achilles provides descriptive statistics on an OMOP CDM database. ACHILLES currently supports CDM version 5.3 and 5.4.

Data Quality Dashboard

The goal of the Data Quality Dashboard (DQD) project is to design and develop an open-source tool to expose and evaluate observational data quality. This package will run a series of data quality checks against an OMOP CDM instance (currently supports v5.4, v5.3 and v5.2). It systematically runs the checks, evaluates the checks against some pre-specified threshold, and then communicates what was done in a transparent and easily understandable way.

EmpiricalCalibration

This R package contains routines for performing empirical calibration of observational study estimates. By using a set of negative control hypotheses we can estimate the empirical null distribution of a particular observational study setup. This empirical null distribution can be used to

compute a calibrated p-value, which reflects the probability of observing an estimated effect size when the null hypothesis is true taking both random and systematic error into account, as described in the paper Interpreting observational studies: why empirical calibration is needed to correct p-values.

Also supported is empirical calibration of confidence intervals, based on the results for a set of negative and positive controls, as described in the paper Empirical confidence interval calibration for population-level effect estimation studies in observational healthcare data.

Method Evaluation

This R package contains resources for the evaluation of the performance of methods that aim to estimate the magnitude (relative risk) of the effect of a drug on an outcome. These resources include reference sets for evaluating methods on real data, as well as functions for inserting simulated effects in real data based on negative control drug-outcome pairs. Further included are functions for the computation of the minimum detectable relative risks and functions for computing performance statistics such as predictive accuracy, error and bias.

Supporting Packages

Andromeda

AsynchroNous Disk-based Representation of Massive DATA (ANDROMEDA): An R package for storing large data objects. Andromeda allow storing data objects on a local drive, while still making it possible to manipulate the data in an efficient manner.

BigKNN

An R package implementing a large scale k-nearest neighbor (KNN) classifier using the Lucene search engine.

BrokenAdaptiveRidge

A R package that approximates best-subset selection (L0) regression with an iteratively adaptive Ridge (L2) penalty for large-scale models, using Cyclops.

Cyclops

Cyclops (Cyclic coordinate descent for logistic, Poisson and survival analysis) is an R package for performing large scale regularized regressions.

DatabaseConnector

This R package provides function for connecting to various

DBMSs. Together with the SqlRender package, the main goal of DatabaseConnector is to provide a uniform interface across database platforms: the same code should run and produce equivalent results, regardless of the database back end.

Eunomia

Eunomia is a standard dataset manager for sample OMOP CDM datasets. Eunomia facilitates access to sample datasets from the EunomiaDatasets repository. Eunomia is used for testing and demonstration purposes, including many of the exercises in the Book of OHDSI.

FeatureExtraction

An R package for generating features (covariates) for a cohort using data in the Common Data Model.

Hydra

An R package and Java library for hydrating package skeletons into executable R study packages based on specifications in JSON format.

Supporting Packages

IterativeHardThresholding

A R package that fits large-scale regression models with a penalty that restricts the maximum number of non-zero regression coefficients to a prespecified value, using CyclicS.

OhdsiSharing

This is an R package for sharing data between OHDSI partners.

OhdsiShinyModules

OhdsiShinyModules is an R package containing Shiny modules that can be used within shiny result interfaces. The OHDSI tools often provide shiny interfaces for viewing and exploring results. Many of these shiny apps have overlapping features. To ensure consistency we have created a repository containing useful shiny modules that can be used in multiple result explorers.

ParallelLogger

Support for parallel computation with progress bar, and option to stop or proceed on errors. Also provides logging to console and disk, and the logging persists in the parallel threads. Additional functions support function call automation with delayed execution (e.g. for executing functions in parallel).

ResultModelManager

RMM is a database data model management utilities for R packages in the Observational Health Data Sciences and Informatics program. RMM provides utility functions to allow package maintainers to migrate existing SQL database models, export and import results in consistent patterns.

ROhdsiWebApi

ROhdsiWebApi is a R based interface to 'WebApi' (OHDSI RESTful services), and performs GET/PULL/POST/DELETE calls via the WebApi. All objects starting from R or output to R - are analysis ready R-objects like list and data.frame. The package handles the intermediary steps by converting R-objects to JSON and vice versa. To ensure r-objects are analysis ready, the objects are type converted where possible, e.g. date/date time are converted from string to POSIXct.

This package makes reproducible research easier, by offering ability to retrieve detailed study specifications, transport study specifications from one instance to another, programmatically invoke the generation of a sequence of steps that are part of a study, manage running studies in batch mode.

ShinyAppBuilder

Create Shiny apps using modules from OhdsiShiny-Modules or custom modules.

SqlRender

This is an R package for rendering parameterized SQL, and translating it to different SQL dialects. SqlRender can also be used as a stand-alone Java library and a command-line executable.

Kheiron Contributor Cohort

The Kheiron Contributor Cohort has entered its third year, and 12 new members have been accepted into the leadership program with the aim of onboarding new software developers into the OHDSI open-source software community. The Kheiron faculty includes Katy Sadowski, Paul Nagy, Anthony Sena, John Gresh, Hayden Spencer, Kyle Vollo-Zenecek, and Dan Smith. The leadership program kicks off each fall and goes through to the spring OHDSI DevCon event. Developers commit 10% of their time for a year to participate in the open-source journey, working closely with an experienced OHDSI developer who volunteers to assist their mentees in making meaningful contributions to the community. The cohort participates in hands-on workshops, attends Technical Advisory Board meetings, and performs development work in HADES, vocabulary mapping, and more.

Package Statuses (as of 09Sep2024)

HADES Maintainers

Package	Version	Maintainer(s)	Availability
Ablites	v1.7.0	Frank DeFalco	CRAN
Anatomedia	v0.0.7	Martijn Schuemie	CRAN
BigPain	v1.0.3	Martijn Schuemie	GitHub
ElasticSearchR	v1.0.7	Marc Suchard	CRAN
SAGE	v2.0.3	Martin Lavallee	GitHub
Characterization	v3.0.1	Jenna Reps	GitHub
CircuR	v1.7.7	Chris Knoll	CRAN
ConcoctDashboard	v3.2.3	Jamie Gilbert	GitHub
ConcoctExplorer	v0.1.0	Gowtham Rao	CRAN
CohortGenerator	v0.11.0	Anthony Sena	GitHub
CohortIntelligence	v4.0.7	Chris Knoll	GitHub
ConcoctMethod	v4.3.7	Martijn Schuemie	GitHub
Cyclops	v2.4.1	Marc Suchard	CRAN
DatabaseConnector	v0.7.7	Martijn Schuemie	CRAN
DataQualityDashboard	v2.6.1	Katy Sadowski	GitHub
DeepPatientLevelPrediction	v2.1.0	Egill Fridgeirsson	GitHub
EmpiricalCallibration	v3.1.7	Martijn Schuemie	CRAN
EnsemblePatientLevelPrediction	v1.0.3	Jenna Reps	GitHub
Eusencia	v2.0.1	Frank DeFalco	CRAN
EvidenceSynthesis	v0.7.7	Martijn Schuemie	CRAN
FeatureExtraction	v3.7.0	Ger Inberg	CRAN
Hysia	v0.1.0	Anthony Sena	GitHub
IterativeHardThresholding	v1.0.2	Marc Suchard	CRAN
Keeper	v0.2.0	Anna Ostropolets	GitHub
MethodEvaluation	v2.3.0	Martijn Schuemie	GitHub
OhdsiSharing	v0.2.2	Lee Evans	GitHub
OhdsiShinyModules	v1.0.0	Jenna Reps	GitHub
ParallelLogger	v3.3.1	Martijn Schuemie	CRAN
PatientLevelPrediction	v0.3.9	Egill Fridgeirsson & Jenna Reps	GitHub
PhenotypeLibrary	v3.32.0	Gowtham Rao	GitHub
Phevaluator	v2.2.11	Joel Swerdel	GitHub
ResultModelManager	v0.3.10	Jamie Gilbert	GitHub
ROhdsiWebApi	v1.3.3	Gowtham Rao	GitHub
SelfControlledCaseSeries	v5.3.0	Martijn Schuemie	GitHub
SelfControlledCohort	v1.0.0	Jamie Gilbert	GitHub
ShinyAppBuilder	v3.0.0	Jenna Reps	GitHub
SqlRender	v1.18.1	Martijn Schuemie	CRAN

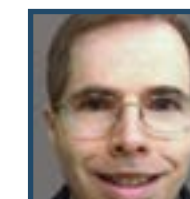
The open-source tools that empower OHDSI research are not only available to the community, but they are DEVELOPED by the community. We thank the many developers and maintainers who empower our research initiatives around the world!



Adam Black



Frank DeFalco



Lee Evans



Egill Fridgeirsson



Jamie Gilbert



Ger Inberg



Christopher Knoll



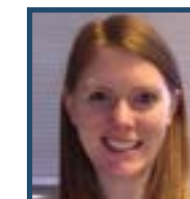
Martin Lavallee



Anna Ostropolets



Gowtham Rao



Jenna Reps



Peter Rijnbeek



Katy Sadowski



Martijn Schuemie



Anthony Sena



Marc Suchard

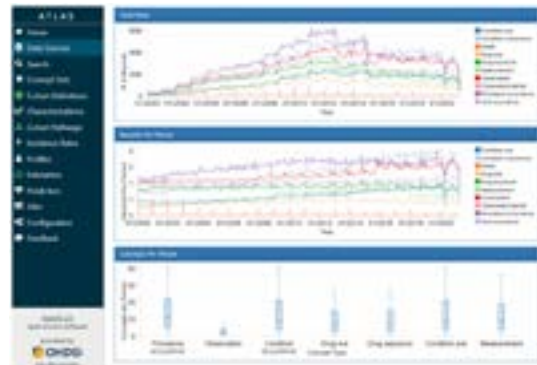


Joel Swerdel

ATLAS

ATLAS is a free, publicly available, web-based tool developed by the OHDSI community that facilitates the design and execution of analyses on standardized, patient-level, observational data in the OMOP CDM format.

Enabling A Journey From Data To Evidence



Explore Data



Design Analyses



Produce Code



Generate Evidence



"ATLAS makes it possible for everyone in the OHDSI community to collaboratively design high-quality observational studies and produce reproducible code that can be shared and executed on OMOP CDM databases around the world."

- Christopher Knoll
2018 Titan Award for Open-Source Development recipient

Want to learn more about ATLAS?

Experience: atlas-demo.ohdsi.org

Download: github.com/ohdsi/atlas

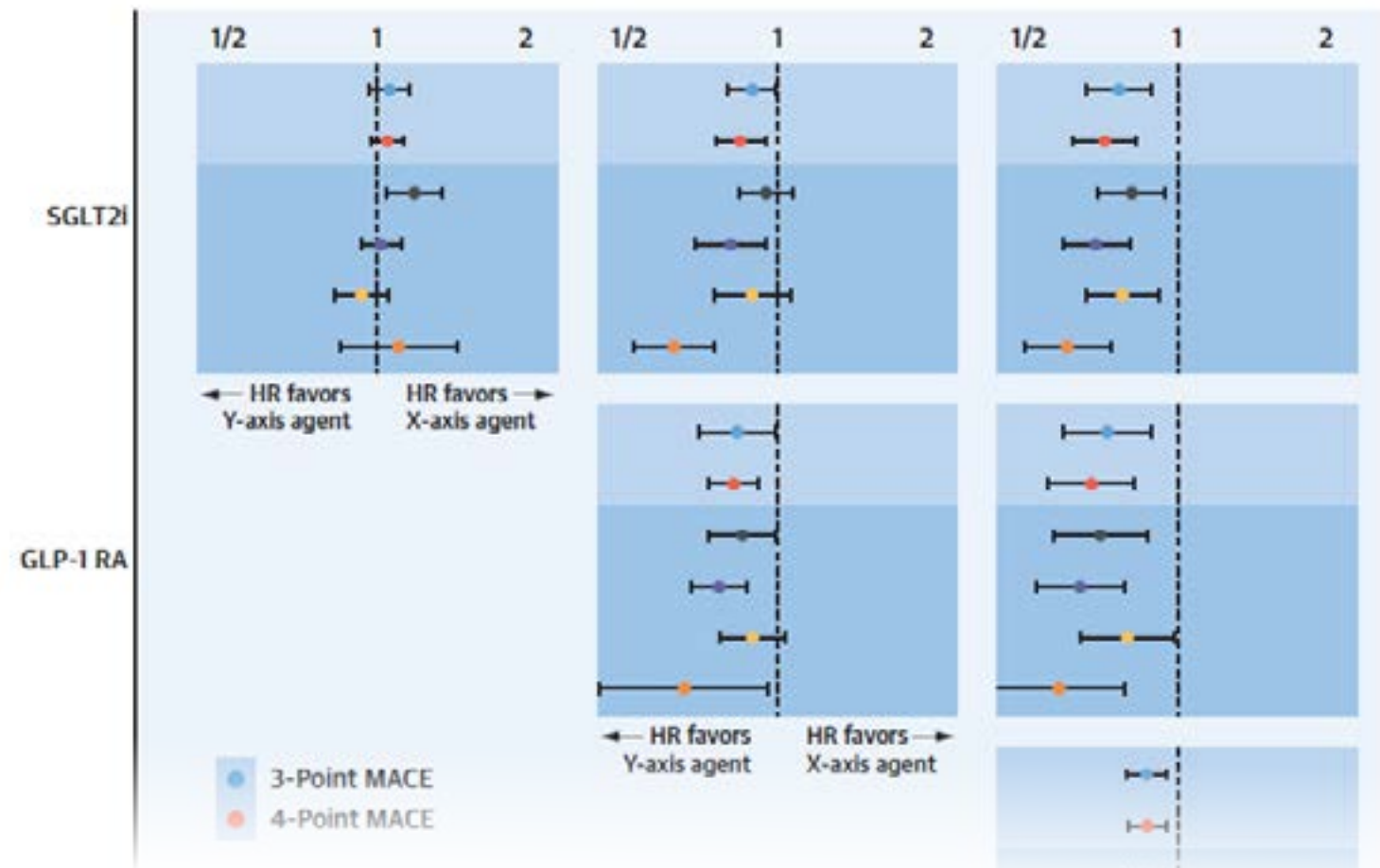
Read: book.ohdsi.org

Train: academy.ehden.eu



VIII.

Methods Research



LEGEND in Principle

LEGEND (Large-scale Evidence Generation and Evaluation across a Network of Databases) applies high-level analytics to perform observational research on hundreds of millions of patient records within OHDSI's international database network.

LEGEND is based on 10 guiding principles that were published in JAMIA (August, 2020) and are listed below.

1. LEGEND will generate evidence at a large scale.

Instead of answering a single question at a time (eg, the effect of 1 treatment on 1 outcome), LEGEND answers large sets of related questions at once (eg, the effects of many treatments for a disease on many outcomes). **Aim:** Avoids publication bias, achieves comprehensiveness of results, and allows for an evaluation of the overall coherence and consistency of the generated evidence.

2. Dissemination of the evidence will not depend on the estimated effects.

All generated evidence is disseminated at once. **Aim:** Avoids publication bias and enhances transparency.

3. LEGEND will generate evidence using a prespecified analysis design. All analyses, including the research questions that will be answered, will be decided prior to analysis execution. **Aim:** Avoids P hacking.

4. LEGEND will generate evidence by consistently applying a systematic process across all research questions.

This principle precludes modification of analyses to obtain a desired answer to any specific question. This does not imply a simple one-size-fits-all process, rather that the logic for modifying an analysis for specific research questions should be explicated and applied systematically. **Aim:** Avoids P hacking and allows for the evaluation of the operating characteristics of this process (Principle 6).

5. LEGEND will generate evidence using best practices. LEGEND answers each question using current best practices, including advanced methods to address confounding, such as propensity scores. Specifically, we will not employ suboptimal methods (in terms of bias) to achieve better computational efficiency. **Aim:** Minimizes bias.

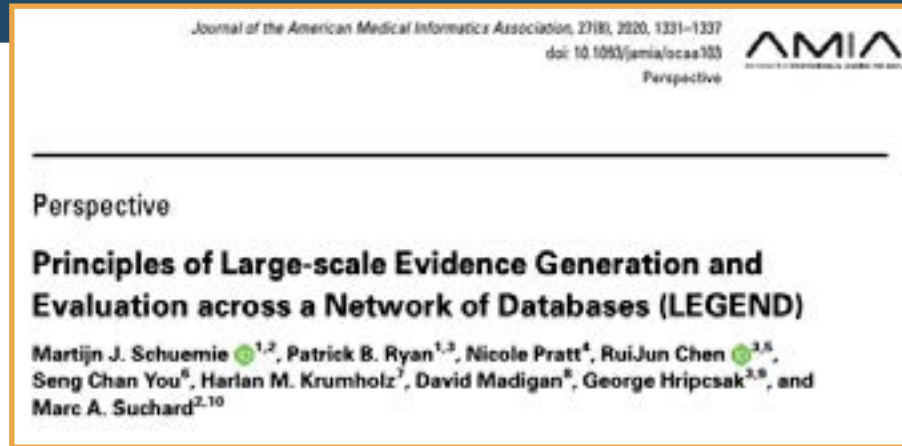
6. LEGEND will include empirical evaluation through the use of control questions. Every LEGEND study includes control questions. Control questions are questions where the answer is known. These allow for measuring the operating characteristics of our systematic process, including residual bias. We subsequently account for this observed residual bias in our P values, effect estimates, and confidence intervals using empirical calibration. [7,8] **Aim:** Enhances transparency on the uncertainty due to residual bias.

7. LEGEND will generate evidence using open-source software that is freely available to all. The analysis software is open to review and evaluation, and is available for replicating analyses down to the smallest detail. **Aim:** Enhances transparency and allows replication.

8. LEGEND will not be used to evaluate new methods. Even though the same infrastructure used in LEGEND may also be used to evaluate new causal inference methods, generating clinical evidence should not be performed at the same time as method evaluation. This is a corollary of Principle 5, since a new method that still requires evaluation cannot already be best practice. Also, generating evidence with unproven methods can hamper the interpretability of the clinical results. Note that LEGEND does evaluate how well the methods it uses perform in the specific context of the questions and data used in a LEGEND study (Principle 6). **Aim:** Avoids bias and improves interpretability.

9. LEGEND will generate evidence across a network of multiple databases. Multiple heterogeneous databases (different data capture processes, health-care systems, and populations) will be used to generate the evidence to allow an assessment of the replicability of findings across sites. **Aim:** Enhances generalizability and uncovers potential between-site heterogeneity.

10. LEGEND will maintain data confidentiality; patient-level data will not be shared between sites in the network. Not sharing data will ensure patient privacy, and comply with local data governance rules. **Aim:** Privacy.



LEGEND in Action

LEGEND principles have been applied to studying the effects of treatments for hypertension, depression, COVID-19 and Type 2 diabetes. The clinical impact of LEGEND can be found in high-impact journals like The Lancet, JAMA Internal Medicine, Hypertension, and the Journal of the American College of Cardiology (see story below).

A recent study published in the Journal of the American College of Cardiology has found that two newer classes of diabetes medications significantly reduce the risk of heart problems in patients with type 2 diabetes (T2DM) and cardiovascular disease. The research, which analyzed nearly 1.5 million patients, compared the effectiveness of different diabetes drugs and found that newer medications—GLP-1 receptor agonists and SGLT-2 inhibitors—were more effective at lowering heart risks than older drugs like sulfonylureas and DPP-4 inhibitors.



Marc Suchard

The study's corresponding author, Dr. Marc Suchard from UCLA, emphasized that these findings could change the way doctors treat diabetes patients with heart issues. The newer drugs not only help control blood sugar just as well as older ones but also decrease cardiovascular risks and come with fewer side effects.

This critical research, part of the LEGEND-T2DM study, highlights an important step forward in diabetes care and was published in September 2024.



The Evidence Gap

Although current clinical practice guidelines recommend using SGLT-2 inhibitors (SGLT2is) and GLP-1 receptor agonists (GLP1-RA) for T2DM patients who are already on metformin, many patients are still being prescribed older drugs like DPP4 inhibitors (DPP4is) and sulfonylureas (SUs), likely due to their history and a lack of direct, head-to-head studies comparing all these medications.

The study found no statistical difference in cardiovascular effectiveness between SGLT2is and GLP1-RA. However, both were shown to reduce heart risks more than the older drugs. SGLT2is lowered heart risks by 11% compared to DPP4is and 24% compared to SUs, while GLP1-RA reduced heart risks by 17% and 28%, respectively.

This research strongly supports current clinical guidelines recommending the use of SGLT2is and GLP1-RA for people with both type 2 diabetes and heart disease, and it suggests these newer drugs should be the preferred second-line treatments for such patients.

The LEGEND Method

The LEGEND Initiative uses advanced analytics to perform observational research on hundreds of millions of patient records within OHDSI's international database network. These principles have been applied to research treatments for conditions like hypertension, depression, and COVID-19.

In this study, researchers looked at 10 international data sources covering 30 years and analyzed records of 1,492,855 patients with T2DM and heart disease who were on metformin and started one of these four second-line agents.

LEGEND Study Publications

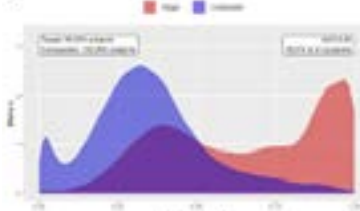
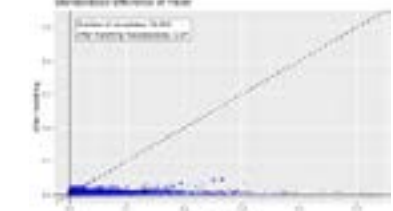
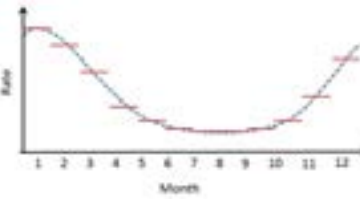
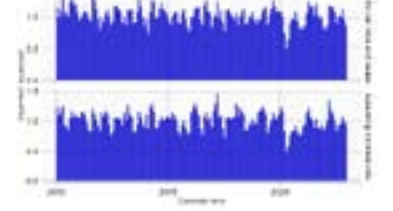


The Journey To Reliable Evidence With Causal Effect Estimation

OHDSI has created a framework for reliably estimating causal effects from real-world data. The two workhorses of this framework are the comparative cohort design and self-controlled case series (SCCS), two designs implemented as open-source R packages. Each design has standardized inputs and outputs, improving reproducibility.

Causal estimates from real-world data are only valid if several assumptions have been met. OHDSI provides advanced methods to adjust for bias (for example due to confounding), and a framework of objective diagnostics verifying the assumptions have been met. A study that fails diagnostics should not have its results unblinded.

	Overall Design	Design Choices
Cohort Method	The comparative cohort design is akin to a randomized trial, comparing two cohorts of people	<p>Target cohort: people having the exposure of interest</p> <p>Comparator cohort: people with some active comparator exposure</p> <p>Outcome cohort: outcome of interest</p> <p>Time-at-risk: Period for which to estimate the effect</p>
SCCS	The self-controlled case series (SCCS) design compares exposed to non-exposed time in the same people	<p>Target cohort: people having the exposure of interest</p> <p>Indication cohort: Time when people have the indication for the exposure</p> <p>Outcome cohort: outcome of interest</p> <p>Time-at-risk: Period for which to estimate the effect</p>

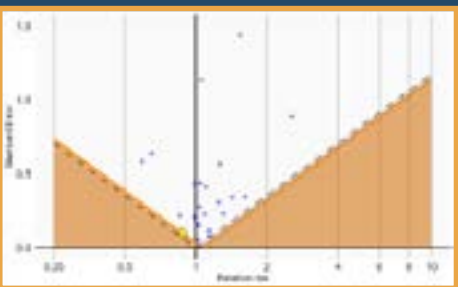
Advanced Bias Adjustment	Objective Diagnostics
<p>Large-scale propensity scores</p>  <p>A data-driven approach to confounder adjustment</p>	<p>Covariate balance</p>  <p>Must achieve balance on all observed variables (often >10,000)</p>
<p>Splines for temporal trends</p>  <p>Flexible and powerful adjustment for time-varying confounding</p>	<p>Temporal stability</p>  <p>Rate of outcome after spline adjustment must be constant over time</p>

Negative Controls & Empirical Calibration

Negative controls – exposure-outcome pairs with no causal relationship – offer a powerful diagnostic to evaluate the reliability of a population-level effect estimation study. By applying the same method on the same data to a large collection of negative controls, one can determine if there is systematic error in the analysis, whether due to selection bias, confounding, or measurement error.

Negative controls therefore serve as an objective diagnostic applicable to multiple designs: if the expected systematic error exceeds some pre-defined threshold, we should not trust the results of our study.

Empirical calibration is a statistical procedure developed by OHDSI collaborators to use the error distribution estimated from negative controls and correct the original study statistics – point estimates, confidence intervals, and p-values – to restore their nominal operating characteristics and allow for a more honest interpretation of what really has been learned from observational data.



Evidence Synthesis

One strength of OHDSI is in its numbers: data from across the OHDSI network can contribute to our understanding of the effects of treatments. A challenge is that only summary statistics, not patient-level data, can be shared. Previously, sites produced effect estimates and confidence intervals, combined via standard meta-analysis. However, this method can be biased when outcomes are rare. OHDSI developed a new approach where sites share likelihood curve shapes as points, which avoids this bias while preserving privacy. This method, now the default in HADES, is used in all OHDSI studies as it performs as well or better than standard meta-analysis.



“The existing observational studies in the literature suffer from biases such as confounding, publication bias, and p-hacking. OHDSI has tackled these challenges by standardizing analytic methods, offering advanced methods for bias correction, and implementing objective diagnostics. These measures enable the generation of reliable evidence for patients and clinical decision-makers.”

- **Martijn Schuemie**, 2018 Titan Award recipient for Methodological Research

The Journey To Reliable Evidence With Patient-Level Prediction

Standardized Framework

requires OMOP CDM



Clear specification of the prediction task

- Target Population: patients at risk
- Outcome: medical event to predict
- Time-at-risk (TAR): interval to predict whether outcome will occur



Deep Learning



Large-scale study investigating model development and validation across the OHDSI network using benchmark tasks.



Open-source software

Best Practices



We are performing large-scale empirical studies that guide model design choices.

Clinical Applications



We are using our expertise to develop clinical models.

Benchmark Tasks



We are defining an expanded set of diverse benchmark tasks.

Open Source



We provide software to efficiently develop and validate models.

Join The PLP Journey

Join the monthly PatientLevelPrediction workgroup call: 2nd Wednesday of each month @ 9am ET/3pm CET

PLP GitHub: github.com/OHDSI/PatientLevelPrediction



“Patient-level prediction can make a huge impact on the way we deliver medicine, but a lot more work is needed to ensure quality models are developed. OHDSI is leading research to establish best practices, answering important questions that will ensure future predictive models generate reliable evidence.”

- Jenna Reps
2019 Titan Award recipient for Methodological Research



“In order for Patient-Level Prediction modelling to truly have patient-level impact, we need to answer the questions that matter to clinicians. To do this we must provide clear guidance on how to develop safe and effective models. The PLP workgroup researches best practices and provides training to empower members to create impactful models.”

- Ross Williams
2021 Titan Award recipient for Community Support

Generative AI & Foundational Models

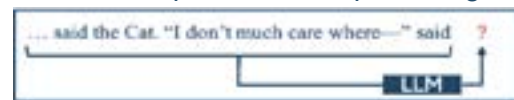
Generative AI brings exciting new possibilities that we are still learning to leverage. The **Generative AI & Foundational Models Workgroup** brings together a diverse set of researchers working towards safe and responsible use of generative AI in observational research.

We're currently exploring two types of generative models:

- Large Language Models (LLMs)
- Foundational Models for Electronic Records (FMEHR)

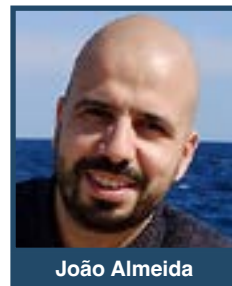
Large Language Models (LLMs)

LLMs are pretrained on predicting the next word in a large text corpus.



To do this task well, an LLM must not only learn syntax (spelling, grammar), but also semantics.

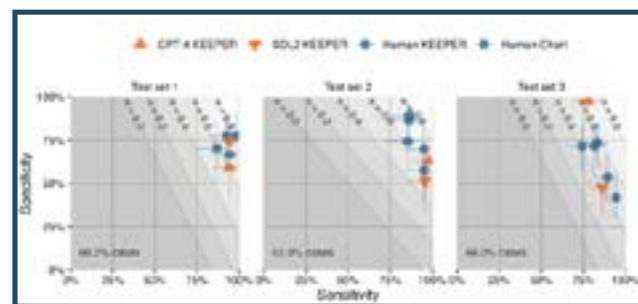
LLMs are often finetuned for tasks such as chat. Well-known LLMs are ChatGPT, Gemini, and Llama.



João Almeida



Martijn Schuemie



OHDSI is exploring various use cases for LLMs in observational research:

- Automated case adjudication (possibly replacing chart review)
- A copilot for (network) study design
- Automatic vocabulary mapping
- A copilot for exploring evidence generated by OHDSI
- Synthesizing real-world evidence with other sources of evidence (i.e. writing the Background and Discussion sections of a paper)

Foundational Models for Electronic Records (FMEHR)

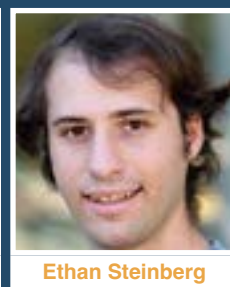
FMEHRs are pretrained on predicting the next event in a patient's record. This pretraining uses all events of all patients in a database. The resulting model is not a language model, but uses many of the same technologies as LLMs such as transformers. FMEHRs can be finetuned for tasks such as predicting specific outcomes but can also fit other use cases.

OHDSI is exploring the following use cases for FMEHRs:

- Improved patient-level prediction
- Counterfactual prediction (also referred to as 'digital twins' or 'cloning')
- Simulating large datasets for software development and methods research
- Automated phenotyping



Egill Fridgeirsson



Ethan Steinberg

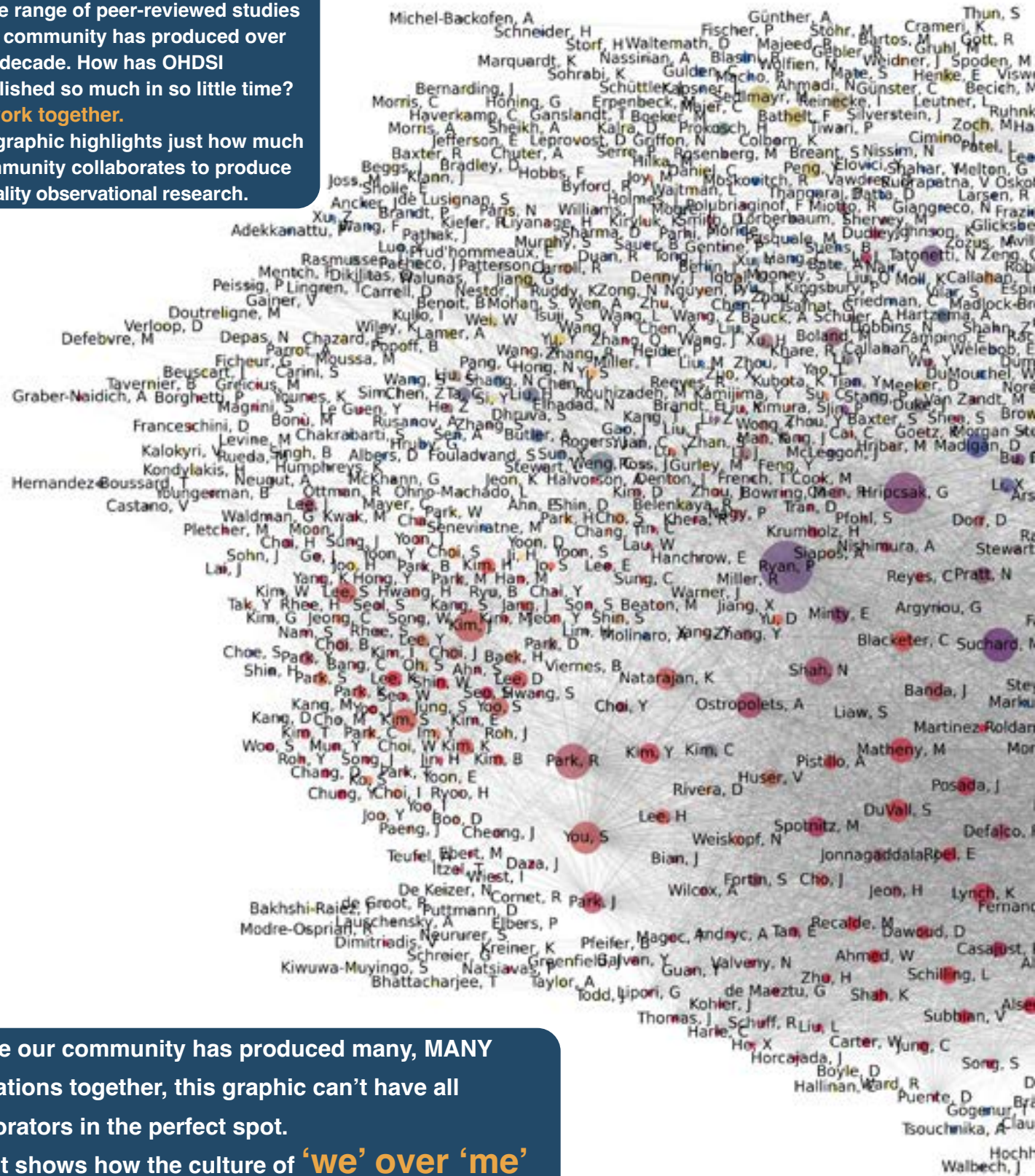
IX. OHDSI Publications

Collaborations Within

In this section, you will see the depth and wide range of peer-reviewed studies that our community has produced over the last decade. How has OHDSI accomplished so much in so little time?

We work together.

This graphic highlights just how much our community collaborates to produce high-quality observational research.



Since our community has produced many, MANY publications together, this graphic can't have all collaborators in the perfect spot.

But it shows how the culture of **'we' over 'me'** has powered OHDSI to incredible heights.

Our OHDSI Community

• Each dot is an OHDSI collaborator with at least 2 OHDSI papers, which include studies involving OMOP

• Size of the dot indicates the number of OHDSI/OMOP papers

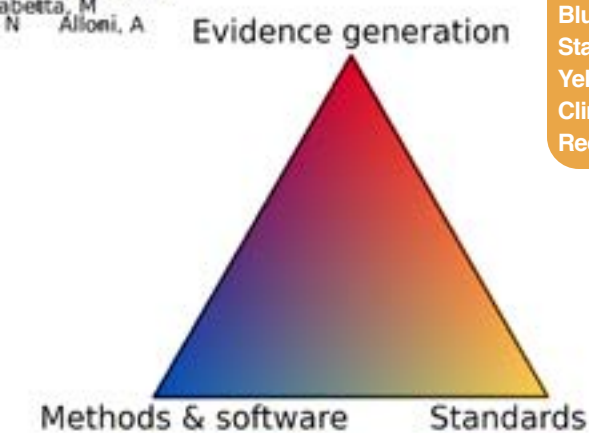
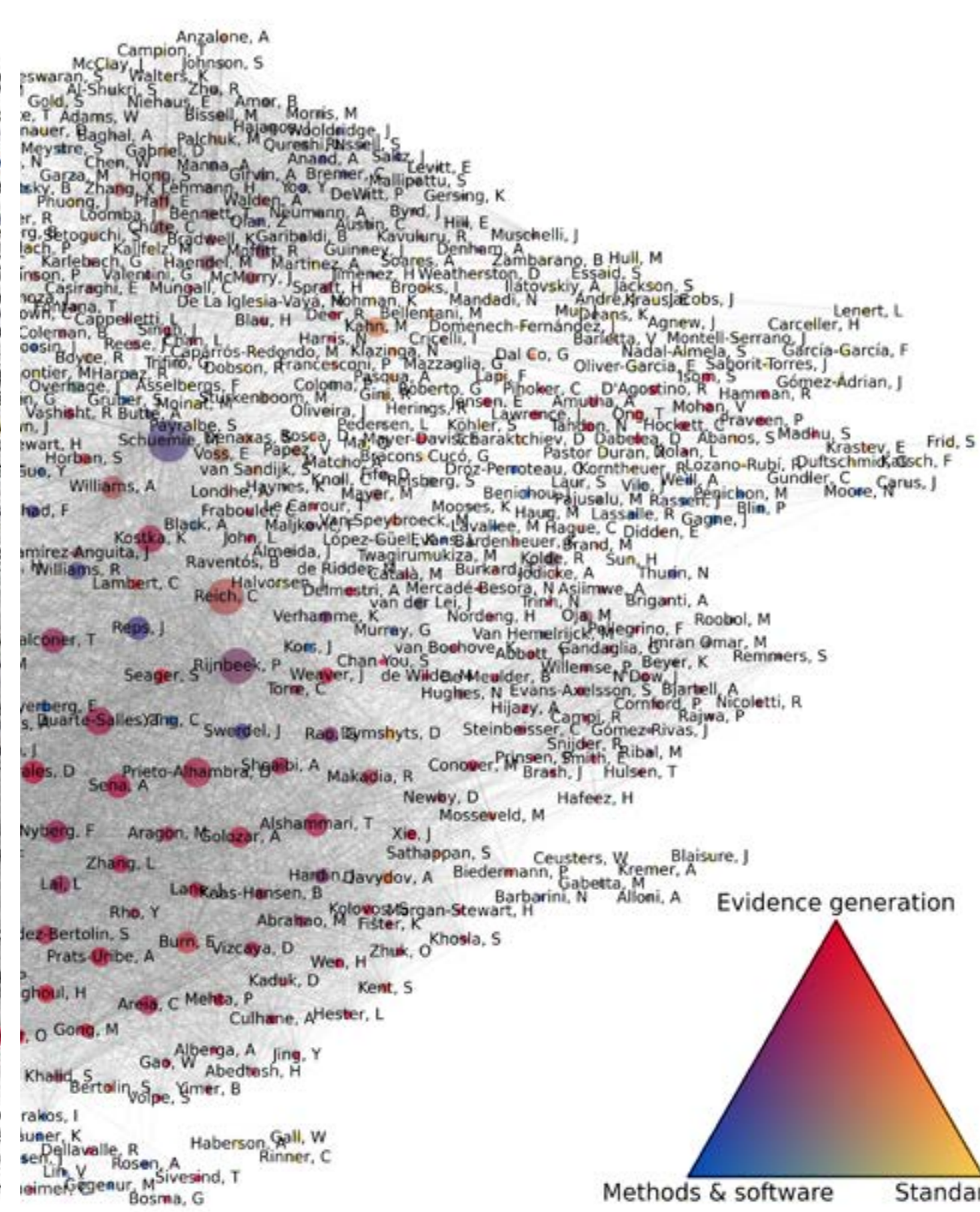
• The color indicates the mix of topics that an author has published on (see legend below)

• A line means two authors were on the same paper. The darker the color of the line, the more papers they co-authored

• The layout is based on co-authorships, so people who collaborated more end up close together in the graph

LEGEND

- Methods & software: Blue
- Standards: Yellow
- Clinical evidence: Red



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>2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Thru Aug 2024
30	14	16	24	29	30	46	79	112	124	100	107

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OHDSI PUBLICATIONS

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38	14	16	24	29	38	46	79	112	124	108	107

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38	14	16	24	29	38	46	79	112	124	108	107

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>2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Thru Aug 2024
38	14	16	24	29	38	46	79	112	124	108	107

X. Join The Journey



Building Community, One Lego At A Time

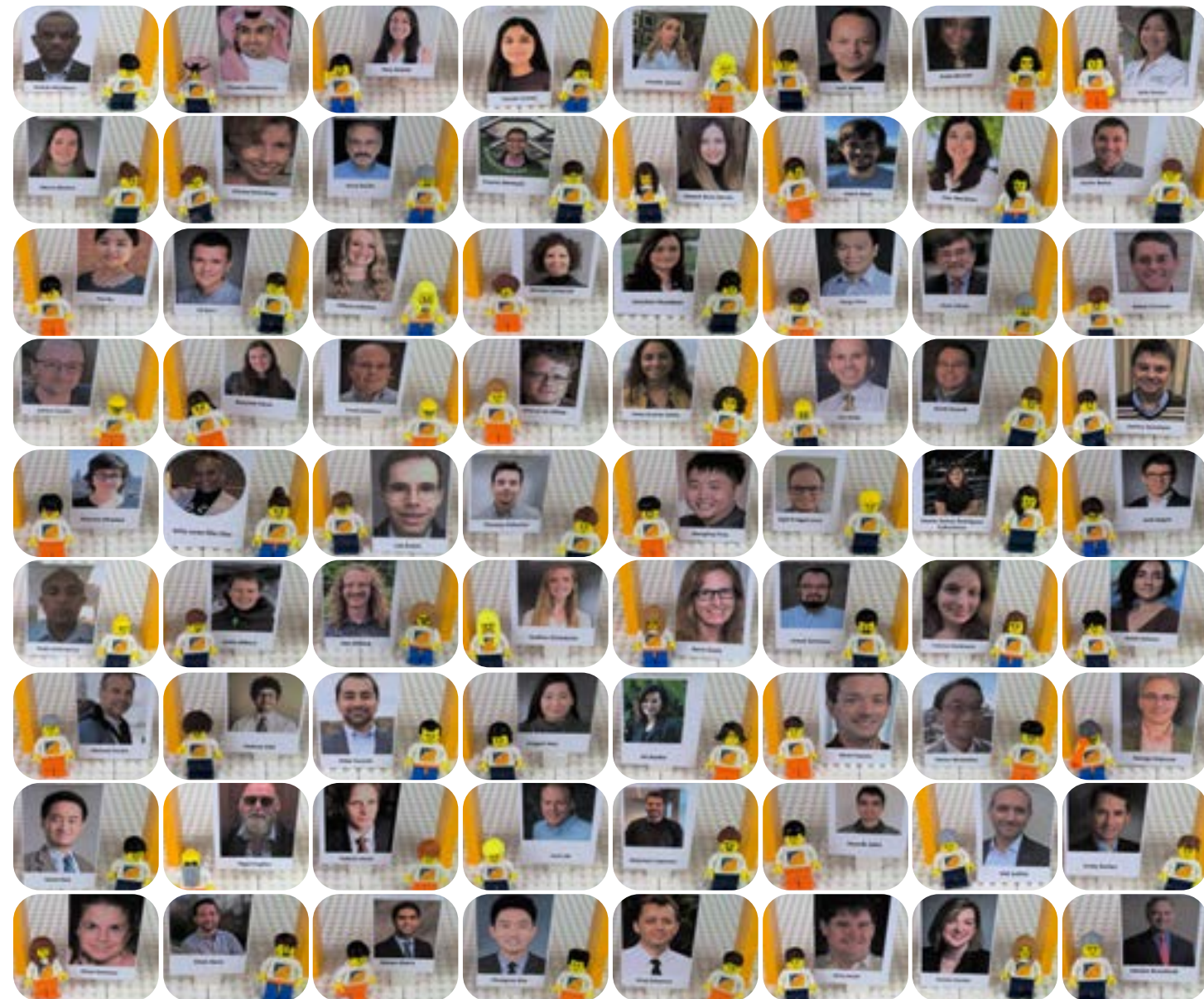
The term 'community' is defined in the *Oxford Dictionary* as 'a feeling of fellowship with others, as a result of sharing common attitudes, interests, and goals.'

Improving health by empowering a community to collaboratively generate the evidence that promotes better health decisions and better care — the OHDSI mission — is not a one-person endeavor. It isn't a one-company, one-country, one-stakeholder, one-discipline, one-anything endeavor.

The challenge is too great. The stakes are too high.

Open science is a team effort, and the OHDSI community knows that success can only occur if we come together and build upon each other's strengths and passions. This message was at the heart of the 2022 Global Symposium closing, as small sets of individual legos were passed out to the hundreds of collaborators who came together. Small sections were built, and they were nice. When all pieced together, they formed something nobody expected beforehand.

That is the OHDSI belief: What would be unimaginable alone, we build together.





Patrick Ryan has provided the closing talk at the annual OHDSI Global Symposiums. Naturally, we figured the appropriate way to end this annual report was a closing letter from Patrick. Thank you for Joining The Journey with OHDSI!

Bill Gates is often credited with paraphrasing Amara’s law: “We always overestimate the change that will occur in the next two years and underestimate the change that will occur in the next ten.”

I am admittedly not the most patient person and often get frustrated with how slowly things change. Each year when we set our objectives and key results (OKRs), I question if we are being ambitious enough. Each year, I feel unsatisfied with our progress.

As OHDSI celebrates 10 years, it is important to reflect on how far we’ve come, and to look forward to the journey ahead.

When we held our first in-person OHDSI collaborator meeting at Columbia University in 2014, there were fewer than 50 participants. I never imagined that 10 years later, we’d have a thriving community of over 4,200 members, host events across the globe—from Sydney and Rotterdam to Singapore and Mumbai. I didn’t foresee that our annual Global Symposium would bring together more than 400 people from 20+ countries. I didn’t expect that we’d establish National Nodes in 13 European countries, or grow a network of over 60 medical centers in South Korea.

When OMOP CDM version 5 was released in 2014, we celebrated contributions from 16 organizations and saw 58 databases adopt the standard. Today, more than 540 data sources across 54 countries have transformed their data into OMOP CDM format, covering patient-level data from electronic health records, administrative claims, hospital systems, clinical registries, and biobanks.

Open-source development has been a pillar of our community from Day 1. In 2014 we

were proud to release tools like WhiteRabbit for ETL, ACHILLES for database characterization, and CYCLOPS for large-scale regression. I never dreamed that one decade later, we’d have an entire ecosystem of standardized tools, with over 800,000 downloads of HADES packages, empowering researchers around the world to conduct robust observational analyses.

The impact of our community on education has been profound. When we offered the first set of tutorials to a roomful of students at the 2016 OHDSI Symposium, we had no idea that OHDSI would become a cornerstone in the curricula of leading academic institutions. We are shaping undergraduate, Master’s, and PhD programs with focus on ‘real-world evidence’ and ‘data science’—concepts that were barely mentioned 10 years ago. We have seen trainees grow through our scientific innovations, and then we have seen those trainees lead methodological research that has advanced both causal inference and machine learning. The Book of OHDSI has grown into a community textbook used by over 2,000 people each month, and the EHDSI Academy has provided free educational resources to more than 5,000 learners in over 100 countries. These materials served as the basis to certify 64 small to medium-sized enterprises (SMEs) with the skills to support organizations to standardize data to the OMOP CDM and build technical infrastructures to enable standardized analytics.

At our onset, we knew we wanted OHDSI to be a research community that aspired to do more than improve the reliability of the evidence generation process. We aimed to generate and disseminate reliable evidence. 10 years later, we have produced a list of over 730 peer-reviewed publications, including OHDSI network study results featured in JAMA, Lancet, BMJ and JACC, among other clinical journals.

From the beginning, I had hoped that we would produce actionable information to support the clinical community making treatment decisions, as we’ve now done at scale for hypertension and diabetes. But I didn’t anticipate 10 years ago that we would face a global pandemic, or that real-world evidence generated by our community would play such an integral role in supporting regulators and policy makers as we learned about COVID-19 natural history and monitored the safety and effectiveness of COVID-19 vaccines and purported treatments.

At that initial 2014 OHDSI event, we proposed a vision for our community: “OHDSI collaborators access a network of 1 billion patients to generate evidence about all



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aspects of healthcare. Patients and clinicians and other decision-makers around the world use OHDSI tools and evidence every day.” George highlighted this vision in our first OHDSI community paper from MEDINFO 2015.

Some called this vision too ambitious, and we later refined it to: “A world in which observational research produces a comprehensive understanding of health and disease.” But as we look back, the original goal doesn’t seem so far-fetched anymore.

Together, our community has built the world’s largest network of observational data. We have generated evidence across a wide range of healthcare areas—from cardiovascular disease and oncology to women’s health and vision care. With the OHDSI Evidence Network, we will continue to improve how OHDSI collaborators can access the distributed network and expand the scale of the evidence we produce.

Together, our community has developed tools that enable all stakeholders to take part in the journey from data to evidence, and we see our colleagues from industry, academia, and regulatory agencies around the world embedding these tools into their daily operations. Hardly a day goes by when I’m not designing a cohort in ATLAS, reviewing results in an OHDSI Shiny viewer, or just hacking SQL against the OMOP CDM. I know I’m not alone.

Looking ahead, it’s no longer a question of “if” we will achieve our vision, but rather “how” we will maximize our impact on healthcare now that we’re here. To motivate all of us to think big about the opportunity in front of us, here are some of targets that may be overly ambitious for the next year, but are hopefully an underestimation for where we’ll be in 2034:

- OHDSI’s open science community approach to evidence generation becomes the expected behavior across stakeholders and disciplines to promote innovation, reproducibility, and collaboration.
- The OMOP Common Data Model will evolve and become recognized as the preferred international data standard for real-world evidence generation, will be seamlessly interoperable with complementary clinical data exchange standards, and will be consistently adopted across academia, industry, and government around the world.
- The number of unique data sources adopting the OMOP CDM will exceed 50,000, but organizations will also use the CDM as a mechanism to partner to advance cross-organizational data linkage and participatory patient self-reporting. This will increase the completeness and longitudinal continuity of patient records, enable connections across



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familial generations, and improve the fitness-of-use for each integrated source across a broader set of analytic use cases.

- The OHDSI Standardized Vocabularies will provide the singular resource that maps all source terminologies and unstructured medical text into a common reference ontology, with real-time updating to reflect the current state of knowledge in medicine.
- Every organization collecting patient-level data during the routine course of clinical care will have established systems to standardize the data to the OMOP CDM using the latest OHDSI standardized vocabularies on a nightly basis, enabling daily reporting for disease surveillance and quality improvement.
- The OHDSI community will prove that real world evidence from real world data—when adhering OHDSI’s best practices and passing all objective diagnostics—can be considered just as reliable as evidence from randomized clinical trials. Open-source systems that follow these practices will become trusted by health systems, payers, and regulators for guiding clinical care and policy decisions.

Advances in OHDSI’s open-source analytic platform will decrease the time to generate reliable real-world evidence across the OHDSI distributed network; this process will be measured in minutes, not months.

The OHDSI Evidence Network will make it both commonplace and expected to see hundreds of databases, representing hundreds of millions of patients, be represented in network studies of every important public health question. This would ensure that the evidence we generate is replicable within similar populations and generalizable to patients across North and South America, Europe, Africa, Asia and Australia.

The OHDSI community will represent and support all clinical subspecialties, and will become the primary source of real-world evidence to proactively fill evidence gaps needed to inform clinical guidelines around management of every disease.

The OHDSI community will design, implement, and deliver results from more than 10,000 network studies, with the majority of research questions coming directly from



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patients and clinicians seeking reliable evidence to address their needs at the point-of-care.

- Discoveries across the OHDSI network about unrecognized effects of existing medical interventions will yield new indications that achieve regulatory approval due to the robustness of the real-world evidence produced within our community.

- OHDSI will freely disseminate its evidence through more than 100,000 scholarly publications, but it will also establish new modalities for evidence dissemination to more directly support clinical practice.

- Every disease will have a comprehensive real-world evidence summary that characterizes natural history and treatment pathways across the globe so we can understand patient heterogeneity, promote health equity, and recognize unmet medical needs.

- Every medical product will have a comprehensive real-world evidence surveillance summary from OHDSI that provides characterization of the incidence of all outcomes, population-level estimation of the causally attributable risk of each outcome and comparative effectiveness with all alternative treatments, and patient-level prediction models so that individuals can accurately determine their personalized risk given their medical history.

- OHDSI evidence repositories will become the primary source of knowledge underpinning foundational models to promote better health decisions and better care.



If we can get all that done, then maybe I'll be satisfied.

If we all work together, then I know I'll enjoy the journey.

-Patrick Ryan



How Can You Join The Journey?

Our community has set both the foundation and the highest of standards for global collaboration around observational research. We continue to make real differences in healthcare, and we are doing it through transparent and reproducible science. We also recognize that there is so much more to be done, and so much more that we can do.

If you are inspired by what you read in this book, if you want to learn more about methods research or open-source development, if you have a clinical question you believe needs answering, or if you want to join a community of people dedicated to the team sport of observational health data sciences and informatics, we have a place for you.

How can you get started?

Join The OHDSI Forums (forums.ohdsi.org)

Connect with other OHDSI collaborators on our community forums and start discussing how you can help us inform medical decision-making, or simply follow discussions that are interesting to you and learn about the work happening within our global community.

Join Our Workgroups & MS Teams Environment (ohdsi.org/ohdsi-workgroups)

Our workgroups present opportunities for all community members to find a home for their talents and passions, and a place to make meaningful contributions. We are always looking for new collaborators. Learn more by checking out the workgroups homepage Our workgroups collaborate inside the OHDSI MS Teams environment; a form to join our Teams environment is available here: bit.ly/Join-OHDSI-Teams.

Join Our Community Calls (ohdsi.org/community-calls)

Join collaborators around the world each week during our OHDSI Community Call, held Tuesdays at 11 am ET within our Teams environment. Following weekly updates, we have a variety of call formats, including research presentations, workgroup updates, discussions, tutorials, debates and more. These calls are recorded, and you can access them (as well as the meeting link) at our Community Calls page.

Continue To Learn About OHDSI

Learn about OHDSI tools and research processes in a variety of ways.

- The OHDSI website keeps you informed of recent news, publications, upcoming studies and more, while providing all critical links needed to help with your journey: ohdsi.org
- The Book of OHDSI (which is also translated into both Korean and Chinese) is a community-developed resource with information for every step of your journey: ohdsi.github.io/TheBookOfOhdsi
- Check out the EHDEN Academy, a set of free, on-demand training and development courses. These are open to anybody, but we always encourage new OHDSI collaborators to use this resource to learn about best practices towards our mission of improving health by empowering a community to collaboratively generate evidence that promotes better health decisions and better care: academy.ehden.eu
- Check out the OHDSI YouTube page (youtube.com/c/OHDSI) for many community-developed learning resources, including tutorials, research presentations and more. Follow OHDSI on LinkedIn ([OHDSI](https://www.linkedin.com/company/ohdsi)), Twitter/X ([@OHDSI](https://twitter.com/OHDSI)) and Instagram ([@OHDSI](https://www.instagram.com/ohdsi)) and to keep updated on community research and follow the [#OHDSISocialShowcase](https://twitter.com/OHDSISocialShowcase) to see the research shared at our annual symposia.

Join The Journey

Your journey with OHDSI has started. Your interest in our global community is the first step in making a difference in global health. There is no limit to the impact you can make, and you can do so in a supportive, positive and fun environment. We invite you to search our website, post to the forum, join us in Teams, check out our GitHub (github.com/OHDSI), or reach out to us over email (contact@ohdsi.org).

Thank you for Joining The Journey with OHDSI!



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