4th OHDSI Symposium
4th OHDSI Symposium

George Hripcsak, MD, MS
OHDSI Coordinating Center
Columbia University, New York, USA
NewYork-Presbyterian Hospital, New York, USA
Welcome!
Thank you to our sponsors!

We would also like to thank FDA-CBER for their support of the 2018 OHDSI Symposium through their conference grant (#1 R13 FD006470-01)
OHDSI is
an open science community
OHDSI’s mission

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

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

We’re all in this journey together...

Check out the map in the back
Symposia around the world

2017: OHDSI’s 4th F2F, Georgia Tech, GA, USA

2017: OHDSI Korea Symposium, Ajou University, Suwon, South Korea

2017: OHDSI’s 3rd F2F, National Library of Medicine, MD, USA

2017: OHDSI Hadoop hack-a-thon, QuintilesIMS, PA, USA

2018: 1st OHDSI Europe Symposium, Rotterdam, NL

2015: 1st Annual OHDSI Symposium, Washington DC, USA

2015: 1st OHDSI China, Zhejiang University, Hangzhou, China

2015: OHDSI’s 1st F2F meeting, Columbia University, NY, USA

2016: 2nd Annual OHDSI Symposium, Bethesda, MD, USA

2018: OHDSI China, Guangzhou, China

2018: 4th Annual OHDSI Symposium, Bethesda, MD, USA

2014: OHDSI’s 1st F2F meeting, Columbia University, NY, USA

2015: OHDSI’s 2nd F2F, Stanford University, CA, USA

2017: OHDSI’s 4th F2F, Georgia Tech, GA, USA

2017: 3rd Annual OHDSI Symposium, Bethesda, MD, USA

2018: OHDSI’s 5th F2F, Columbia University, NY, USA

2017: OHDSI China, Zhejiang University, Hangzhou, China
OHDSI’s community engagement

• Weekly community web conferences for all collaborators to share their research ideas and progress

• 15 workgroups for solving shared problems of interest
  – Common Data Model, Population-level Estimation, Patient-level Prediction, Architecture, Phenotype, NLP, GIS, Oncology, ...

• Active community online discussion: forums.ohdsi.org

• 2,010 users have made 13,625 posts on 2,369 topics:
  – Implementers, Developers, Researchers, CDM Builders, Vocabulary users, OHDSI in Korea, OHDSI in China, OHDSI in Europe
Open Science

- Database summary
- Cohort definition
- Cohort summary
- Compare cohorts
- Exposure-outcome summary
- Effect estimation & calibration
- Compare databases

Open science

Data + Analytics + Domain expertise

Enable users to do something

Generate evidence

Standardized, transparent workflows
How OHDSI works

Source data warehouse, with identifiable patient-level data

Standardized, de-identified patient-level database (OMOP CDM v5)

Standardized large-scale analytics

Analysis results

Summary statistics results repository

OHDSI Coordinating Center

- Data network support
- Analytics development and testing
- Research and education

OHDSI.org

OHDSI Data Partners
Data across the OHDSI community

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

All using one open community data standard: OMOP Common Data Model
Standardized Structure (OMOP CDM6)
Standardized Content (OMOP Vocab)
Standardized Conventions (THEMIS)
Standardized Analytics (OHDSI Tools)
15
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1

Standardized Structure (OMOP CDM6)
Standardized Content (OMOP Vocab)
Standardized Conventions (THEMIS)
Standardized Analytics (OHDSI Tools)

Standardized health system data
- Location
- Location_history
- Care_site
- Provider

Standardized derived elements
- Condition_era
- Drug_era
- Dose_era

Results Schema
- Cohort
- Cohort_definition

Standardized health economics
- Cost
- Payer_plan_period

Shared Conventions developed by the THEMIS Workgroup

203

CDM_source
Metadata

1 3 1

Person
Observation_period
Visit_occurrence
Visit_detail
Condition_occurrence
Drug_exposure
Procedure_occurrence
Device_exposure
Measurement
Note
Note_NLP
Survey_conduct
Observation
Specimen
Fact_relationship

Standardized clinical data

Shared Conventions developed by the THEMIS Workgroup
Standardized Structure (OMOP CDM6)
Standardized Content (OMOP Vocab)
Standardized Conventions (THEMIS)
Standardized Analytics (OHDSI Tools)

Amazon Web Services tutorial environment
Complementary evidence to inform the patient journey

- **Clinical characterization:** What happened to them?
- **Patient-level prediction:** What will happen to me?
- **Population-level effect estimation:** What are the causal effects?

Inference and causal inference are connected by observation.
OHDSI community in action
Data
MIRACUM: Medical Informatics in Research and Care in University Medicine

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

Hans-Ulrich Prokosch¹; Till Acker²; Johannes Bernarding³; Harald Binder⁴,⁵; Martin Boeker⁵; Melanie Boerries⁶; Philipp Daumke⁷; Thomas Ganslandt¹,⁸; Jürgen Hesser⁹; Gunther Hönig¹⁰; Michael Neumaier¹¹; Kurt Marquardt¹²; Harald Renz¹³; Hermann-Josef Rothkötter¹⁴; Carmen Schade-Brittinger¹⁵; Paul Schmücker¹⁶; Jürgen Schüttler¹⁷; Martin Sedlmayr¹,¹⁸; Hubert Serve¹⁹; Keywan Sohrabi²⁰; Holger Storf²¹

Exploiting the OMOP data model as part of a German data network
A Clinical Data Warehouse Based on OMOP and i2b2 for Austrian Health Claims Data

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

\textsuperscript{a}Center for Medical Statistics, Informatics and Intelligent Systems, Medical University of Vienna, Austria

Austrian OMOP-based clinical data warehouse using i2b2 tools via multi-fact table addition
Expanding transplant outcomes research opportunities through the use of a common data model

Sylvia Cho | Sumit Mohan | Syed Ali Husain | Karthik Natarajan

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

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

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

Framework for scaling up the development of prediction models emphasizing reproducibility
Empirical confidence interval calibration for population-level effect estimation studies in observational healthcare data

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

\textsuperscript{a}Observational Health Data Sciences and Informatics, New York, NY 10032; \textsuperscript{b}Epidemiology Analytics, Janssen Research & Development, Titusville, NJ 08560; \textsuperscript{c}Department of Biomedical Informatics, Columbia University, New York, NY 10032; \textsuperscript{d}Medical Informatics Services, New York–Presbyterian Hospital, New York, NY 10032; \textsuperscript{e}Department of Statistics, Columbia University, New York, NY 10027; \textsuperscript{f}Department of Biostatistics, University of California, Los Angeles, CA 90095; \textsuperscript{g}Department of Biostatistics, University of California, Los Angeles, CA 90095; and \textsuperscript{h}Department of Human Genetics, University of California, Los Angeles, CA 90095

Detailed description and evaluation of the OHDSI confidence interval calibration method
Evaluating large-scale propensity score performance through real-world and synthetic data experiments

Yuxi Tian,¹* Martijn J Schuemie² and Marc A Suchard¹,³,⁴

Detailed description of the OHDSI propensity score method, and comparison to an existing standard
Improving reproducibility by using high-throughput observational studies with empirical calibration

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

\textsuperscript{1}Observational Health Data Sciences and Informatics (OHDSI), New York, NY 10032, USA
Title: Effect of Vocabulary Mapping for Conditions on Phenotype Cohorts

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

It is possible to achieve just a trivial error rate due to OHDSI SNOMED conversion
Clinical
Comprehensive comparison of monotherapies for psychiatric hospitalization risk in bipolar disorders

Anastasiya Nestsiarovich¹ | Aurélien J Mazurie² | Nathaniel G Hurwitz³ | Berit Kerner⁴,⁵ | Stuart J Nelson⁶,⁷ | Annette S Crisanti⁸ | Mauricio Tohen⁸ | Ronald L Krall⁹ | Douglas J Perkins¹ | Christophe G Lambert¹,⁷

Bipolar disorder treatments efficacy does vary by as much as 2x, and patients end monotherapy after two months.
Database Studies of Treatment-Resistant Depression Should Take Account of Adequate Dosing

Daniel Fife, MD\textsuperscript{a,\ast}; Clair Blacketer, MPH\textsuperscript{a}; Jenna Marie Reps, PhD\textsuperscript{a}; and Patrick Ryan, PhD\textsuperscript{a}

<table>
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<th>No. of Dispensings in the Era\textsuperscript{a}</th>
<th>CCAE (no. of eras)</th>
<th>CCAE (% of eras with a dispensing ≥ minimum effective dose)</th>
<th>MDCD (no. of eras)</th>
<th>MDCD (% of eras with a dispensing ≥ minimum effective dose)</th>
<th>MDCR (no. of eras)</th>
<th>MDCR (% of eras with a dispensing ≥ minimum effective dose)</th>
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<td>58,775</td>
<td>59.6</td>
<td>25,275</td>
<td>60.1</td>
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</table>

\textsuperscript{a}Era is defined as a sequence of dispensings of an antidepressant medication during an episode of pharmacologically treated depression with no more than 30 days between each dispensing of the medication and the end of the days’ supply of the previous dispensing.

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

A substantial proportion of patients on depression therapy never reach the minimum therapeutic dose.
Original Investigation | Diabetes and Endocrinology

August 24, 2018

Association of Hemoglobin A1c Levels With Use of Sulfonylureas, Dipeptidyl Peptidase 4 Inhibitors, and Thiazolidinediones in Patients With Type 2 Diabetes Treated With Metformin

Analysis From the Observational Health Data Sciences and Informatics Initiative

Rohit Vashisht, PhD1,2; Kenneth Jung, PhD1,2; Alejandro Schuler, MS1,2; Juan M. Banda, PhD1,2; Rae Woong Park, MD, PhD1,3,4; Sanghyung Jin, MS1,4; Li Li, MS, MD5; Joel T. Dudley, PhD5; Kipp W. Johnson, MD, PhD5; Mark M. Shervey, PhD5; Hua Xu, PhD1,6; Yonghui Wu, PhD1,7; Karthik Natrajan, PhD1,8,9; George Hripcsak, MD, MS1,9; Peng Jin, MS1,9; Mui Van Zandt, BS1,10; Anthony Reckard, BS1,10; Christian G. Reich, MD1,10; James Weaver, MPH, MS1,11; Martijn J. Schuemie, PhD11; Patrick B. Ryan, PhD1,9,11; Alison Callahan, PhD1,2; Nigam H. Shah, MBBS, PhD1,2

Study efficacy and safety for second line treatment for type 2 diabetes mellitus, found only small differences
Comparative effectiveness of canagliflozin, SGLT2 inhibitors and non-SGLT2 inhibitors on the risk of hospitalization for heart failure and amputation in patients with type 2 diabetes mellitus: A real-world meta-analysis of 4 observational databases (OBSERVE-4D)

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

Sodium glucose co-transporter 2 inhibitors showed reduced hosp for heart failure but no increased knee amputation versus non-SGLT2, and no differences among SGLT2 inh.; POSTED ON OHDSI
• Incidence of side effects
  • Develop condition for first time after get drug
  • Within time at risk
• Any drug on the world market
• Any condition
• Absolute risk
  • Not causal (Characterization)
• On the Internet
Impact on the research community: publications on OHDSI or the OMOP CDM in 2018 via Google Scholar
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## Methods 2018-47

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Data model 2018 (137)
Beyond Latin alphabet

의료 빅데이터를 활용한 질병 처방 예측 모델
고승완, 강현태, 오영택, 박재호, 허의남 - 한국정보과학회 학술발표 ..., 2018 - dbpia.co.kr
요약본 건의료 분야에서 빅데이터 활용의 기대 효과가 증가함에 따라 의료 데이터를 분석해 효과적인 치료 방법을 도출하는 연구에 대한 관심이 증대되고 있다. 의료 데이터 분석은 주로 어떤 질병에 대한 진단 및 처방 방법을 최적화하는 것에 목적을 두고 있으며, 이를 위해 코호트 ...
(Prediction model of disease prescription using medical big data)

Real World Data를 활용하는 관찰 연구 데이터베이스의 고려
木村映善 - 保健医療科学, 2018 - jstage.jst.go.jp
抄録: 全国的に収集されたReal World Data (RWD)を用いた観察研究からエビデンスを導出できるような取り組みが求められている。データベース設計に関する課題として、標準情報モデルへの統合、統制用語へのマッピング、各施設の測定結果などの組織間較正、患者個体の識別・追跡性の確保 ...
(A Study of Observational Research Data Using Utilization)

비정형 헬스케어 데이터 표준화
신수용 - 한국통신학회지 (정보와통신), 2018 - dbpia.co.kr
최근 전세계적으로 헬스케어 산업에 대한 관심이 부각되고 있고, 그 중에서도 헬스케어 데이터를 담당자들의 기계학습을 통한 의료 AI 산업이 급속히 주목을 받고 있다. 기계학습 기법의 특성상 의료 AI 개발을 위해서는 헬스케어 빅데이터가 반드시 필요하다 ...
(Standardization of Atypical Healthcare Data)

呼吸系统疾病专病队列研究的标准制定与数据共享
孙一鑫, 裴正存, 詹思延 - 中华流行病学杂志, 2018 - html.rhhz.net
目的: 慢性阻塞性肺疾病, 哮喘, 间质性肺疾病和肺血栓栓塞症是重大呼吸系统疾病,严重危害我国居民健康,整合并开展大规模人群队列研究有助于观察疾病的暴露,发病与转归情况。本研究针对我国社区与临床队列资源的多源异构现状,制定呼吸系统疾病专病...
(Standard setting and data sharing for the study of respiratory disease specific disease cohort)
Community
Community

• “Can we post your slides from your talk?”
  – Let me look over the deck.
  – Let me delete a few slides and send it back.
  – Let me check with my colleagues.

• OHDSI: Go ahead, it’s already on the Internet.
  – Open science
Community

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

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

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

• New initiatives
  – So much to be done, need new groups
  – A lot of work
  – Love to run a large famous study
# 2018 Symposium Agenda

Friday, October 12th at the Bethesda North Marriott

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

Grand Ballroom Foyer  
Grand Ballroom E-H
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<th>Time</th>
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<td>11:30 – 1:00pm</td>
<td><strong>OHDSI Collaborator Showcase: Part One</strong>&lt;br&gt;Software demonstrations and poster session highlighting OHDSI’s research and development</td>
<td><strong>Grand Ballroom Foyer</strong></td>
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<td><em>Buffet lunch served from 12:30-1:00pm in Grand Ballroom</em></td>
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<td>1:00 – 2:00pm</td>
<td><strong>OHDSI Collaborator Showcase: Part Two – Lightning Talks</strong>&lt;br&gt;Moderator: Melanie Philofsky, RN, MS, Senior Business Analyst/Project Manager, Odysseus Data Services, Inc.&lt;br&gt;Speakers:&lt;br&gt;  - Iannis Drakos, Chief Consultant, Region Zealand&lt;br&gt;  - Kyu-pyo Kim, PhD, Associate Professor, Asan Medical Center&lt;br&gt;  - Mary Regina Boland, MA, MPhil, PhD, Assistant Professor, University of Pennsylvania&lt;br&gt;  - Fabricio Kury, PhD, Postdoctoral Research Scientist, Columbia University&lt;br&gt;  - James Weaver, Manager, Epidemiology Analytics, Janssen Research and Development&lt;br&gt;  - Clair Blacketer, MPH, PMP, Manager, Epidemiology Analytics, Janssen Research &amp; Development; Co-lead, OHDSI Common Data Model workgroup&lt;br&gt;  - Ross D. Williams, MS, PhD Student, Erasmus University Medical Centre&lt;br&gt;  - Kristin Feeney Kostka, MPH, Collaborator, OHDSI; Data Science Lead, Deloitte Consulting LLP</td>
<td><strong>Grand Ballroom E-H</strong></td>
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| 2:00 – 3:00pm | **OHDSI Collaborator Showcase: Part Three**  
Software demonstrations and poster session highlighting OHDSI's research and development |
| 3:00 – 3:30pm| **Progress and Lessons Learned from the FDA BEST Program**  
*Moderator: Jon Duke, MD, MS, Director, Center for Health Analytics and Informatics, Georgia Tech; Principal Research Scientist, Georgia Tech College of Computing*
*Panelists:*
  - Azadeh Shoabibi, PhD, MHS, CBER Sentinel Lead, CBER, US Food and Drug Administration
  - Alan E. Williams, PhD, Associate Director for Regulatory Affairs, Office of Biostatistics and Epidemiology, CBER, US Food and Drug Administration |
| 3:30 – 4:30pm| **Global Progress & Perspectives from the OHDSI Community**  
*Moderator: Hanieh Razzaghi, MPH, Assistant Director, PEDSnet Data Coordinating Center, Children’s Hospital of Philadelphia*
*Panelists:*
  - Peter Rijnbeek, PhD, Assistant Professor, Erasmus Medical Center Rotterdam; Lead of OHDSI Europe; Co-Lead, OHDSI Patient Level Prediction WG; European Health Data and Evidence Network (EHDEN) Academic Lead
  - Nicole Pratt, PhD, Associate Professor, University of South Australia
  - Rae Woong Park, MD, PhD, Professor, Department of Biomedical Informatics, Ajou University School of Medicine; Lead of OHDSI Korea
  - Mui Van Zandt, Director Product Development, IQVIA; Co-lead of OHDSI China CDM/Vocabulary working group
  - André Ballalai Ferraz, Manager, RWE/RWD and Market Access in LATAM and Emerging Markets, IQVIA |
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| 4:30 – 5:30pm    | **Closing Session: Where’s Our Journey Going?**  
| Speaker: Patrick Ryan, PhD, Senior Director and Head, Epidemiology Analytics, Janssen Research & Development, Adjunct Assistant Professor of Biomedical Informatics, Columbia University |
| 5:30pm-7:30pm    | **Networking Reception**  
|                  | - Titan Award winners announced  
|                  | - Best Contribution winners announced  
|                  | - Gayageum Performance by Seng Chan You  
|                  | Light refreshments will be served |
|                  | Grand Ballroom E-H  
|                  | Grand Ballroom Foyer |
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