Welcome OHDSI: Where’s our journey?

Patrick Ryan, PhD
Janssen Research and Development
Columbia University Medical Center
18 October 2017
Odyssey (noun): \oh-d-si\ 

1. A long journey full of adventures
2014: OHDSI’s 1st F2F meeting, Columbia University, NY, USA

Welcome!

To the OHDSI Community!
2015: OHDSI’s 2nd F2F, Stanford University, CA, USA

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

2015: OHDSI’s 3rd F2F, National Library of Medicine, MD, USA
2016: 2nd Annual OHDSI Symposium, Washington DC, USA
2017: OHDSI Korea Symposium
Ajou University, Suwon, South Korea
2017: OHDSI’s 4th F2F, Georgia Tech, GA, USA

2017: OHDSI Korea Symposium, Ajou University, Suwon, South Korea
2017: OHDSI’s 4th F2F, Georgia Tech, GA, USA

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

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

2017: OHDSI China, Zhejiang University, Hangzhou, China
2018: 1st OHDSI Europe Symposium, Rotterdam, NL
European OHDSI Symposium

Bridging Europe

23-24th March 2018, Rotterdam, The Netherlands

http://www.ohdsi-europe.org/
Welcome!
Thank you sponsors
OHDSI symposium, by the numbers

- 437 collaborators registered
- 47 participants from 14 different countries
- US collaborators hailing from 29 states
- 48 friends from FDA
OHDSI Symposium, by the numbers

• 118 different organizations

AbbVie
Bayer
CHOP
Deloitte
Erasmus MC
Fourx
Geisinger
Harvard
IBM
Johns Hopkins
Kaiser Permanente
LTS Consulting
Mayo Clinic

National Institute of Health
Optum
Pfizer
QuintilesIMS
Regenstrief
Sanofi
Tufts
U.S. Bureau of Economic Analysis
Virginia Tech
Weill Cornell Medical College
X
Y
ZS Associates
OHDSI Symposium, by the numbers
OHDSI Symposium, by the numbers
“I’m new to OHDSI and curious to learn more”
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...
OHDSI’ 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
- 594 distinct users have made 8,894 posts on 1,631 topics:
  - Implementers, Developers, Researchers, CDM Builders, Vocabulary users, OHDSI in Korea, OHDSI in China, OHDSI in Europe
OHDSI is an international data network
Data across the OHDSI community

- 84 organizations have access to 64 different databases
- Patient-level data from various perspectives:
  - Electronic health records, administrative claims, hospital systems, clinical registries, health surveys, biobanks
- Collectively, totaling 1.26 billion patient records
- Data in 17 different countries, with 115 million patient records from outside US

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

Journey of an open community data standard
Journey of an open community data standard

**Nov 2009**
Focus on drug safety surveillance, methods research

**OMOP CDM v1**

**May 2009**
Strawman

**OMOP CDM v2**

**June 2012**
Expanded to support comparative effectiveness research

**OMOP CDM v4**

**Nov 2014**
Expanded to support medical device research, health economics, biobanks, freetext clinical notes; vocabulary-driven domains

**OMOP CDM v5**

**2015-2017**
Improvements to support additional analytical use cases of the community

**OMOP CDM v5.0.1**
**OMOP CDM v5.1**
**OMOP CDM v5.2**

[https://github.com/OHDSI/CommonDataModel](https://github.com/OHDSI/CommonDataModel)
Thanks to Rimma Belenkaya, Christian Reich, and Clair Blacketer for leading our community data model stewardship!
OHDSI’s standardized vocabularies

• 78 Vocabularies across 32 domains
  – MU3 standards: SNOMED, RxNorm, LOINC
  – Disparate sources: ICD9CM, ICD10(CM), Read, NDC, Gemscript, CPT4, HCPCS...

• 5,720,848 concepts

Thank you Christian and the Odysseus team for continue to steward, maintain, and improve this invaluable resource for the entire community!

• 32,612,650 concept relationships

Publicly available for download at: http://athena.ohdsi.org/
OHDSI is collaborating to generate reliable evidence
What is OHDSI’s strategy to deliver reliable evidence?

• **Methodological research**
  – Develop new approaches to observational data analysis
  – Evaluate the performance of new and existing methods
  – Establish empirically-based scientific best practices

• **Open-source analytics development**
  – Design tools for data transformation and standardization
  – Implement statistical methods for large-scale analytics
  – Build interactive visualization for evidence exploration

• **Clinical evidence generation**
  – Identify clinically-relevant questions that require real-world evidence
  – Execute research studies by applying scientific best practices through open-source tools across the OHDSI international data network
  – Promote open-science strategies for transparent study design and evidence dissemination
Thank you Martijn Schuemie, Marc Suchard, Peter Rijnbeek, and Jenna Reps for leading methods research and development efforts!
Journey toward open-source analytics development

- 88 developers on 101 OHDSI GitHub repositories

- Applications released for:
  - CDM ETL design and implementation
  - Clinical characterization (ACHILLES, ATLAS)
  - Population-level effect estimation
  - Patient-level prediction
  - OHDSI network studies (protocol + source code, ARACHNE)
Journey toward open-source analytics development

Thank you teams from Columbia, Google, Cloudera, Erasmus MC, Odysseus, BlueCrossBlueShield-South Carolina, Regenstrief, Janssen for contributing to the ATLAS 2.2 release!

Demo at [http://ohdsi.org/web/ATLAS](http://ohdsi.org/web/ATLAS)
Complementary evidence to inform the patient journey

Clinical characterization: What happened to them?

Patient-level prediction: What will happen to me?

Observation

Inference

Population-level effect estimation: What are the causal effects?

Causal inference
Characterizing treatment pathways at scale using the OHDSI network
G Hripcsak, PB Ryan, JD Duke... - Proceedings of the ..., 2016 - National Acad Sciences
Abstract Observational research promises to complement experimental research by providing large, diverse populations that would be infeasible for an experiment.
Observational research can test its own clinical hypotheses, and observational studies also

132 Tracking the Opioid Epidemic Through the OHDSI Collaborative
BH Stovis, AJ Avent, DK Varadhan... - Annals of Emergency ..., 2017 - annemergmed.com
Study Objectives Emergency departments in the United States (US) are in the midst of an opioid epidemic (OE), with more than half of overdose deaths in 2014 attributable to opioids. The US consumes 60% of the world's supply, and contributes to growing concern of an

Electronic phenotyping with APHRODITE and the Observational Health Sciences and Informatics (OHDSI) data network
JM Banda, Y Helpern, D Sontag... - AMIA Summits on ..., 2017 - ncbi.nlm.nih.gov
Abstract The widespread usage of electronic health records (EHRs) for clinical research has produced multiple electronic phenotyping approaches. Methods for electronic phenotyping range from those needing extensive specialized medical expert supervision to those based

Robust empirical calibration of p-values using observational data
MJ Schuemie, G Hripcsak, PB Ryan... - Statistics in ..., 2016 - Wiley Online Library
... Martijn J. Schuemie, Corresponding author: ORCID:orcid.org/0000-0002-0017-5361. Janssen Research and Development LLC, Titusville, NJ, USA. Observational Health Data Sciences and Informatics (OHDSI). ... E-mail: schuemie@ohdsi.org. Search for more papers by this author ...

Sharing Clinical Big Data While Protecting Confidentiality and Security: Observational Health Data Sciences and Informatics
RW Park - Healthcare informatics research, 2017 - synapse.koreamed.org
... Recently, distributed research networks (DRNs), such as Observational Health Data and Informatics (OHDSI, pronounced “Odyssey”), the National Patient Centered Clinical Research Network (PCORNET), or Sentinel Initiatives have gained popularity among clinical data ...

Uncovering exposures responsible for birth season–disease effects: a global study
MR Boland, P Parhi, L Li, R Miotto... - Journal of the ..., 2017 - academic.oup.com
Abstract Objective: Recent studies have found climate impact of disease risk, while the underlying mechanisms remain unclear. We seek to uncover this risk.
Methodological research → Open-source analytics development → Clinical evidence generation

Observational data management
Clinical characterization
Population-level estimation
Patient-level prediction
### Your journey through today

<table>
<thead>
<tr>
<th>Time</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 – 9:30am</td>
<td>YOU ARE HERE</td>
</tr>
<tr>
<td>9:30 – 11:30am</td>
<td><strong>Journey Through Clinical Characterization</strong></td>
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<tr>
<td></td>
<td>Large-Scale Honest Incidence</td>
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<tr>
<td></td>
<td>Speaker: George Hripcsak, MD, MS, Columbia University</td>
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<tr>
<td></td>
<td><strong>Journey Through Population-Level Estimation</strong></td>
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<tr>
<td></td>
<td>Safety Surveillance for the Risk of Angioedema Associated with Levetiracetam</td>
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<td>Speaker: Jon Duke, MD, MS, Georgia Tech</td>
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<td></td>
<td>Comparative Effectiveness of Alendronate and Raloxifene in Reducing the Risk</td>
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<td></td>
<td>of Hip Fracture</td>
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<td></td>
<td>Speakers: Yeesuk Kim, MD, PhD, Hanyang University</td>
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<td></td>
<td>Marc Suchard, MD, PhD, University of California, Los Angeles</td>
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<td></td>
<td><strong>A Journey Through Patient-Level Prediction</strong></td>
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<td></td>
<td>Improving Palliative Care Using Patient Level Prediction</td>
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<td></td>
<td>Speaker: Nigam Shah, MBBS, PhD, Stanford University (webcast)</td>
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<tr>
<td></td>
<td>Precision Medicine through Patient-Level Prediction of Adverse Events</td>
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<td>Speaker: Jenna Reps, PhD, Janssen Research &amp; Development</td>
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## Your journey through today

<table>
<thead>
<tr>
<th>Time</th>
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<tbody>
<tr>
<td>11:30am-12:30pm</td>
<td>OHDSI Morning Collaborator Showcase – Session 1</td>
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<td>Grand Ballroom Foyer</td>
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<td>Visit the <strong>odd</strong> numbered posters and software demonstrations</td>
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<tr>
<td>12:30pm-1:00pm</td>
<td>Buffet Lunch in Grand Ballroom</td>
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<tr>
<td>1:00pm-2:00pm</td>
<td>OHDSI Showcase: Lightning Talks</td>
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<td></td>
<td>Moderator: Melanie Philofsky, RN, MS, University of Colorado</td>
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<td>Speakers:</td>
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<td></td>
<td>Martin Sedlmayr, Friedrich-Alexander-University Erlangen-Nürnberg, Germany</td>
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<td></td>
<td>Maxim Moinat, The Hyve, Netherlands</td>
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<td></td>
<td>Nicole Pratt, PhD, University of South Australia</td>
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<td></td>
<td>Mehr Kashyap, MD Candidate, Stanford University, USA</td>
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<td>Mary Regina Boland, MA, MPhil, PhD, University of Pennsylvania, USA</td>
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<td>Rohit Vashisht, PhD, Stanford University, USA</td>
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<td>Seng Chan You, PhD Candidate, Ajou University, South Korea</td>
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<tr>
<td>2:00pm-3:00pm</td>
<td>OHDSI Morning Collaborator Showcase – Session 2</td>
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<td>Grand Ballroom Foyer</td>
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<td>Visit the <strong>even</strong> numbered posters and software demonstrations</td>
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Vote for the best OHDSI collaborator contributions!

Your vote counts!!!
Winners will be announced during OHDSI community reaction panel

This vote is much too important to allow for undue Russian influence
# Your journey through today

<table>
<thead>
<tr>
<th>Time</th>
<th>Description</th>
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<tr>
<td>3:00-3:45pm</td>
<td>OHDSI Community Reactions</td>
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<td>- A fun and interactive session to elicit thoughts and future directions</td>
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<td></td>
<td>- from the entire OHDSI community, <strong>charge up those smartphones!</strong></td>
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<tr>
<td></td>
<td>- Jon Duke, MD, Georgia Tech</td>
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<td></td>
<td>- Clair Blacketer, MPH, PMP, Janssen Research &amp; Development</td>
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<tr>
<td></td>
<td>- Peter Rijnbeek, PhD, Erasmus University Medical Center</td>
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<td></td>
<td>- Andrew Williams, PhD, Maine Medical Center Research Institute</td>
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<td></td>
<td>- Marc Suchard, MD, PhD, University of California, Los Angeles</td>
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<td></td>
<td>- Frank DeFalco, Epidemiology Analytics, Janssen Research &amp; Development</td>
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<tr>
<td>3:45-4:15pm</td>
<td>Break</td>
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<td>4:15-5:15pm</td>
<td>Panel Discussion: Stakeholder Perspectives On The Journey Ahead</td>
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<tr>
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<td>- Moderator: Kristin Feeney, MPH, ConvergeHEALTH by Deloitte</td>
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<td>- Panelists:</td>
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<td></td>
<td>- Karthik Natarajan, PhD, Columbia University</td>
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<td></td>
<td>- Nasser Al-Qahtani, MSc, MBA, PhD, Saudi Food &amp; Drug Authority</td>
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<td>- Gowtham Rao, MD, PhD, Blue Cross Blue Shield of South Carolina</td>
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<td></td>
<td>- Ming Jack Po, MD, PhD, Google Medical Brain and Google Cloud</td>
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<tr>
<td>5:15-6:00pm</td>
<td>A surprise journey to end the day!</td>
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<td>6:00-7:30pm</td>
<td>Networking reception</td>
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A journey through the rest of the symposium

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<tr>
<th>Thursday, October 19</th>
<th>9:00am – 5:00pm</th>
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<tbody>
<tr>
<td></td>
<td>OMOP Common Data Model and Standardized Vocabularies</td>
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<td>Population-Level Estimation</td>
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<tr>
<th>Friday, October 20</th>
<th>9:00am – 5:00pm</th>
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<td></td>
<td>Patient-level prediction</td>
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<td></td>
<td>OHDSI Development Architecture</td>
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Thank you tutorial faculty

OMOP Common Data Model and Standardized Vocabularies:
George Hripcsak, Christian Reich, Erica Voss, Karthik Natarajan, Mui Van Zandt, Rimma Belenkaya, Clair Blacketer, Don O’Hara, Don Torok

Population-Level Estimation:
Martijn Schuemie, Marc Suchard, Christophe Lambert

Patient-level prediction:
Peter Rijnbeek, Jenna Reps, Joel Swerdel

OHDSI Development Architecture:
Frank DeFalco, Greg Klebanov, Lee Evans, Sigfried Gold
Thank you the community!

We’re all in this journey together...