OHDSI/OMOP Introduction

Mui Van Zandt
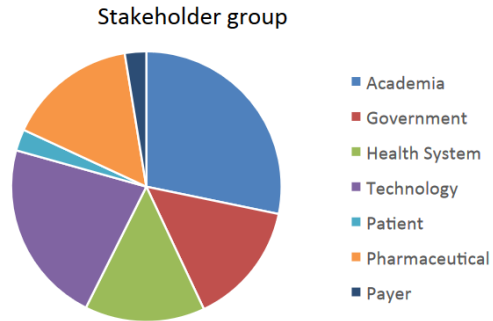
IQVIA

VP/Global Head, Data Strategy, Access and Enablement

OHDSI
OBSERVATIONAL HEALTH DATA SCIENCES AND INFORMATICS

What OHDSI is:

- ✓ **Open Source**
- ✓ **Community**
- ✓ **Data**

Stakeholder group

- Academia
- Government
- Health System
- Technology
- Patient
- Pharmaceutical
- Payer

Why Choose OHDSI/OMOP:

- ✓ **Fast, reliable** studies across a series of datasets and data types

- ✓ **Reduced cost of ownership** including understanding coding schemes, writing statistical programs across databases or developing software

- ✓ **Expanded data access** via the OHDSI network and remote multi-center database studies

OHDSI Collaborators:
- 4,294 collaborators
- >1,100 organizations
- 83 countries from 6 continents

OHDSI Network:
- 544 data sources
- 54 countries
- 974M unique patient records

https://ohdsi.org/

OHDSI's Mission

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

History of OMOP/OHDSI

Global Acceptance

End of OMOP Experiment

First OHDSI Symposium/ Network Study Published

European Chapter

EMA Adoption

First Hackathon at Columbia University

FDA Adoption (FDA BEST Launch)

Australia, Japan Chapters

India Chapter

2013

2015

2017

2019

2022

2009

2014

2016

2018

2020

2023

OMOP Experiment #1

Launch of OHDSI

China Chapter

EHDEN Initiation (Europe)

OHDSI COVID-19 Study-a-Thon

OMOP in Thailand

Thailand (1)
Siriraj Hospital EHR

FEEDER-NET Initiation (Korea)

Korea Chapter

Singapore, Taiwan Chapters

First European Symposium

Data Standardization to OMOP Enables Systematic Research

Analytical method: Adherence to Drug
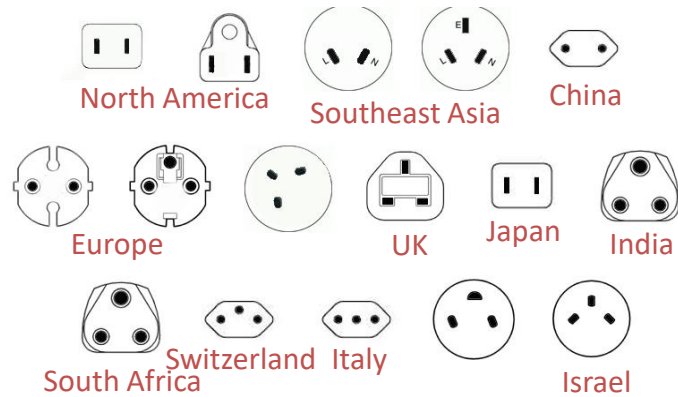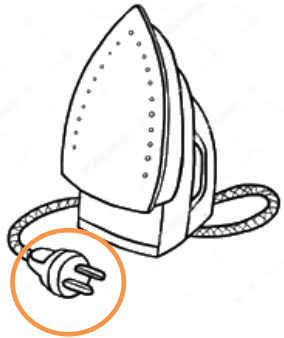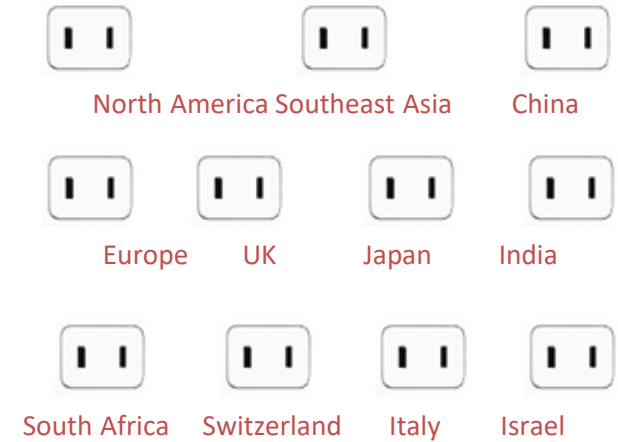
One SAS or R script for each study
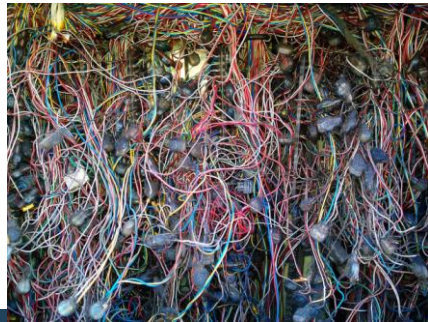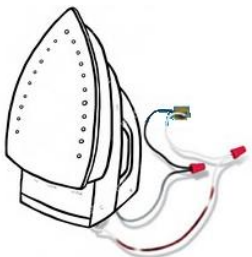
- Reliant on partner capabilities
- Not scalable
- Not transparent
- Expensive
- Slow
- Prohibitive to non-expert routine use

North America Southeast Asia China Europe UK Japan India South Africa Switzerland Italy Israel

OMOP CDM

North America Southeast Asia China Europe UK Japan India South Africa Switzerland Italy Israel

OHDSI tools

Adherence Mortality Prediction

Safety Signals
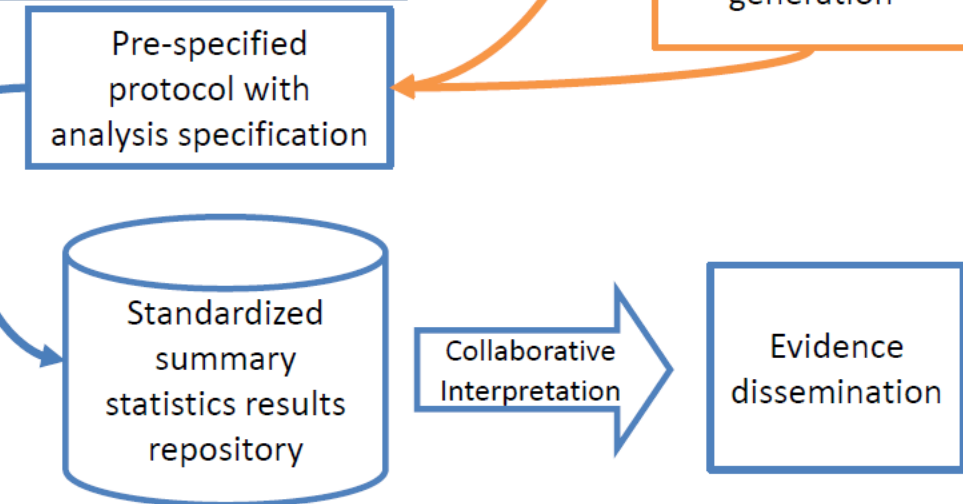
Health Analytics Data-to-Evidence (HADES)

Suite of OHDSI R packages for running standardized analytics against OMOP data assets

Overview

- R packages that can run against any OMOP database

- Support R packages
  - DatabaseConnector
  - SqlRender
  - ROhdsiWebApi
  - CohortDiagnostics
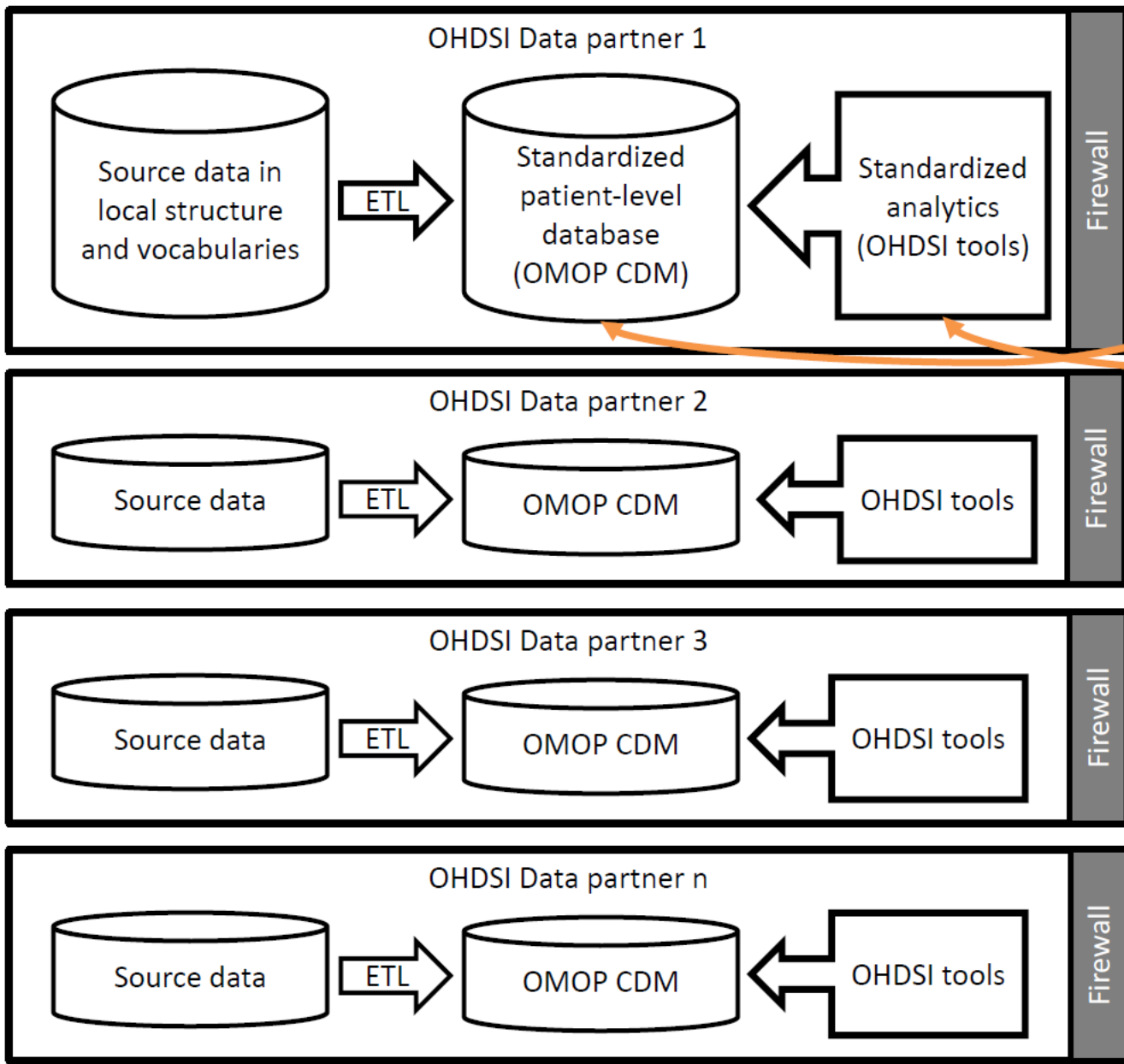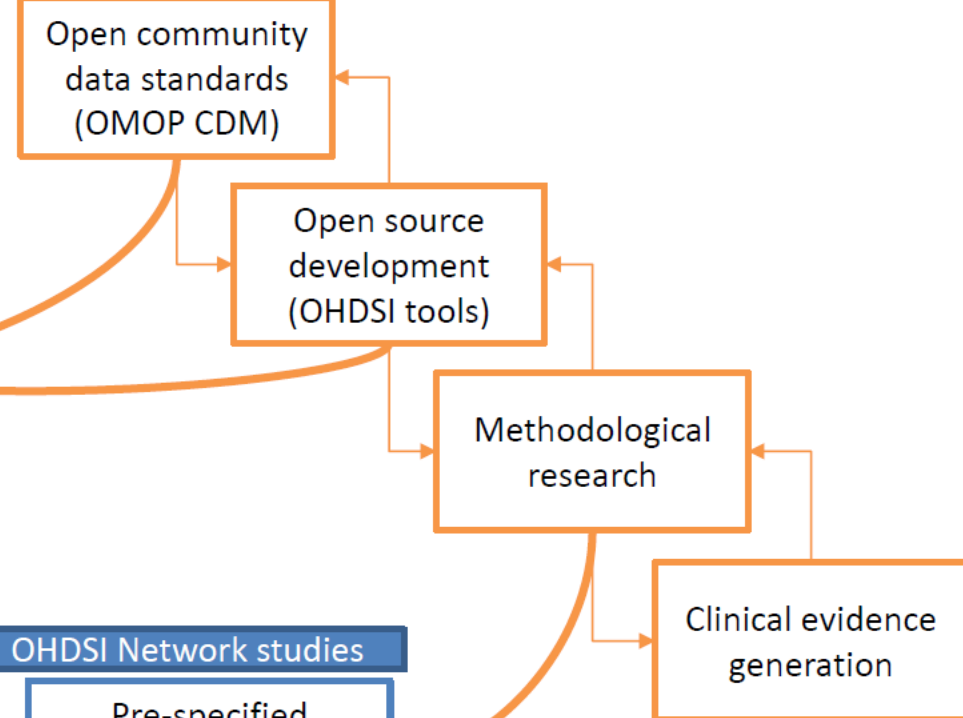
- Analytical R packages
  - PatientLevelPrediction
  - CohortMethod (comparative effectiveness)
  - FeatureExtraction (characterization)
  - SelfControlledCaseSeries

HADES — HEALTH ANALYTICS DATA-TO-EVIDENCE SUITE

CohortMethod New-user cohort studies using large-scale regression for propensity and outcome models. Learn more…	**SelfControlledCaseSeries** Self-Controlled Case Series analysis using few or many predictors, includes splines for age and seasonality. Learn more…	**Cyclops** Highly efficient implementation of regularized logistic, Poisson and Cox regression. Learn more…	**DatabaseConnector** Connect directly to a wide range of database platforms, including SQL Server, Oracle, and PostgreSQL. Learn more…	**SqlRender** Generate SQL on the fly for the various SQL dialects. Learn more…
SelfControlledCohort A self-controlled cohort design, where time preceding exposure is used as control. Learn more…	**EvidenceSynthesis** Routines for combining causal effect estimates and study diagnostics across multiple data sites in a distributed study. Learn more…	**ParallelLogger** Support for parallel computation with logging to console, disk, or e-mail. Learn more…	**FeatureExtraction** Automatically extract large sets of features for user-specified cohorts using data in the CDM. Learn more…	**Andromeda** Storing very large data objects on a local drive, while still making it possible to manipulate the data in an efficient manner. Learn more…
PatientLevelPrediction Build and evaluate predictive models for user-specified outcomes, using a wide array of machine learning algorithms. Learn more…	**EmpiricalCalibration** Use negative control exposure-outcome pairs to profile and calibrate a particular analysis design. Learn more…	**BigKnn** A large scale k-nearest neighbor classifier using the Lucene search engine. Learn more…	**ROhdsiWebApi** Interact with OHDSI WebAPI web services. Learn more…	**OhdsiSharing** Securely sharing (large) files between OHDSI collaborators. Learn more…
MethodEvaluation Use real data and established reference sets as well as simulations injected in real data to evaluate the performance of methods. Learn more…	**CohortDiagnostics** Generate a wide set of diagnostics to evaluate cohort definitions against databases in the CDM. Learn more…	**Hydra** Hydrating package skeletons into executable R study packages based on specifications in JSON format. Learn more…	**Eunomia** A standard CDM dataset for testing and demonstration purposes that runs on an embedded SQLite database. Learn more…	**CirceR** An R wrapper for Circe, a library for creating cohort definitions, expressing them as JSON, SQL, or Markdown. Learn more…

https://ohdsi.github.io/Hades/index.html

Data relevance across clinical domains

OMOP Workgroups & OHDSI Phenotype Collaborations

APAC
Current Participants: 297
Lead: Mui Van Zandt

ATLAS/WebAPI
Current Participants: 253
Lead: Anthony Sena

Clinical Trials
Current Participants: 295
Leads: Mike Hamidi, Lin Zhen

CDM
Current Participants: 686
Lead: Clair Blacketer

CDM Vocab Subgroup
Current Participants: 686
Lead: Michael Kallfelz

Data Network Quality
Current Participants: 298
Lead: Clair Blacketer

Dentistry
Current Participants: 8
Lead: Robert Koski

Education
Current Participants: 136
Lead: Nigel Hughes

HADES
Current Participants: 295
Lead: Martijn Schuemie

Health Equity
Current Participants: 228
Lead: Jake Gillberg

Latin America
Current Participants: 48
Lead: Jose Posada

NLP
Current Participants: 444
Lead: Hua Xu

Oncology
Current Participants: 328
Lead: Asieh Golozar

Registry
Current Participants: 175
Lead: Tina Parciak

Steering Group
Current Participants: 82
Lead: Patrick Ryan

Vaccine Vocabulary
Current Participants: 79
Lead: Asiyah Lin

Early-Stage Researcher
Current Participants: 243
Leads: Faaizah Arshad, Ross Williams

Eye Care & Vision Research
Current Participants: 74
Leads: Sally Baxter, Kerry Goetz

FHIR and OMOP
Current Participants: 287
Leads: Jon Duke, Davera Gabriel, Christian Reich

GIS
Current Participants: 157
Leads: Robert Miller, Kyle Zollo-Venecek, Andrew Williams

Methods Research
Current Participants: 379
Leads: Martijn Schuemie, Marc Suchard

Perinatal & Reproductive Health Group
Current Participants: 30
Leads: Alison Callahan et al.

Psychiatry
Current Participants: 132
Leads: Dmitry Dymshyts, Andrew Williams

Surgery & Perioperative Medicine
Current Participants: 42
Leads: Jenny Lane, Evan Minty

Medical Imaging
Current Participants: 155
Leads: Paul Nagy, Seng Chan You

Medical Devices
Current Participants: 141
Leads: Vojtech Huser, Asiyah Lin

Open-Source Community
Current Participants: 145
Leads: Adam Black, Paul Nagy

Patient-Level Prediction
Current Participants: 89
Leads: Jenna Reps, Ross Williams

Healthcare Systems
Current Participants: 471
Lead: Melanie Philofsky

Phenotype
Current Participants: 310
Lead: Gowtham Rao

- Type 2 Diabetes Mellitus
- Type 1 Diabetes Mellitus
- Atrial Fibrillation
- Multiple Myeloma
- Alzheimer's Disease
- Hemorrhagic Events
- Neutropenia

- Parkinson's Disease and Parkinsonism
- Attention Deficit Hyperactivity Disorder
- Hypertension
- Acute Myocardial Infarction
- Heart Failure
- Cardiomyopathy
- Multiple Sclerosis

- Hidradenitis Suppurativa
- Anaphylaxis
- Depression
- Non-Small-Cell Lung Cancer
- Drug-Induced Liver Injury
- Severe Visual Impairment And Blindness
- Suicide Attempts

- Kidney Stones
- Delirium
- Systemic Lupus Erythematosus
- Triple Negative Breast Cancer
- Pulmonary Hypertension
- Prostate Cancer
- HIV

OHDSI.org

Expanding APAC Collaboration

As of October 2024

- **7 regional chapters** in APAC since 2014
- **104 OMOP data sources** from 8 APAC countries

Coming soon!

APAC Studies

JAMA Network Open

Original Investigation | Pharmacy and Clinical Pharmacology

Ranitidine Use and Incident Cancer in a Multinational Cohort

Seng Chan You, MD; Seung In Seo, MD; Thomas Falconer, MSc; Chen Yanover, PhD; Talita Duarte-Salles, PhD; Sarah Seager, BA; Jose D. Posada, PhD; Nigam H. Shah, PhD; Phung-Anh Nguyen, PhD; Yeesuk Kim, MD; Jason C. Hsu, PhD; Mui Van Zandt, BS; Min-Huei Hsu, MD; Hang Lak Lee, MD; Heejoo Ko, MD; Woon Geon Shin, MD; Nicole Pratt, PhD; Rae Woong Park, MD; Christin G. Reich, MD; Marc A. Suchard, MD; George Hripcsak, MD; Chan Hyuk Park, MD; Daniel Prieto-Alhambra, MD

Abstract

IMPORTANCE Ranitidine, the most widely used histamine-2 receptor antagonist (H$_2$RA), was withdrawn because of N-nitrosodimethylamine impurity in 2020. Given the worldwide exposure to this drug, the potential risk of cancer development associated with the intake of known carcinogens is an important epidemiological concern.

OBJECTIVE To examine the comparative risk of cancer H$_2$RAs.

Key Points

Question Is use of ranitidine associated with higher risk for incident cancer compared with other histamine-2 (H$_2$) receptor antagonists (H$_2$RAs)?

Findings In this cohort study including

Research

JAMA Psychiatry | Original Investigation

Rates of Antipsychotic Drug Prescribing Among People Living With Dementia During the COVID-19 Pandemic

Hao Luo, PhD; Wallis C. Y. Lau, PhD; Yi Chai, PhD; Carmen Olga Torre, MSc; Robert Howard, MD; Kathy Y. Liu, PhD; Xiaoyu Lin, MSc; Can Yin, MSc; Stephen Fortin, PharmD; David M. Kern, PhD; Dong Yun Lee, MD; Rae Woong Park, PhD; Jae-Won Jang, MD; Celine S. L. Chui, PhD; Jing Li, MSc; Christian Reich, PhD; Kenneth K. C. Man, PhD; Ian C. K. Wong, PhD

IMPORTANCE Concerns have been raised that the use of antipsychotic medication for people living with dementia might have increased during the COVID-19 pandemic.

OBJECTIVE To examine multinational trends in antipsychotic drug prescribing for people living with dementia before and during the COVID-19 pandemic.

Editorial page 199
Supplemental content

Total 41 publications from APAC in 2023, including 2 multi-center publications in _JAMA_

PLOS ONE

JAMA Network Open

Journal of Hypertension

JAMA Psychiatry

Journal of Medical Internet Research

Scientific Data

Pharmaceuticals

Thrombosis Journal

Scientific Reports

JHEP Reports

Nutrients

Journal of Clinical Medicine

Summary

1 **Open Source**
CDM, tools, methods, and documentation all publicly available

2 **Standardization**
Standard CDM, vocabulary/ontology, tools, methods, data quality, and documentation

3 **Research Community**
Large research community with multiple stakeholders and disciplinaries

4 **Multi-country/multi-center research**
Large scale research using standardized tools and methods

Join The Journey

As a community, we are collaborating towards improving health outcomes for patients around the world.

To achieve this goal, we are developing open-source analytic tools and generating high-quality evidence to inform medical decision making.

Whether you're a software developer, physician or clinical researcher, there is a place for everyone in the OHDSI community.

Want to Join The Journey? Here are a few ways you can get started!

https://www.ohdsi.org/join-the-journey/

Thank you!