Observational Medical Outcomes Partnership (OMOP) Common Data Model

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Source 1  Source 2  Source 3

Transformation to OMOP common data model

Analysis method
OMOP, the Project (2008-2012)

OHDSI, the Movement

• Observational Medical Outcomes Partnership (OMOP)
  • Public-Private-Partnership: Pharmaceutical Research and Manufacturers of America (PhRMA), FDA, Foundation for the National Institutes of Health (FNIH)
  • „correlations between individual medical interventions and specific health outcomes“
  • OMOP Common Data Model und Standardized Vocabularies

• Observable Health Data Sciences and Informatics (OHDSI)
  • Weiterentwicklung des Data Models
  • Pflege der Terminologien
  • Open Source Toolbox
  • Community Management
  • Webinars
  • Jährliche Treffen
OMOP CDM V5

- Person
  - Observation_period
  - Specimen
  - Death
- Standardized health system data
  - Location
  - Care_site
  - Provider
  - Payer_plan_period
  - Visit_cost
  - Procedure_cost
  - Drug_cost
  - Device_cost
- Standardized meta-data
  - CDM_source
- Standardized clinical data
  - Visit_occurrence
  - Procedure_occurrence
  - Drug_exposure
  - Device_exposure
  - Condition_occurrence
  - Measurement
  - Note
  - Observation
  - Fact_relationship
- Standardized derived elements
  - Cohort
  - Drug_era
  - Dose_era
  - Condition_era
<table>
<thead>
<tr>
<th>Vocabulary ID (CDM V4.5)</th>
<th>Vocabulary code (CDM V5)</th>
<th>VOCABULARY NAME</th>
<th>Available</th>
<th>Latest</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SNOMED</td>
<td>Systematic Nomenclature of Medicine - Clinical Terms (IHTSDO)</td>
<td>31-JA</td>
<td></td>
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<tr>
<td>2</td>
<td>ICD9CM</td>
<td>International Classification of Diseases, Ninth Revision, Clinical Modification, Volume 1 and 2 (NCHS)</td>
<td>01-OC</td>
<td></td>
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<tr>
<td>3</td>
<td>ICD9Proc</td>
<td>International Classification of Diseases, Ninth Revision, Clinical Modification, Volume 3 (NCHS)</td>
<td>01-OC</td>
<td></td>
</tr>
</tbody>
</table>

**Diagram:**
- Top-level classification
- Higher-level classifications
- Low-level concepts
- Source codes
  - ICD10
  - ICD10CM
  - Read
  - SNOMED
  - Oxmis
  - Ciel
  - MeSH
  - ICD9CM

- MedDRA
  - System organ class
  - High-level group terms
  - High-level terms
  - Preferred terms
  - Low-level terms

- SPL: Structured Product Labeling (FDA)
- GCN_SEQNO: Clinical Formulation ID (FDB)
- CCS: Clinical Classifications Software for ICD-9-CM (HCUP)
- OPCS4: OPCS Classification of Interventions and Procedures version 4 (NHS)
ETL-Tools

Overview Table

Selected Mapping

Search Facility
Standardized large-scale analytics tools under development within OHDSI

- **ACHILLES**: Database profiling
- **CIRCE**: Cohort definition
- **HERMES**: Vocabulary exploration
- **HERACLES**: Cohort characterization
- **CALYPSO**: Feasibility assessment
- **OHDSI Methods Library**:
  - CYCLOPS
  - CohortMethod
  - SelfControlledCaseSeries
  - SelfControlledCohort
  - TemporalPatternDiscovery
  - Empirical Calibration
- **LAERTES**: Drug-AE evidence base
- **PLATO**: Patient-level predictive modeling
- **HOMER**: Population-level causality assessment

Patient-level data in OMOP CDM

[http://github.com/OHDSI](http://github.com/OHDSI)
Ongoing Studies

- Early Treatment Pathways in Chronic Disease
- Drug Utilization in Children
- Celecoxib versus Naproxen
- Predicting outcomes in cancer patients
- Learning Effective C
care
- SeaWAS: Birth Mortality
- Quality of Race and
Bioresonance
- Data Quality Study
- Large-Scale Predictors
- Large-Scale Populations
- Risk of hip fracture

Treatment Pathways in Chronic Disease

Objective: The objective of this study is to characterize the prevalence of different treatment pathways for three chronic diseases: Hypertension, Type II Diabetes, and Depression. We will systematically summarize the treatment pathways observed among patients who have at least 3 years of continuous observation and persistent treatment following initiation. We will study temporal trends, and will further stratify by data source to determine population, geography, and data capture processes.

Rationale: While numerous treatment guidelines exist for chronic conditions, the real-world treatment pathways that patients experience in practice are essential for establishing context around questions of drug utilization, efficacy, and safety.

Project Leads: Patrick Ryan, Jon Duke, George Hipposak, Martin Schwarz, and John Pezullo

Coordinating Institution(s): Janssen R&D, Columbia University, Research Triangle Institute, and the National Center for Health Statistics.

Additional Participants:

Full Protocol: [Hypertension Treatment Pathways 12-4-2014]
Initial Proposal Date: 12/3/2014
Launch Date: 12/5/2014
Study Closure Date: 12/31/2014
Results Submission: Email or SFTP

Requirements:

CDM: V4 or V5
Database Dialect: SQL Server, Postgres, Oracle
Software: SQL as above, R (optional)

Code:

https://github.com/OHDSI/StudyProtocols

Discussion:

Treatment Pathways Discussion Thread

Datasets Run:
- Truven
- Optum
- CPRD
- Indiana Network for Patient Care

OHDSI Drug Utilization in Children Protocol

This study aims to measure the prevalence of drug use in children in several countries in Asia. We will compute prevalence for all drugs captured in the databases in the pediatric population. The main analysis will focus on drug classes (anatomical and therapeutic) and these prevalences will be stratified by year to evaluate temporal trends. A secondary analysis will report the five top ingredients per anatomical class per country. All analysis will be stratified by age (< 2 years, 2-11 years, and 12-18 years), and by setting (inpatient or ambulatory care).

Detailed information and protocol is available on the OHDSI Wiki.

How to run:

1. Make sure that you have Java installed. If you don’t have Java already installed on your computer (on most computers it already is installed), go to java.com to get the latest version. If you have trouble building with Java below, be sure on Windows that your Path variable includes the path to jvm.dll (Windows Button --> type "Path" --> Edit Environment Variables --> Edit "Path" variable, add to and C:\Program Files\Java\jdk1.8.0_121\bin)
MI-Initiative: Konzeptphase

- 11 Universitätskliniken
- 3,3 Mio Patienten
- 30 Mio Diagnosen
- 23 Mio Prozeduren

Catchment Area of MIRACUM Partners

http://www.bmbf.de/de/medizininformatik-3342.html
OMOP on FHIR

OMOP v5
- care_site
- concept
- condition_occurrence
- drug_exposure
- measurement
- observation
- person
- procedure_occurrence
- provider
- visit_occurrence

CREATE, READ, UPDATE, DELETE

Location
Medication
Condition
MedicationOrder
MedicationDispense
MedicationAdministration
Observation
Patient, Procedure,
Practitioner
Encounter

<Hapi/> FHIR® DSTU2

SMART®

EHR
OMOP on FHIR


https://github.com/gt-health/GT-FHIR
Ausblick

- OMOP als CDM
- OHDSI ist eine aktive Community, die viele Werkzeuge entwickelt
  - www.ohdsi.org
  - github.com/OHDSI
- Work in Progress, lebt vom Mitmachen
  - (noch) keine OMICS-Daten, Tumordokumentation, Geovisualisierung
  - Keine föderierte Abfrage
- OMOP on FHIR
  - SMART on FHIR (https://smarthealthit.org)
- Deutsch?
  - ICD10GM, Mapping OPS<->SNOMED
  - Deutsche Übersetzung MedDRA, LOINC, ...
  - Verlegungsketten, Abrechnungsdaten, ...