OMOP Myth Busters

Dispelling misconceptions about common data model transformations

THE PROBLEM

Observational health databases are not created equal. The purpose for collecting the data, the format of the data and terminologies used differ among healthcare settings and data types (e.g. electronic health record, patient registries, administrative claims). Without standardization, conducting a study that uses multiple observational databases has proven to be expensive, time-consuming and difficult to replicate.

THE SOLUTION

Converting the data in these disparate databases into a common data model (CDM), with common representation, (terminologies, vocabularies, coding schemes) provides researchers with the ability to conduct studies that are cost-effective, faster, and more reliable.

OMOP[1] is a common data model that allows for the systematic analyses of disparate observational databases using standardized analytical methods and tools developed by the OHDSI[2] community. The beneficial combination of a common data model along with common methodologies, provides researchers with the ability to perform health research analytics at scale.

THE MYTHS AND THE TRUTHS

As interest in using a common data model to analyze multiple heterogenous databases increases, so do questions about the accuracy and effectiveness of these data conversions. IQVIA is a global leader in OMOP common data model conversions. We currently host more than 12 datasets in the OMOP format and have conducted over 20 conversions.

Here are some common misconceptions we have heard over time and the truths behind them:

1. **Myth #1**
   "Loss of Data"
2. **Myth #2**
   "Loss of Accuracy in Conversion"
3. **Myth #3**
   "Loss of Accuracy in Vocabulary Mapping"
4. **Myth #4**
   "It Takes Too Much Time"
5. **Myth #5**
   "You Don't Have My Use Case in OMOP"
6. **Myth #6**
   "I Have to Learn New Medical Terminology"

[1]OHDSI (Observational Health Data Science and Informatics) is a public initiative independent of IQVIA
[2]OMOP (Observational Medical Outcomes Partnership) was a public partnership between FDA and industry, developing the OMOP CDM and Standardized Vocabularies; now maintained by OHDSI

Myth #1 “Loss of Data”

Data Quality

MYTH

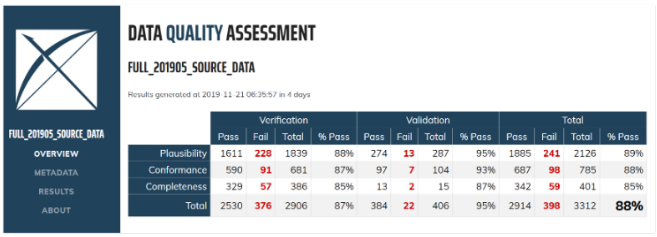
“Converting to a CDM will result in “losing” data because it does not map to the standard.”

TRUTH

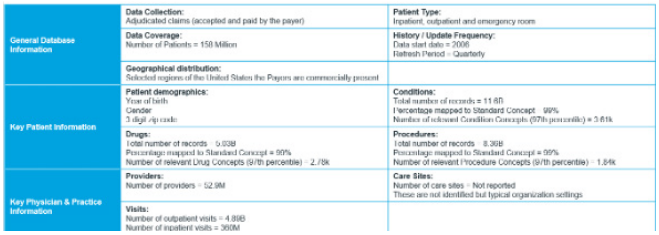
After converting data from source to OMOP, IQVIA has a standard quality control service including:

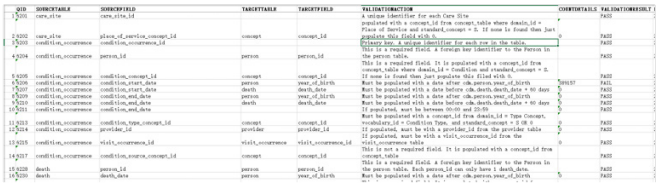
- OHDSI Data Quality Dashboard
- Quality Control checks
- On-premise checks
- Data Profiling checks

RESOURCES



	Verification				Validation				Total			
	Pass	Fail	Total	% Pass	Pass	Fail	Total	% Pass	Pass	Fail	Total	% Pass
Plausibility	1611	228	1839	88%	274	13	287	95%	1885	241	2126	89%
Conformance	590	91	681	87%	97	7	104	93%	687	98	785	88%
Completeness	329	57	386	85%	13	2	15	87%	342	59	401	85%
Total	2530	376	2906	87%	384	22	406	95%	2914	398	3312	88%





Myth #2 “Loss of Accuracy in Conversion”

Retaining the Accuracy of Source Data

MYTH

“Using OMOP standards can degrade the accuracy of the data. There could be issues in the conversions ability to accurately reflect a data set.”

TRUTH

- Validation studies have found minimal differences in the source to OMOP data
- DA France / LPD France validation study found consistency between native and OMOP data sets

Reference: Schwalm M, Raoul T, Chu D, Shah U, Potdar M, Van Zandt M, Coffin G, Jouaville SL. Conversion of a French Electronic Medical Record (Emr) Database into the Observational Medical Outcomes Partnership Common Data Model. Research on Methods – Databases & Management Methods. 2017 Oct 01; vol 20.issue 9, PA741

RESOURCES

Table 3 : Patients profile : comparison between the 3 data sources : DA FR Native / DA FR OMOP / LPD Native

	DA FR NATIVE	DA FR OMOP	LPD NATIVE
	N=12 302*	N=12 382*	N=15 623
Males	7 179 (58.4)	7 231 (58.4)	9 291 (59.5)
Age (in year))	74.6 (± 11.1)	74.4 (± 11.1)	74.6 (± 11.1)
Age ≥75 years	7 055 (57.3)	7 032 (56.8)	8 981 (57.5)
BMI	28.1 (± 5.3)	28.2 (± 5.3)	27.9 (± 5.3)
Diastolic blood pressure	76.2 (± 12)	79.3 (± 20)	76 (± 9)
Systolic blood pressure	131.9 (± 15)	132.7 (± 15)	133 (± 15)
Co-treatments			
NSAIDs	5 320 (43.3)	5 341 (43.1)	7 492 (48.0)
Anti-arrhythmic drug	6 014 (48.9)	6 018 (48.6)	7 425 (47.5)
Injectable anticoagulants	373 (3.0)	377 (3.0)	482 (3.1)
$CHADS_2$ Score[2]			
0	2 262 (18.4)	2 311 (18.7)	2 638 (16.9)
1	3 997 (32.5)	4 027 (32.5)	5 026 (32.2)
≥2	6 043 (49.1)	6 044 (48.8)	7 959 (50.9)
CHA_2DS_2-Vasc Score[3]			
0	822 (6.7)	844 (6.8)	998 (6.4)
1	1 559 (12.7)	1 591 (12.8)	1 774 (11.4)
≥2	9 921 (80.6)	9 947 (80.3)	12 851 (82.3)

OMOP model assign an occurrence date to all events including clinical measures and lab results. As a result there is a slight difference in visit number between DA FR OMOP and DA FR NATIVE, which explains a slightly elevated number of included patients in DA FR OMOP.

Myth #3 “Loss of Accuracy in Vocab Mapping”

Evaluating the Accuracy of Vocabulary Mapping

MYTH

“OMOP vocabulary mappings are incorrect. There could be issues in the preservation of source information as it is translated to standard concepts.”

TRUTH

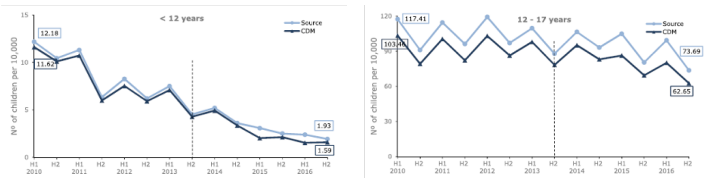
- Validation studies have found minimal differences in the source to OMOP data
- EMA Validation study of IQVIA IMRD UK found consistency between source and OMOP CDM data

RESOURCES

Clin Pharmacol Ther. 2020 Apr;107(4):915-925. doi: 10.1002/cpt.1785. Epub 2020 Mar 2.

Can We Rely on Results From IQVIA Medical Research Data UK Converted to the Observational Medical Outcome Partnership Common Data Model?: A Validation Study Based on Prescribing Codeine in Children

Gianmario Candore [1], Karin Hedenmalm [1], Jim Slattery [2], Alison Cave [2], Xavier Kurz [2], Peter Arlett [2]
Affiliations – collapse



SIX-MONTHLY PREVALENCE (PER 10,000) OF CODEINE PRESCRIBING FOR PAIN IN 0–17 YEARS

Reference: Candore G, Hedenmalm K, Slattery J, Cave A, Kurz X, Arlett P. Can We Rely on Results From IQVIA Medical Research Data UK Converted to the Observational Medical Outcome Partnership Common Data Model?: A Validation Study Based on Prescribing Codeine in Children. Clin Pharmacol Ther. 2020 Apr;107(4):915-925.

Myth #4 “It Takes Too Much Time”

OMOP Conversion Overview

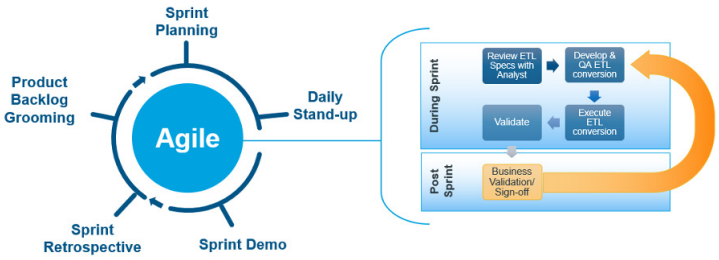
MYTH

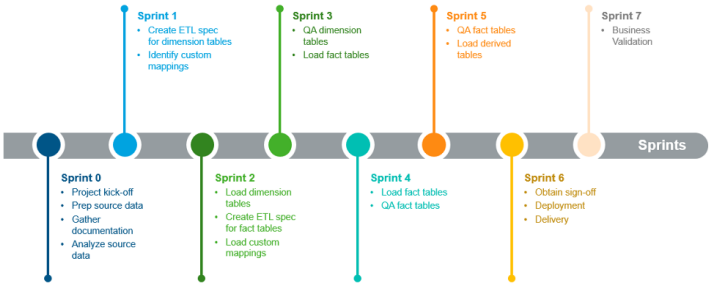
“Taking data from source format to OMOP common data model is tedious and time consuming.”

TRUTH

- Yes, it takes time to convert data into the OMOP CDM
- We spend time cleaning the data and removing data that cannot contribute to analytical use cases
- We push down common business rules (e.g. patient eligibility criteria, observational period, validity of conditions) into the ETL process. However, this saves significant time during execution of the analytics study packages

RESOURCES





Myth #5 “You Don’t Have My Use Case in OMOP”

OMOP Evolves to Meet Analytical Needs

MYTH

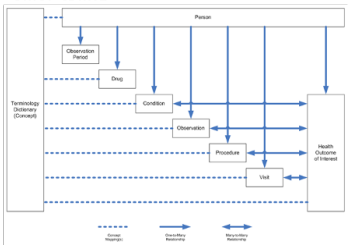
“OMOP is not good enough for my analytical use case or doesn’t cover the therapeutic area that I want to study.”

TRUTH

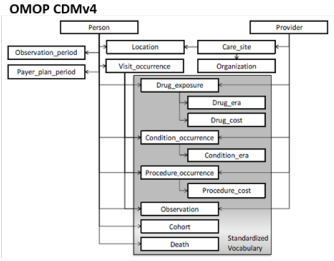
- It’s true, OMOP was not built for every use case
- OMOP continues to evolve to support additional use cases when there is enough of a common need. For example, to support oncology data, OHDSI’s Oncology working group designed an Oncology extension to house oncology-specific information in the OMOP CDM

RESOURCES

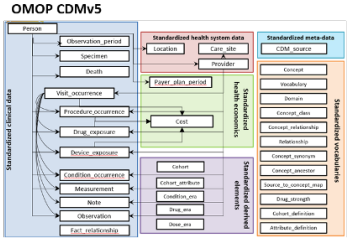
OMOP CDMv2



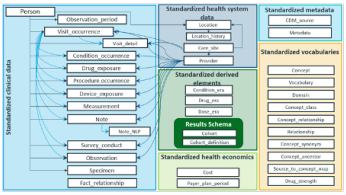
OMOP CDMv4



OMOP CDMv5



OMOP CDMv6



Myth #6 “I Have to Learn New Medical Terms”

OMOP Vocabulary Hierarchy

MYTH

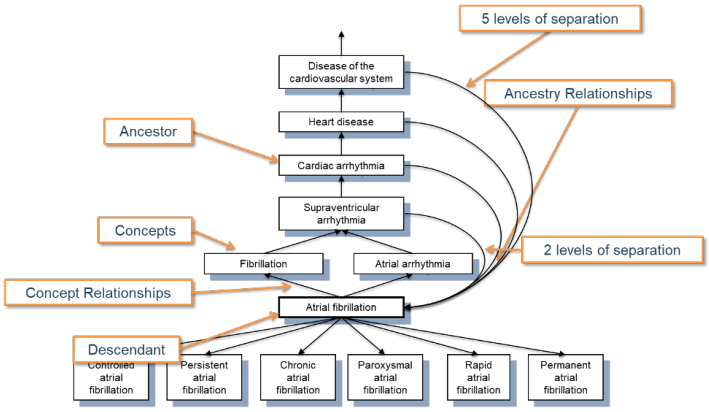
“I have to learn new medical terms. OMOP is forcing me to speak in SNOMED, RxNorm and LOINC codes.”

TRUTH

- OMOP CDM preserves the source codes from the native data and creates a map to a standard concept that is interoperable across all data assets
- You can always start with source codes (e.g., ICD-9/ ICD-10) and use the maps to relationships to find standards
- The hierarchy structure in the standard vocabulary is easily navigated using ancestors and descendants

RESOURCES

Ancestry Relationships



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