Mapping phenotype data of a biobank to OMOP common data model

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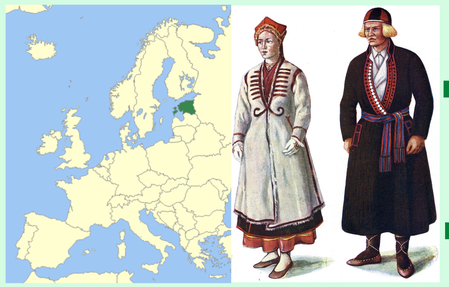
Data (Estonian Genome Center)



52K Estonians (5% of population)

Blood sample → Biobank

Questionnaire → Phenotype database (ICD-10, ATC, ...) → Original data

Mapping to OMOP

SQL scripts
- For setting up an empty database
- For building local copy of OMOP vocabulary
- For building necessary mapping tables
- For mapping input data to OMOP CDM

Extract, Transform, Load → OMOP

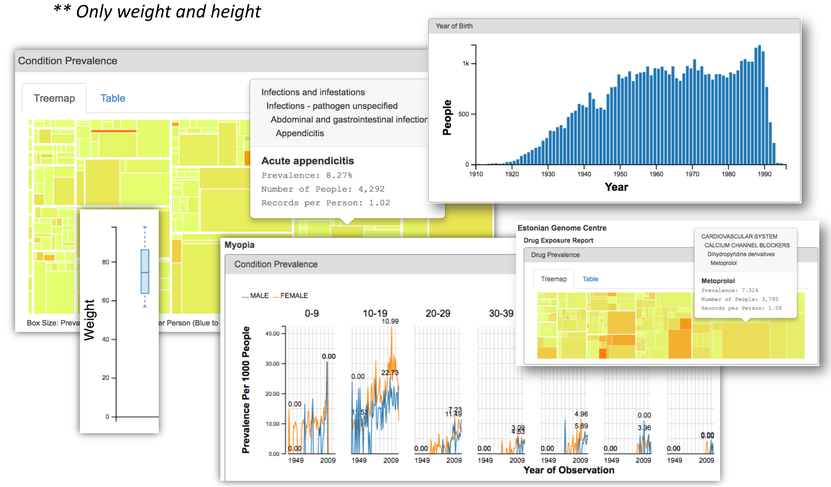
Data in OMOP format: *Persons, Conditions, Observations, Measurements, Drugs*

Validation: Achilles, AchillesWeb

Results

Table	Mapped records %	Mapped records n	Mapped codes %	Mapped codes n
Persons	100%	51,890	-	-
Conditions	99%	402,376	93%	7,740
Observations*	100%	2,448	100%	334
Measurements**	100%	107,939	100%	2
Drugs	86%	56,773	63%	1,638

** All non-mapped observations are shown under Conditions*
*** Only weight and height*



"The visualizations are exactly what we need"

Tõnu Esko
Estonian Genome Center, University of Tartu
Vice Director, Senior Research Fellow, PhD

Mapping challenges

a) Too many options

Which one is the "correct" OMOP concept for measured **"body weight"**?

Body weight findings in OMOP vocabulary:

Code	Name	Table
3013762	Body weight Measured	Measurement
3013853	Body weight Measured –ante partum	Measurement
3015644	Body weight Measured –postoperative	Measurement
3019336	Body weight Measured –pre dialysis	Measurement
3022281	Body weight Measured –pre pregnancy	Measurement
3023166	Body weight Stated	Measurement
3025315	Body weight	Measurement
3026600	Body weight Estimated	Measurement
3027348	Body weight special circumstances	Measurement
3027348	Body weight percentile range Categoriza…	Measurement
3042378	Body weight Set	Observation
4022831	Body weight AND/OR growth problem	Condition
4099154	Body weight	Observation

b) Country-level non-standard "ATC" codes for drugs containing several components

TOP 5 non-mapped ATC codes

Code	Meaning
B01AC80_1	Hjertemagnyl (acetylsalicylic acid and magnesium (hydr)oxide)
M01AB81	Diclofenac+pyridoxine+thiamine+cyanocobalamine
C01DA14	Isosorbite mononitrate
C09DA01_7	Lozap H
A12CX80_1	Panangin

c) Product names differ in different countries, no central registry

Example of product names of Lozap H in 4 countries[1]

Country	Domestic product name
Estonia	Lozap H
Hungary	TERVALON HCT 50 mg/12,5 mg filmtabletta
Latvia	Lozap H 50 mg/12,5 mg apvalkotās tabletes
Lithuania	Lozap H 50/12,5 mg plėvele dengtos tabletės

d) Hierarchy codes, code ranges

Diagnosis **O04** does not have a standard mapping, because it is an ICD-10 hierarchy code.

When a **range** is recorded instead of exact diagnosis, *e.g* **I10-I15** (Hypertensive diseases), there is no standard mapping given in OMOP vocabulary.

e) Missing options

There is a concept for **"red-blonde hair"**, but not for **"blonde hair"**.

Lessons learned

- Do not leave unmapped records out from OMOP model, mark them with *CONCEPT_ID=0* instead
- Keep your mapping scripts under version control (git)
- Make the whole mapping process easily repeatable (need to run it several times)
- In a secure system one has to build mapping scripts on test data, which is challenging (it is also challenging to provide representative test data)

Acknowledgements

Peter R. Rijnbeek, Michel Van Speybroeck, Mairo Puusepp, Tõnu Esko

References

1. MRI Product Index, The Heads of Medicines Agencies: http://mri.cts-mrp.eu/Human/Product/Details/6979

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