



# Lightning Talks

**Moderator: Kristin Kostka**

**IQVIA**



# Standardisation of European medical vocabularies and its incorporation to the OMOP CDM

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Oleg Zhuk, Alina Vaziuro,Odysseus Data Services Inc.

Christian Reich, IQVIA



# Overview

- Variability of the European medical vocabularies.
- Current coverage in the OMOP Standardized Vocabularies.
- Implementation, resources.



# Results

- OMOPed ;
- OMOPed but review / slightly changes are needed ;
- partially OMOPed ;
- not OMOPed, but approach was developed on similar vocabulary ;
- not OMOPed and new approach is needed ;
- \* – not widely used / planned to be implemented.

Country	Domain					
	Condition	Procedure	Drug	Measurement	Device	Other/ mixed
Austria	ICD10-WHO-BMG ICD-O-3	APC APPC	ATC	LOINC-DE		LKF-PCS
Belgium	ICD9-CM ICD10-CM-BE ICD-O-3	ICD9-CM ICD10-PCS-BE	GGR ATC	LOINC-BE		APR-DRG SNOMED-CT-BE*
Czech Republic	ICD10-CZ (MKN) ICD11* ICF ICD-O-3-CV ORPHANET/OMIM/SSIEM TNM8		ATC SUKL		ZT GMDN	MeSH-CZ DRG-IR SNOMED-CT-CZ* MedDRA-CZE* VZP
Denmark	ICD10-DK (SKS) ICD-O-3	NCSP-DK	ATC	NPU-DK		SKS DRG-DK SNOMED-CT-DK SNOMED-CT-ET*
Estonia	ICD10-WHO-ET TNM8 ICD-O-3	NCSP-ET	ATC	LOINC-ET	EUDAMED MSA GMDN	MeSH-FR
France	ICD10-FR (CIM)	CCAM / ACPC CSARR	BDPM ATC	LOINC-FR	LPP	MeSH-FR
Germany	ICD10-GM ICD10-WHO-DE ICD11* ICD-O-3 ICF Alpha ID-SE	OPS	AMIS	LOINC-DE UCUM	EDMA UMDNS GMDN*	G-DRG MeSH-DE
Ireland	ICD10-WHO-AM	ACHI	ATC	LOINC		ACS SNOMED-CT*
Italy	ICD10-WHO-IT ICF & ICF-CY ICPC2* ICD11*	ICD9-CM ICHI* CIPI*		LOINC-IT	CND GMDN	CMS-DRG
Netherlands	ICD10-NL ICF ICPC2-NL ICECI ICD-O-3	CMSV	MIB ATC	LOINC-NL	ISO 9999-MD GMDN	MeSH-DUT SNOMED-CT-NL
Poland	ICD10-PL (MKC) ICF ICNP	ICD9-CM	ATC	LOINC*	GMDN	SNOMED-CT-PL*
Portugal	ICD9-CM ICD10-CM-PT ICF & ICF-CY ICD-O-3 ESOD	ICD9-CM ICD10-PCS	CNPEM ATC	LOINC-PT SNOMED-CT*	CDM GMDN	
Spain	ICD-10-BAQ ICD-10-CAT ICF & ICF-CY			LOINC-ES	GMDN	SNOMED-CT-ES
Sweden	ICD10-SE ICF ICD-O-3		NPL NSL ATC			KVA/SVF SNOMED-SV KSI NordDRG-SV MeSH-SV SwissDRG
Switzerland	ICD10-GM ICF ICD-O-3	CHOP	ATC SwissMedic	LOINC-DE		SwissDRG
United Kingdom	ICD10-WHO ICD-O-3	OPCS-4 NICIP	dm+d Gemscript SNOMED-DrugExt	LOINC	dm+d	SNOMED-CT-UK Read



# Results: 1. Hard to get

- Inadequate web pages.
  - Often reduced English version.
  - Poorly described, sometimes only mentioned without any detail about usage requirement, versions etc.
  - Source files often not available or available in pdf.
-



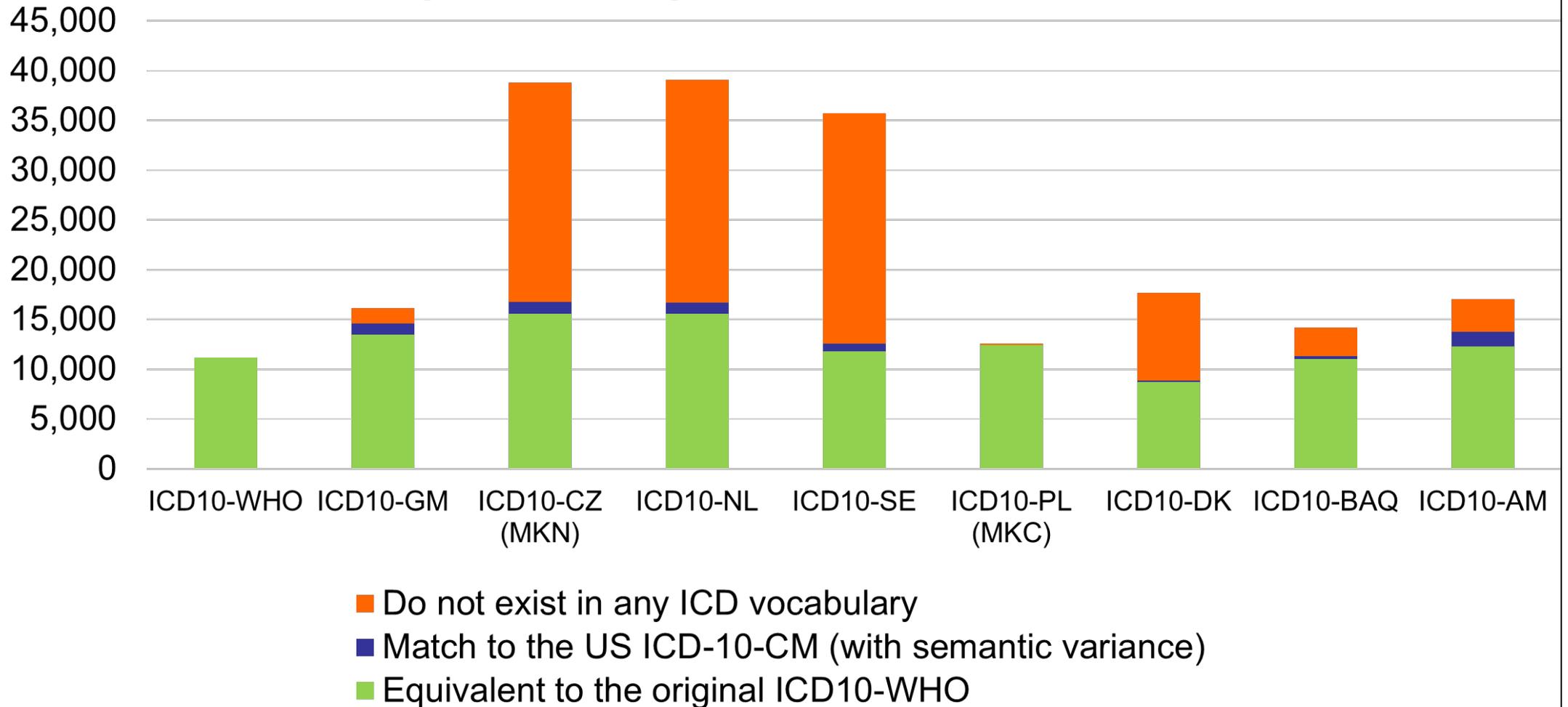
## Results: 2. Lots of reuse

- **Linguistic variants**, i.e. translated to national languages without any semantic modifications (ICD9-CM, ICD10-CM, ICD-O-3, ATC, LOINC and MeSH).
  - **National modification or extensions** use the original vocabularies as a basis and the application of a number of adjustments and alterations (ICD-10 and SNOMED).
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# Results: 3. Use of ICD-10

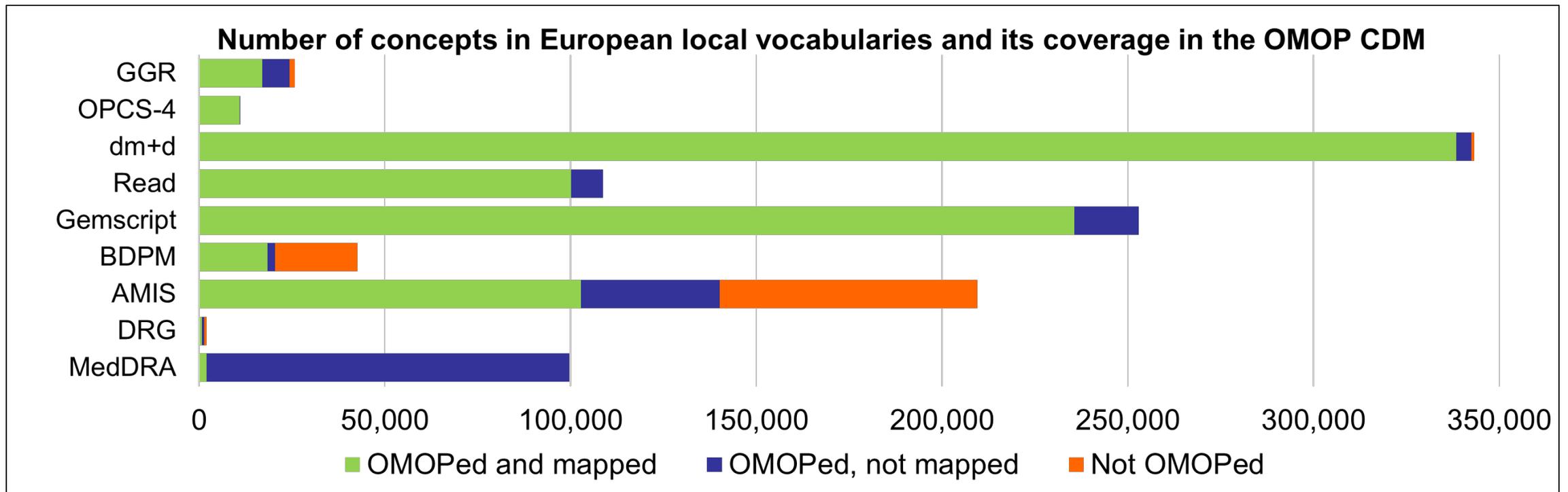
**Number of concepts in different versions of ICD10 vocabulary and its matching to the existing OMOPed ICD10 vocabularies**





# Results: 4. Overall coverage of existing vocabs

- Fully integrated with automatic refreshes and mapping - **GGR** (Belgium), **OPCS-4** (multi-country), **dm+d**, **Read** and **Gemscript** (UK).
- Partial integration – **BDPM** (France), **AMIS** (Germany), **DRG** (multi-country) and **MedDRA** (multi-country).





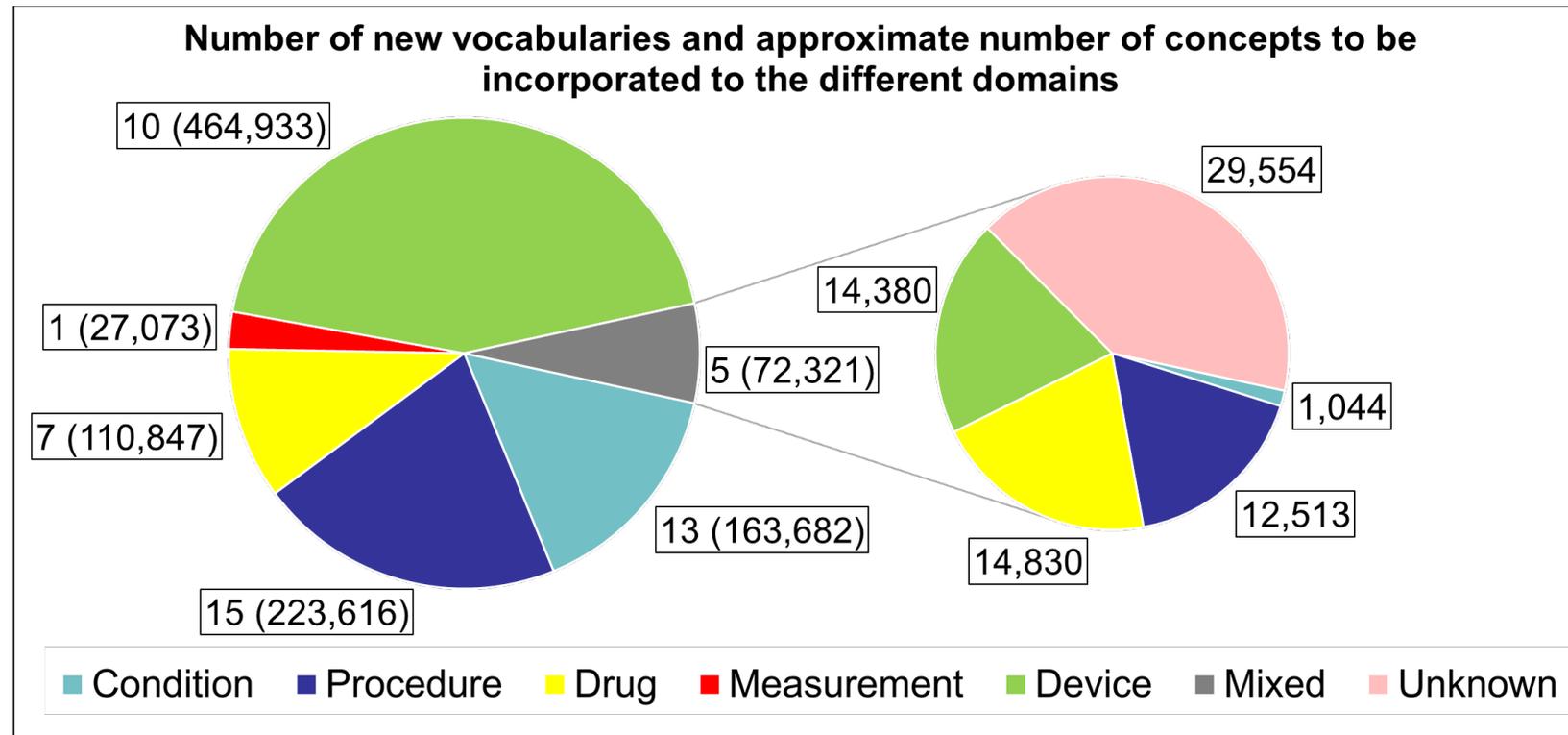
## Results: 5. Coverage by domains varies

- **Measurement:** most covered, mainly because of LOINC wide usage in Europe.
- **Drug:** on a high level we can easily deal with any country drugs encoded by ATC, but for a Drug Product level we still need to OMOP a lot of national drug vocabularies.
- **Condition:** would be covered enough after the several international vocabularies (ICF, ICF-CY, TNM8) and ICD10 national extensions are processed.
- **Procedure:** the most heterogeneous group and still need to be mapped.
- **Device:** still in a grey zone.



# Results: 6. New challenges

- ICD-11 is going to be rolled out, which is both a great challenge as well as a boost of the standardization process in Europe.
- Not all the national vocabularies have the same urgency.
- There are vocabulary-specific features that will cause headache, e.g. the ICD-10 Dual Classification (Dagger and Asterisk) system.





# Conclusions

- OHDSI dissemination to the European countries is a continuous process that will intensify after the EHDEN project has launched.
- OMOP CDM conversion starts with medical vocabularies mapped to standard concepts, which requires serious efforts and resources.
- Although a lot of work has already been done, the medical vocabularies used in Europe are currently not covered completely by the OMOP CDM.
- Heterogeneity of national systems and existence of local editions of international vocabularies (ICD, SNOMED, DRG) will require additional attention.
- This is aggravated by the lack of precise information or vocabulary source files.
- Having a large variety of methods, tools and practical experience, the OHDSI Vocabulary Team is prepared to take on the onset of European vocabularies.

# Standardisation of European medical vocabularies and its incorporation to the OMOP CDM



Thank you for your attention!



## **Conversion of Saudi Arabia Electronic Health Record using the OMOP Common Data Model, Challenges and Solutions**

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RPh<sup>1</sup>, Nasser F BinDhim, PhD<sup>1</sup>, Clair Blacketer, MPH, PMP<sup>2</sup>**

1. Saudi Food and Drug Authority
2. Janssen Research & Development, Virginia, USA
3. Kingdom Hospital, Riyadh, Saudi Arabia
4. Sultan Bin Abdulaziz Humanitarian City, Riyadh, Saudi Arabia

# Background



## Scope:

- to establish a representative national database to enable the SFDA authority to identify, evaluate and report on health effects related to drug safety and effectiveness.

## Objectives:

- To evaluate the safety and effectiveness of medications to help the regulatory decision by the SFDA.
- Examine drug utilization and disease prevalence
- Provide a descriptive summaries on incidence of adverse drug events.
- Protecting the health and wellbeing of the Saudi population.



# Methods

## Mapping to the OMOP CDM

- The pharmacoepidemiology database is being piloted with data from one hospital which contains ~85K unique patients.
- It is the first Middle Eastern country to adopt the OMOP CDM.
- Certain challenges faced that required a deeper understanding of the OHDSI mission.
- This learning curve resulted in a refined process consisting of two phases:

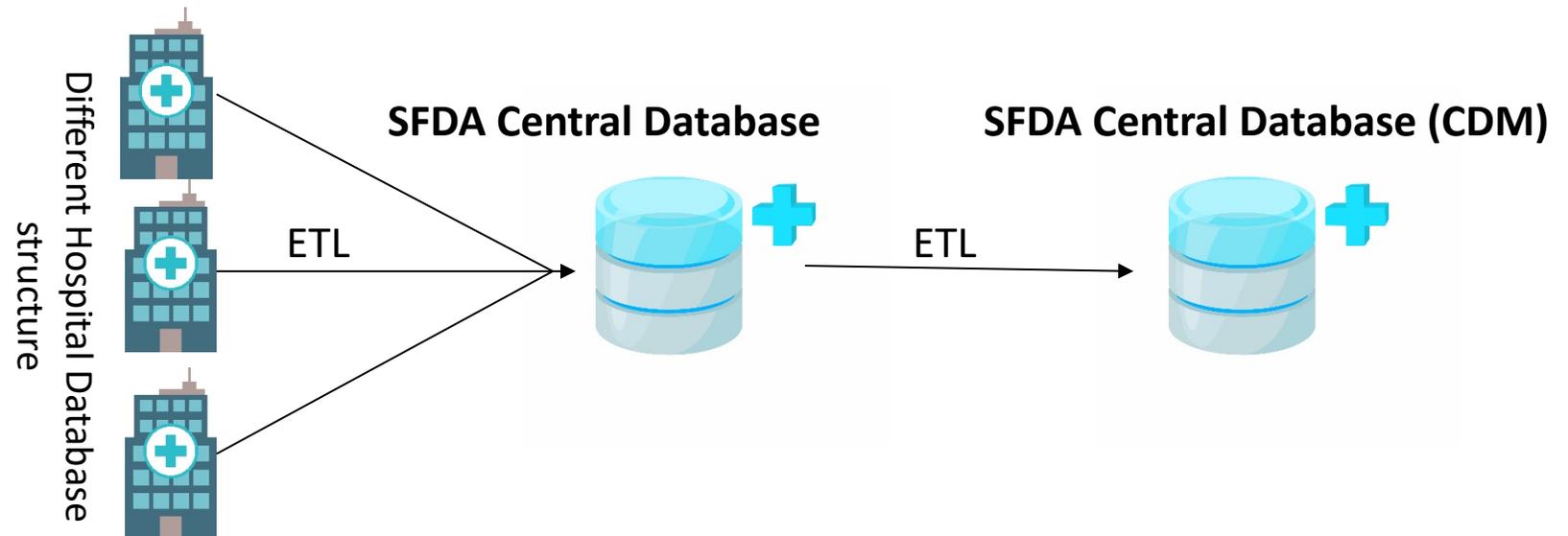


# First Phase: Establishment

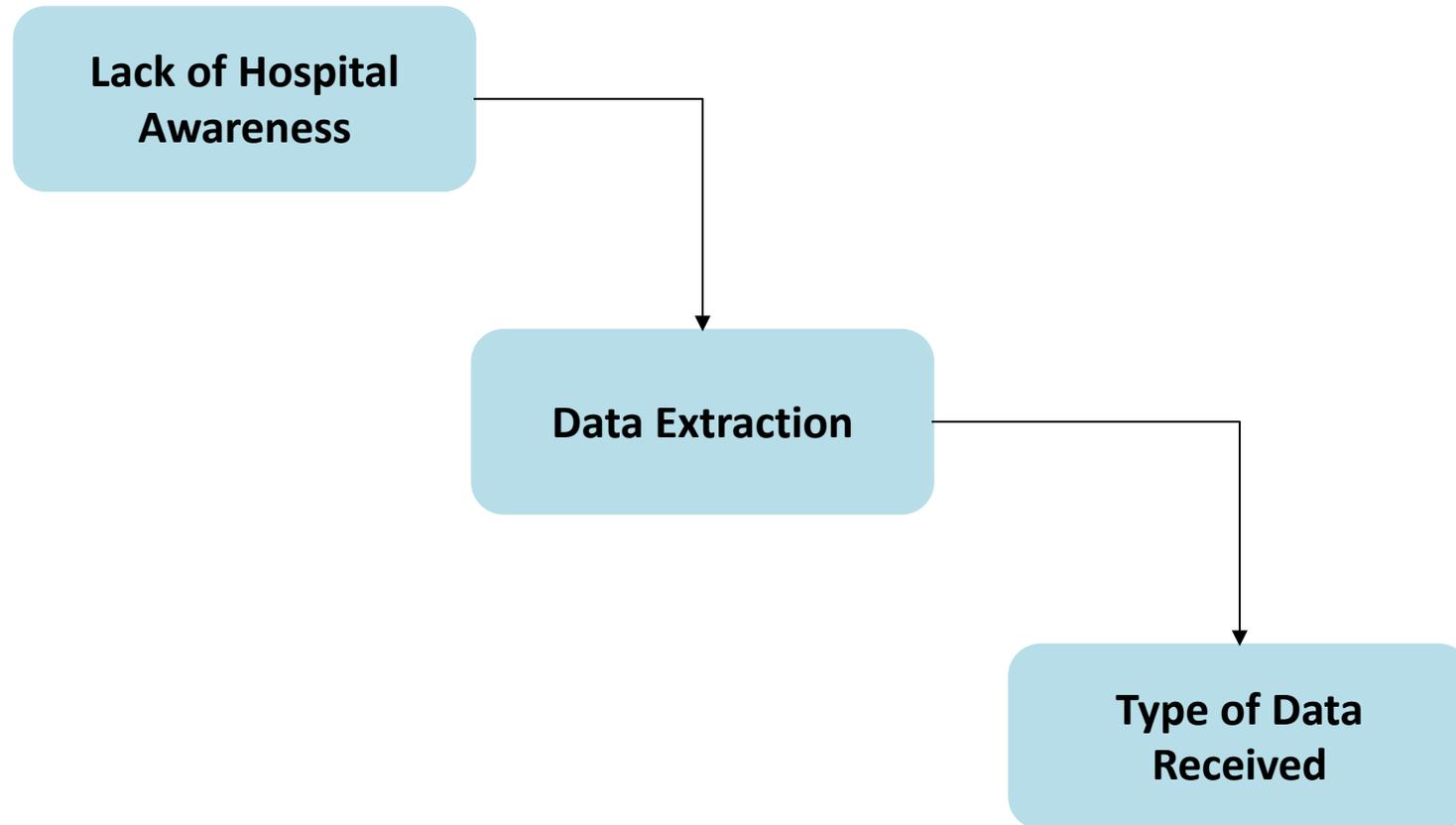


## Database:

- Centralized database

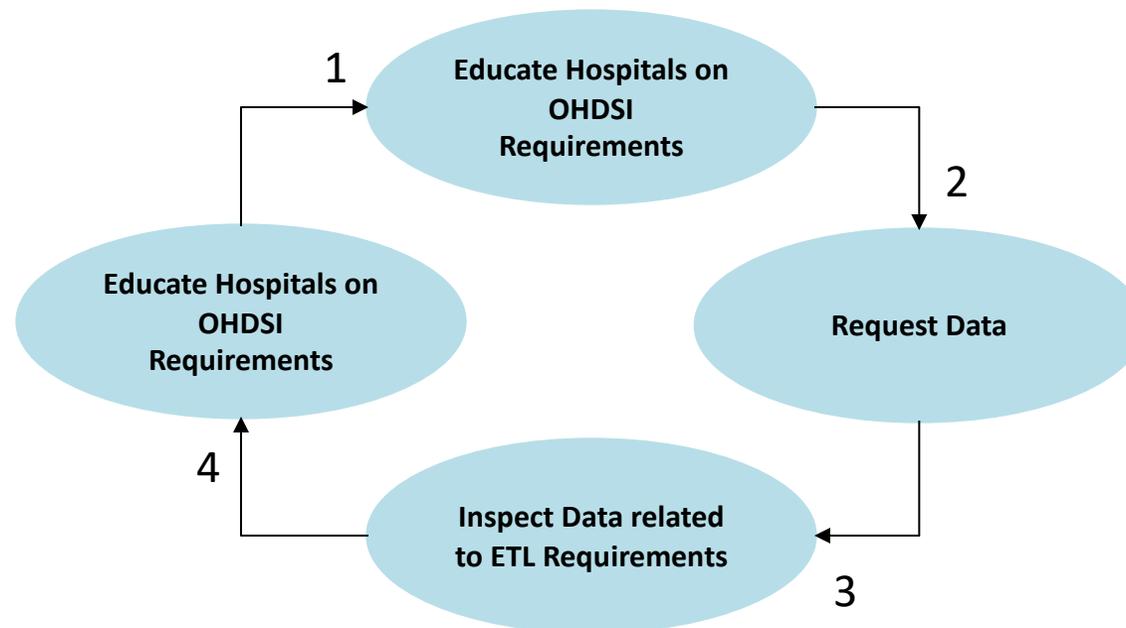


# First Phase: Challenges and Solutions



# First phase: Process of Extraction

- Initially, CDM table information and fields as well as a brief overview about the OHDSI collaborative was provided to the hospital. as a guide to understand our framework and to start extracting the required data
- It became obvious that the brief overview was not enough and thus the following cycle was born (Figure 2):



## Second phase

- leveraged the suite of OHDSI tools to initiate the extract-transfer-load (ETL) process.
- White Rabbit, Rabbit-in-a-hat as and USAGI vocabulary mapping tool.
- ETL blue print has been generated as a guide to converting the initial data extract to the OMOP CDM.



# Conclusion



- With the next hospital to come board we are expecting a smoother process as we have overcome the learning curve faced and prepared proper material for hospitals to understand the OMOP CDM framework.
- In future studies we will be presenting results and outcomes of the conversion process and research made.

# Here To There



SFDA Team



OHDSI Planet

Current and Acquired  
Infrastructure

Current Knowledge  
& Experiences

# Quality control of OMOP-CDM implementation in the



**SIDIAP**

Information System for the Development  
of Research in Primary Care

**Leonardo Mendez-Boo<sup>1</sup>**, Eduardo Herмосilla<sup>2</sup>, Maria del Mar Garcia-Gil, PhD<sup>2</sup>,  
Talita Duarte-Salles, PhD<sup>2</sup>

<sup>1</sup>Institut Català de la Salut, Barcelona, Spain

<sup>2</sup>Fundació Institut Universitari per a la recerca a l'Atenció Primària de Salut Jordi Gol i Gurina (IDIAPJGol), Barcelona, Spain.





# Who we are?

-  SIDIAP was born in 2010.
- As an alliance of:
  -  Research Institute in primary care
  -  Institut Català de la Salut Provider of Health Services
- to promote the development of research based on electronic health record and other complementary sources of data.



## Primary Healthcare

- 287 primary healthcare teams 80%

## Hospital care

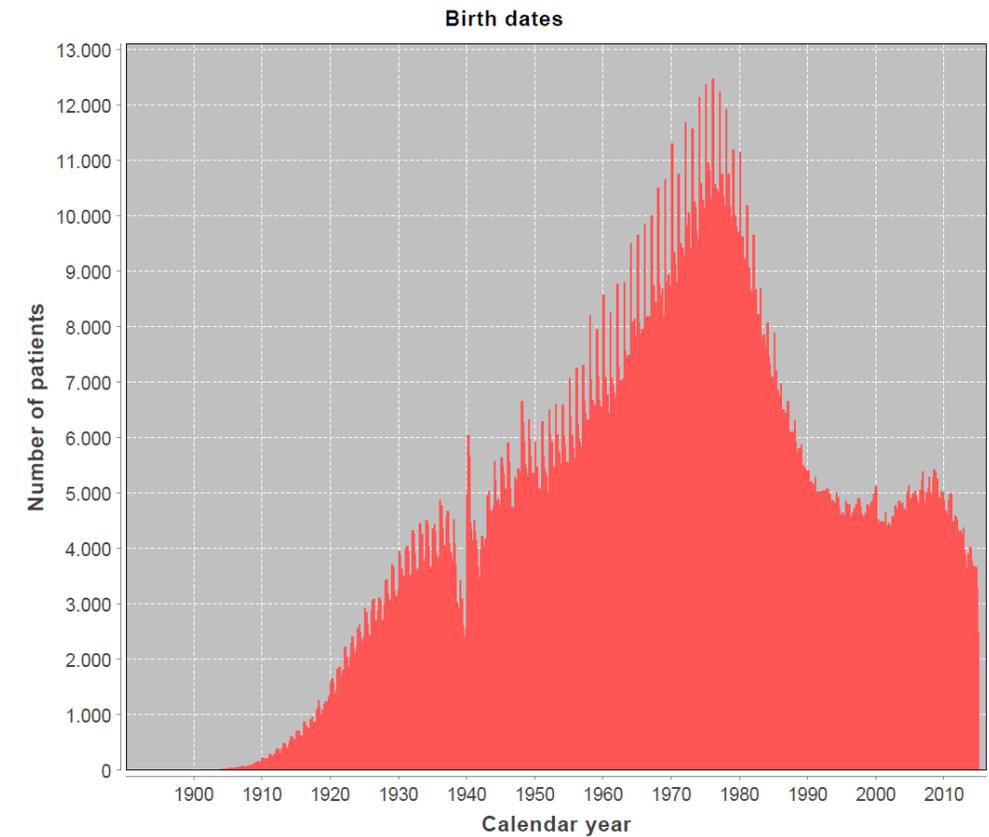
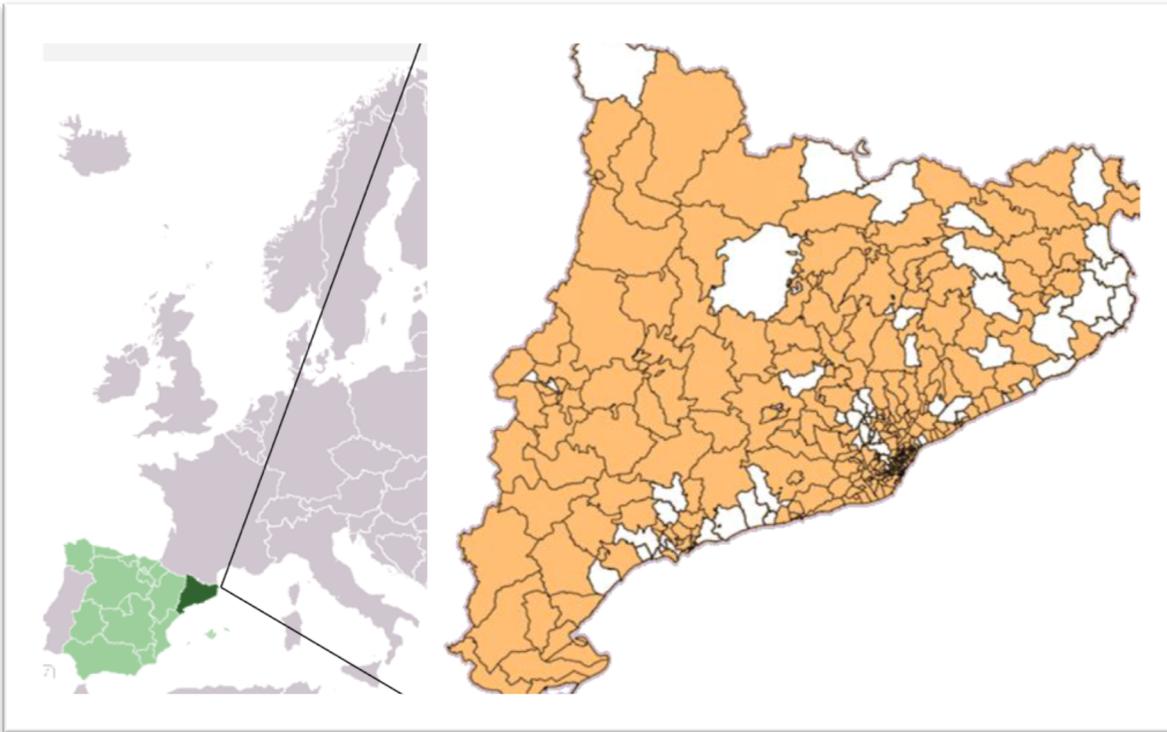
- 8 Hospitals:
- 4,000 beds (32% of the public bed endowment)
- 50% of the high tech bed endowment

- 23 low-risk emergency units
  - 15 low-risk level emergency centres (CUAP)
  - Continuous attention to low-risk emergency in 130 primary healthcare centres (PAC)
    - 17 isolated units (mountain)
- 12 Rehabilitation centres
- 13 Clinical laboratories
- 29 Radiology services
- 35 ASSIR units (sexual and reproductive health): gynaecologists and midwives
- 13 PADES (home terminal care)
- 8 mental health units
- 3 labour health units
- Penitentiary healthcare



# SIDIAP population coverage in Catalonia.

- 80% of Catalan population





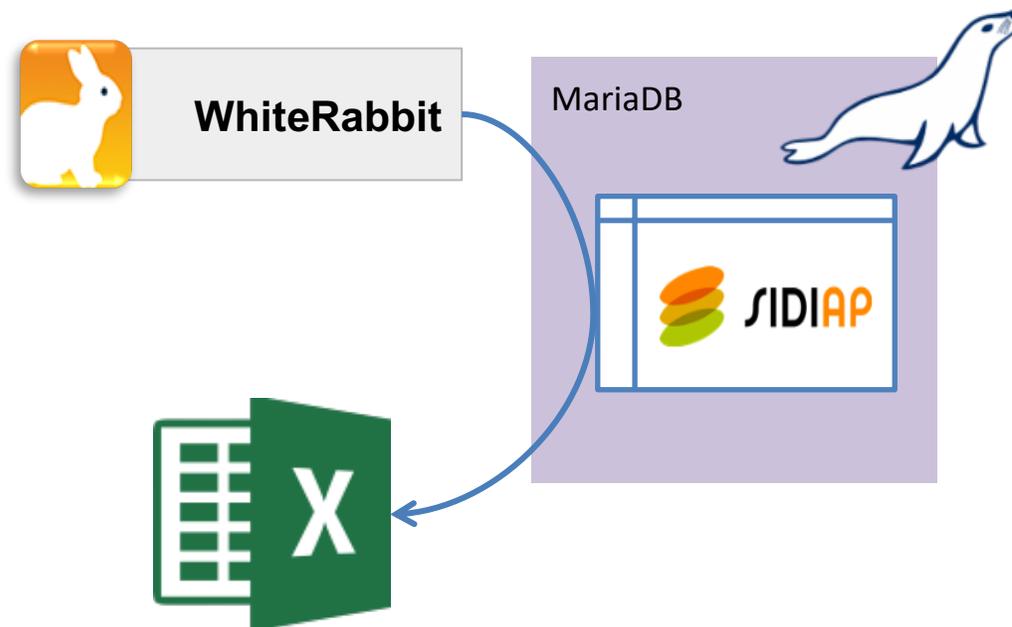
# SIDIAP Available data

- **General data**
  - Age
  - Date of birth
  - Gender
  - Nationality
- **Data of the health service**
  - Primary Health Care Center
  - Allocated physician
  - Allocated nurse
  - Type of health coverage (active/retired)
- **Drugs** [national codes, ATC]
  - Dispensing of drugs
  - Prescription of Medicines
  - Vaccinations
- **Conditions** [icd10, icd9cm]
- **+500 parameters** [local codes]
  - Blood pressure
  - Weight
  - Height
  - BMI
  - Alcohol consumption
  - Smoking
- **Labs.** [local codes]
- **Referrals, Sick leaves, hospital discharges**



# Mapping to OMOP-CDM

- **WhiteRabbit** used to profile source data.





# Mapping to OMOP-CDM

- **Rabbit-in-a-Hat** helped design the ETL mapping logic



**Rabbit in a Hat**

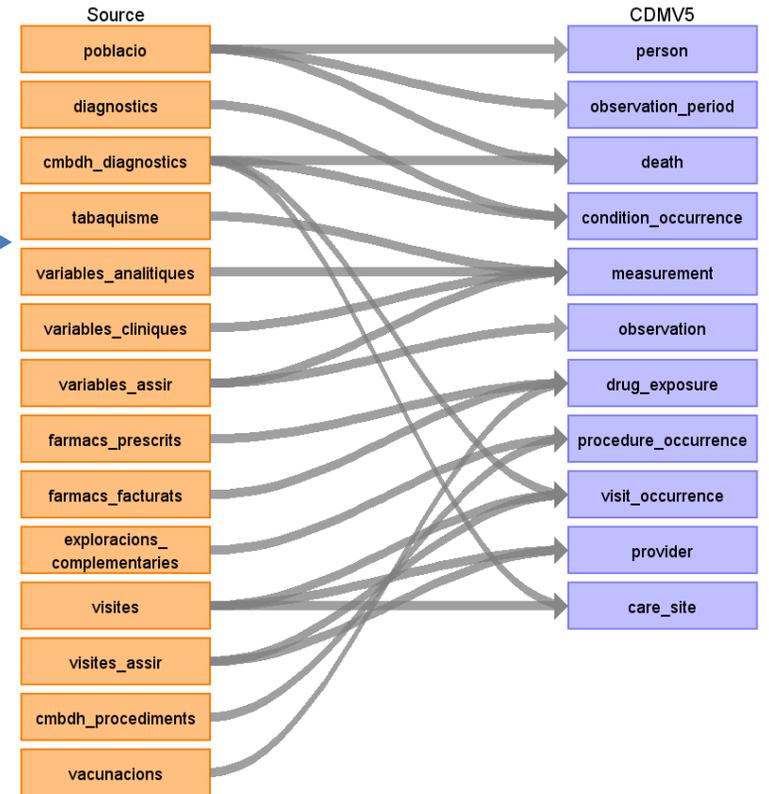
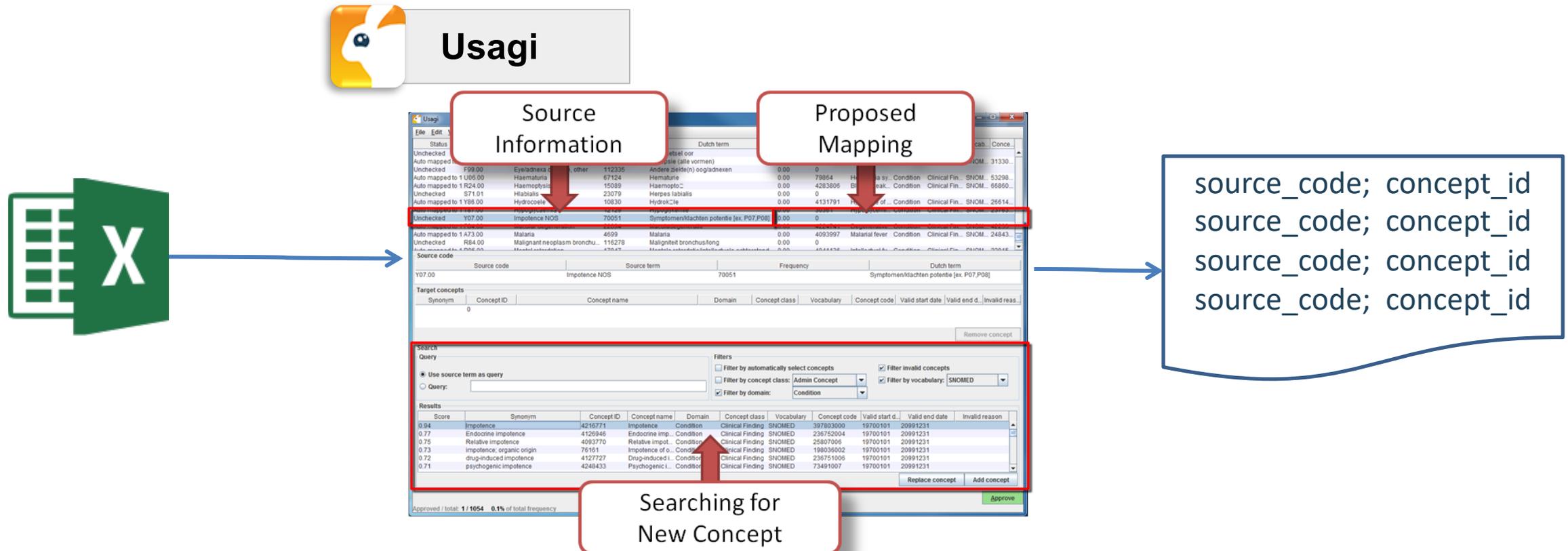


Table name	Reading from	Destination Field	Source Field	Logic	Comment
person	poblacio	person_id	id	No transformation	Possibly overlapping ID's -> reference to sector.
person	poblacio	gender_concept_id	sexe	D -> Concept_id for Female H -> Concept_id for Male	
person	poblacio	year_of_birth	dnaix	First 4 characters	
person	poblacio	month_of_birth	dnaix	substring - 4-6	
person	poblacio	day_of_birth	dnaix	rightstring - 2 characters	
person	poblacio	location_id	abs	ABS represents basic health zone. Will be mapped as is	Check whether prefix is needed to make it unique



# Mapping to OMOP-CDM

- Codes mapping were reviewed with **Usagi**

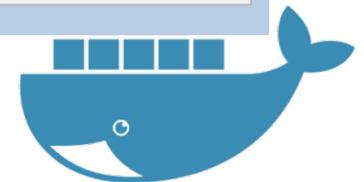
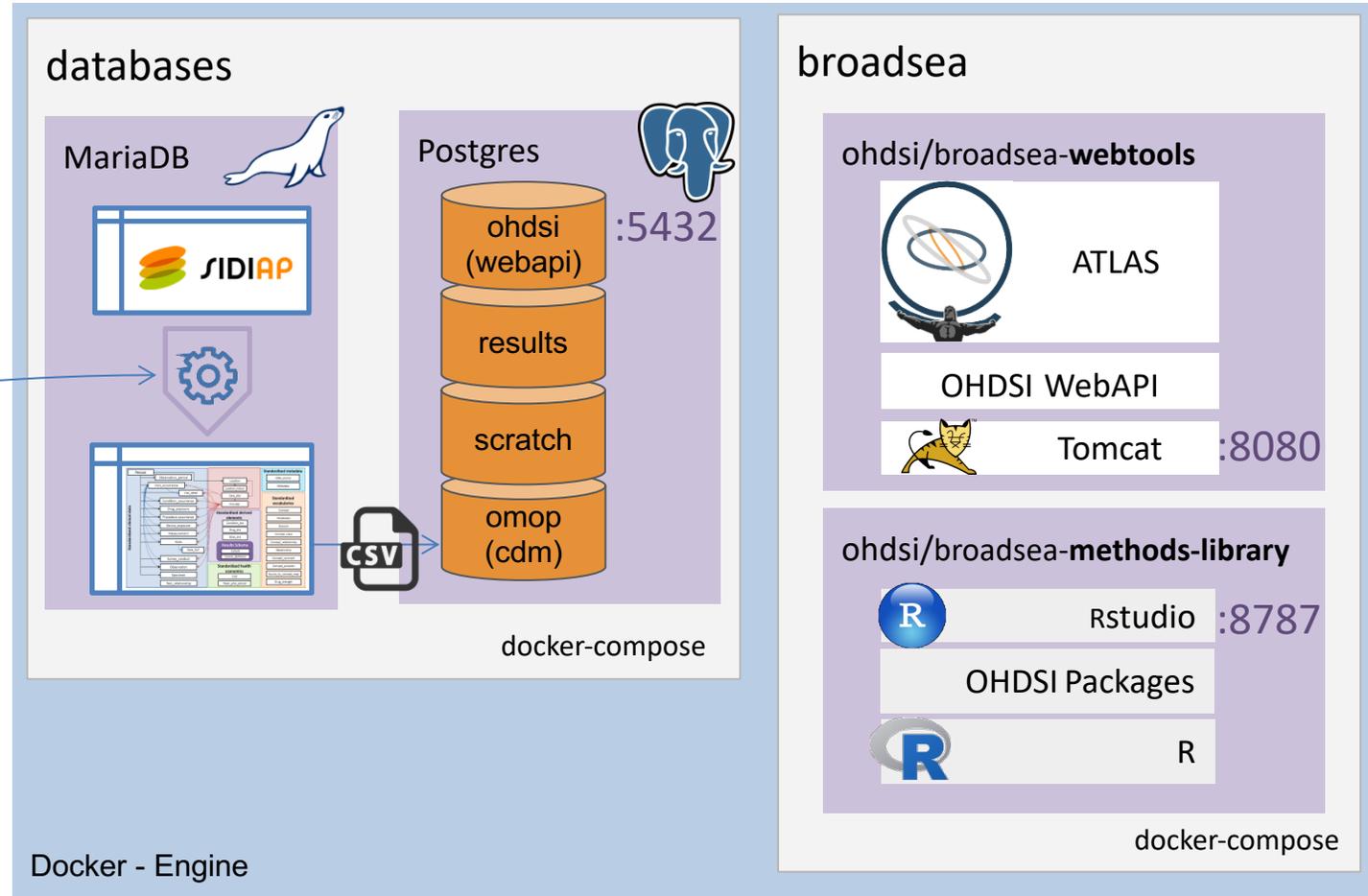


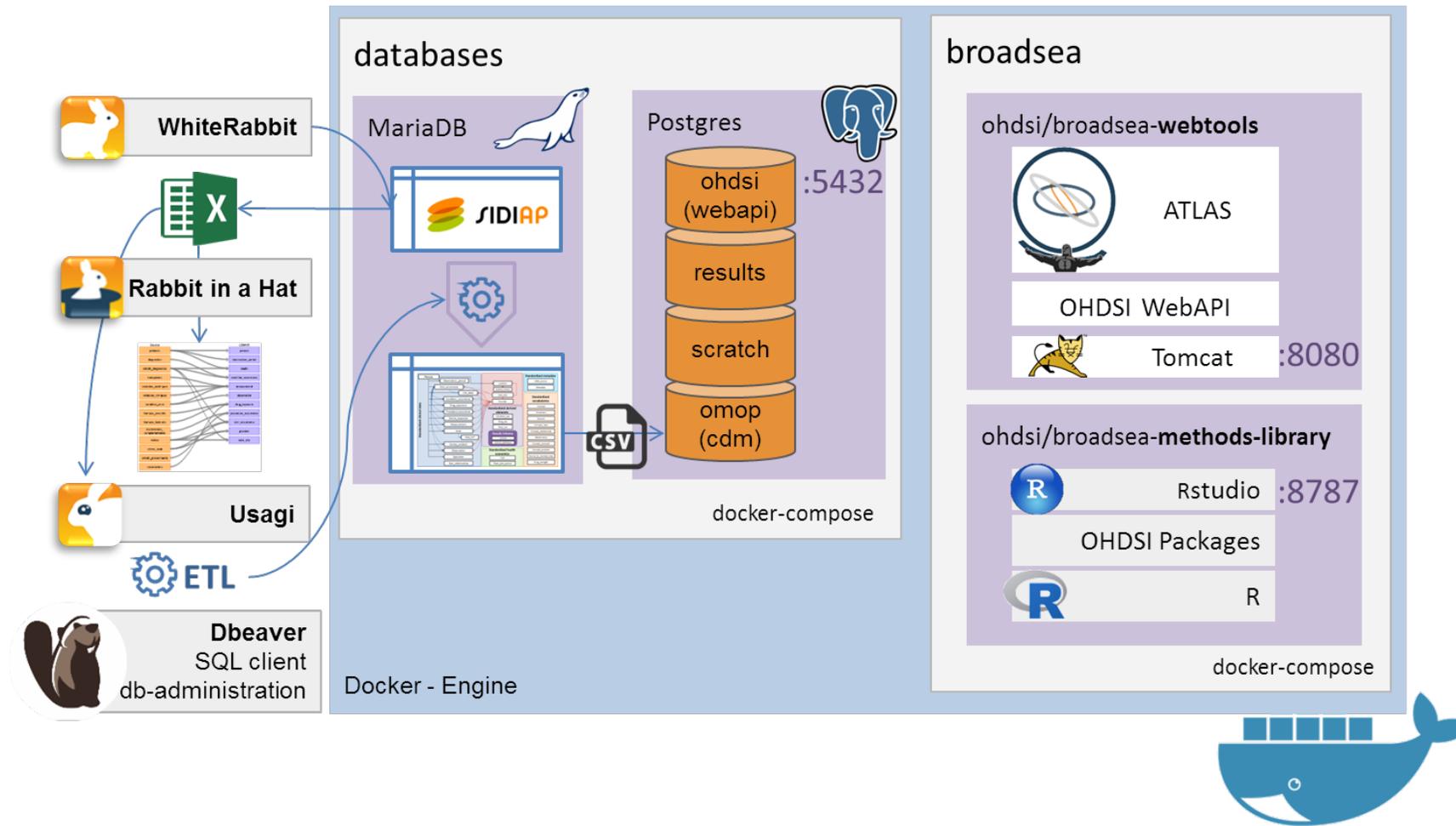


# Deployment of OHDSI tools



**Dbeaver**  
SQL client  
db-administration







# Results

- Mapped to standard codes:
  - ✓ **+24,700 terms**
  - ✓ **+1,400 million registers**
- clinical domains:
  -  Person
  -  observation\_period
  -  death
  -  condition\_occurrence
  -  procedure\_occurrence
    - drug\_exposure
    - measurement.

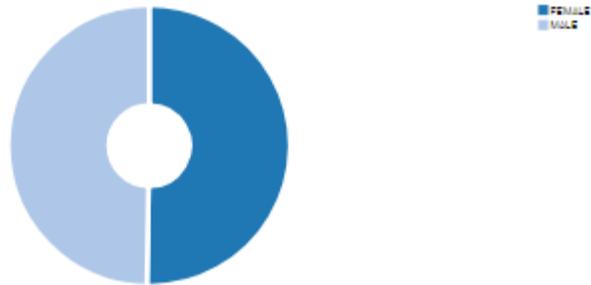


## Dashboard report (SIDIAP-CDMV5)

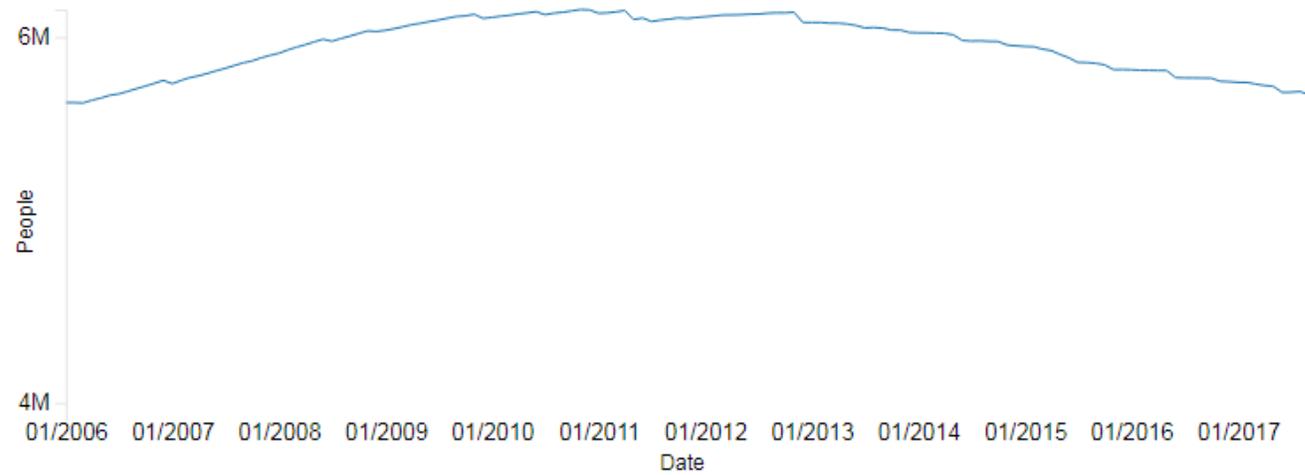
### CDM Summary

Source name	sidiap17
Number of persons	7.5719M

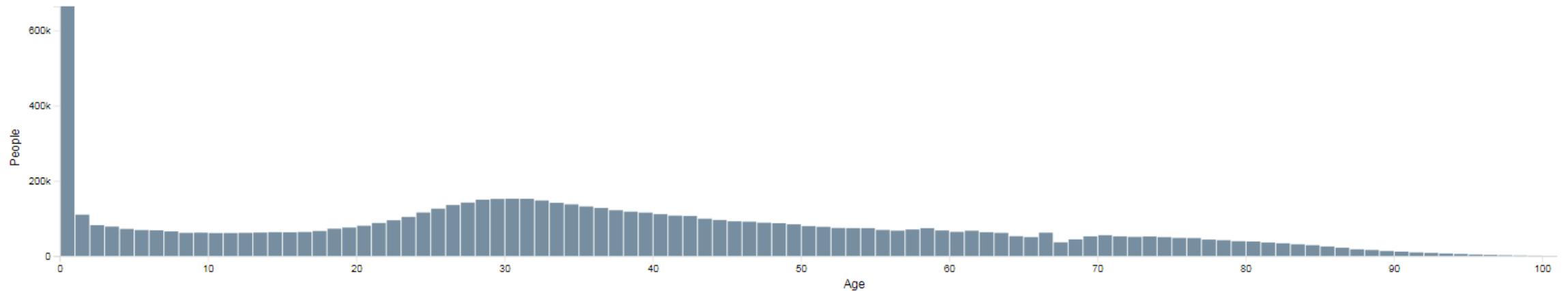
### Population by Gender



### Persons With Continuous Observation By Month



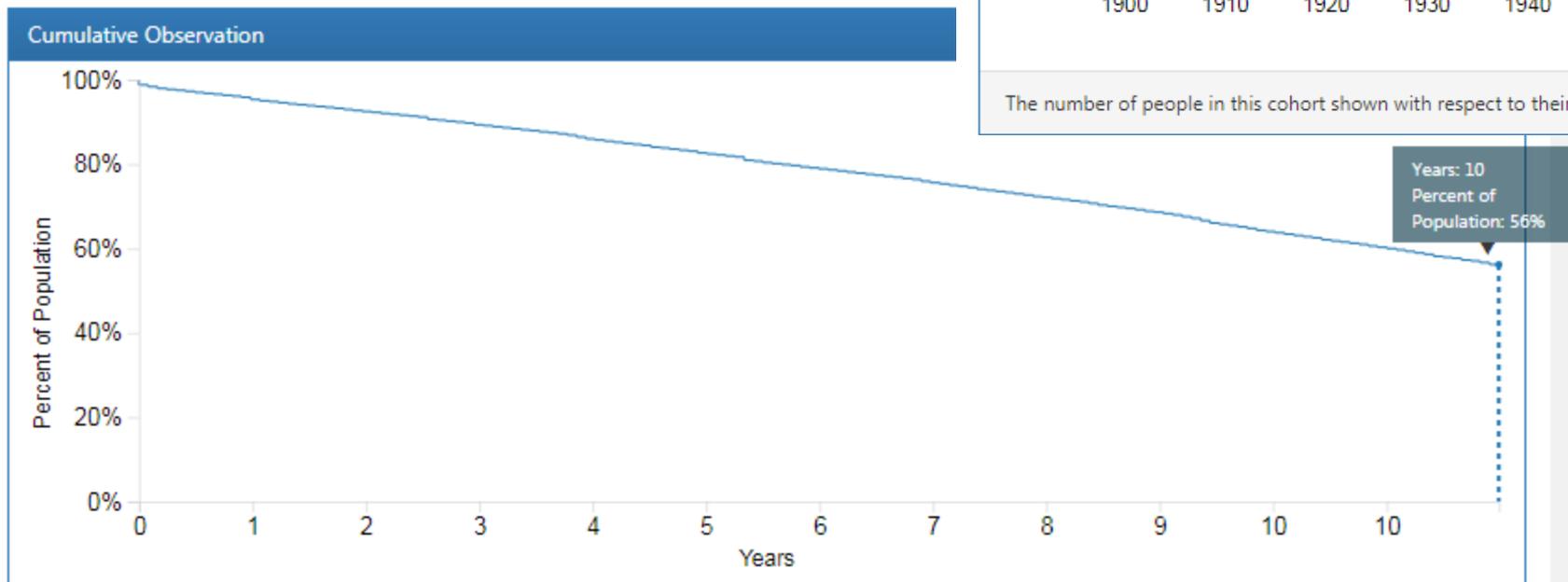
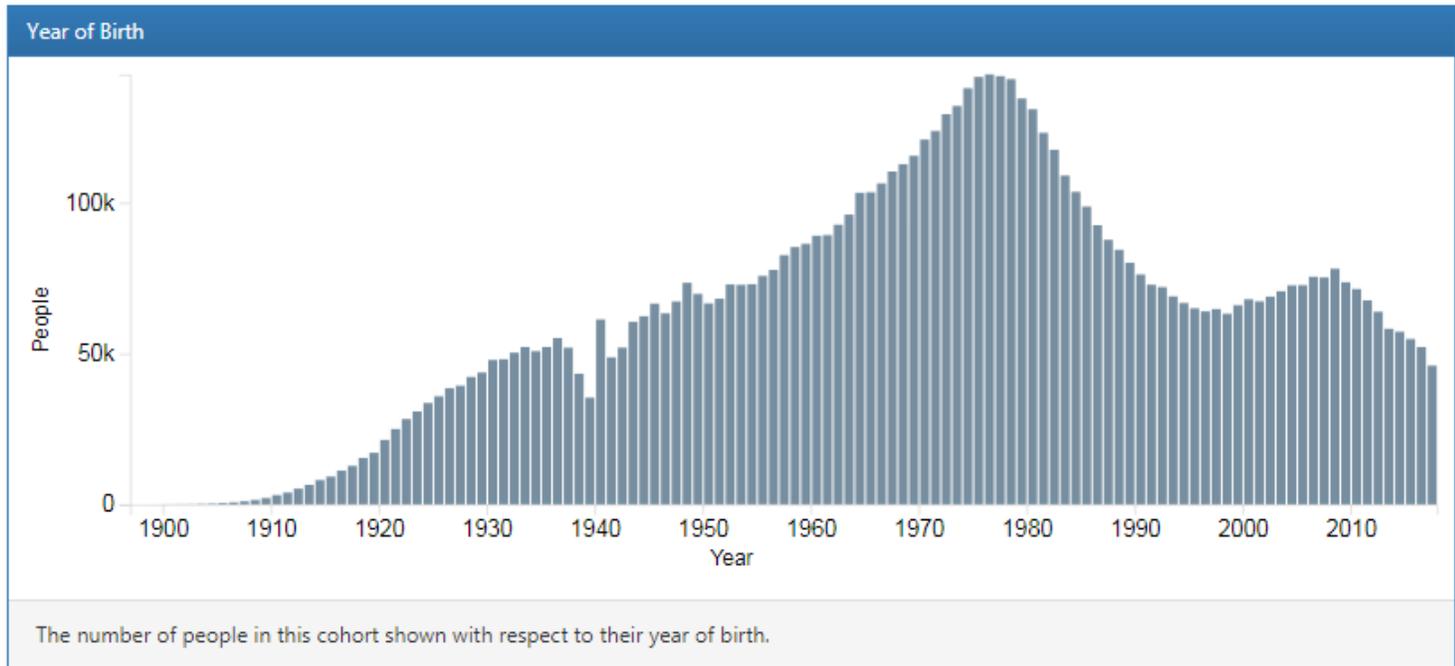
### Age at First Observation





# Birth year & cumulative observation

Person report (SIDIAP-CDMV5)



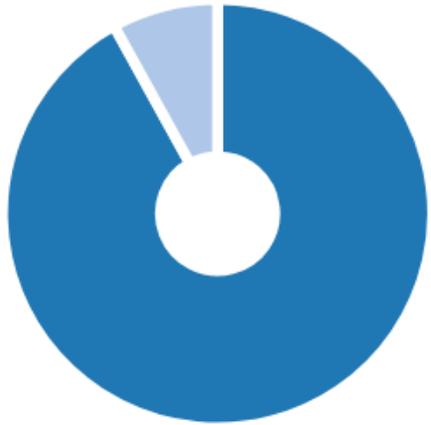
**3,8 million followed for  $\geq 10$  years**

# Death report

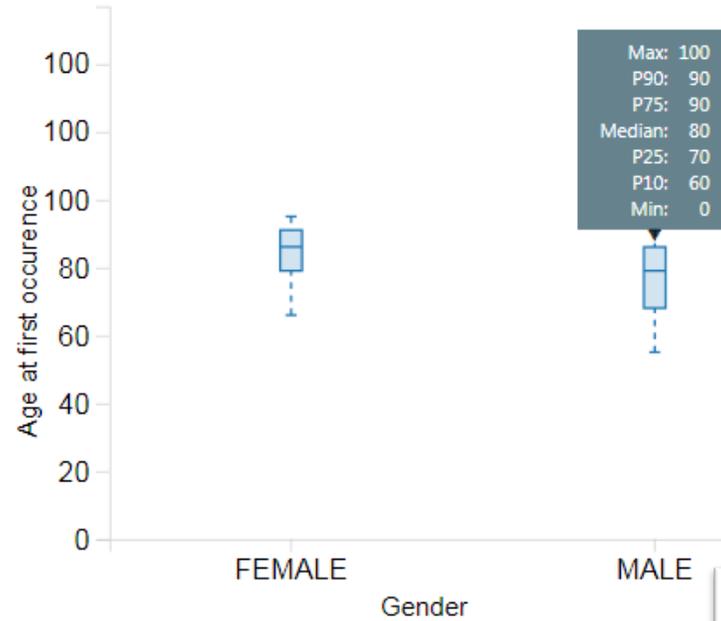


Death by Type

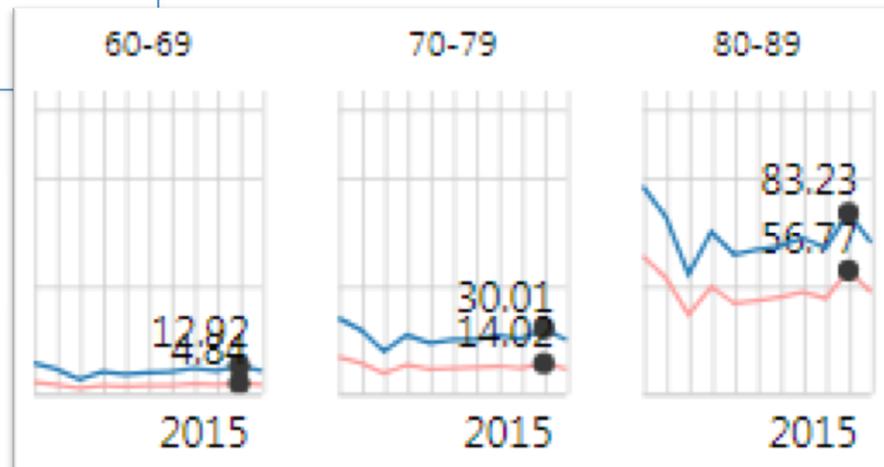
- EHR record patient status "Deceased"
- Medical claim discharge status "Died"



Age at Death



Female  
Male





# Condition Report

- 10,057 target conditions.
- **Infectious diseases and hypertension** were most common (Table 1).

**Table 1. Top five conditions in SIDIAP OMOP-CDM**

Concept Id	Name	Person Count	Prevalence	Records per person
260427	Common cold	2,742,567	36.22%	2.08
198062	Infectious colitis, enteritis and gastroenteritis	1,526,959	20.17%	1.50
320128	Essential hypertension	1,511,828	19.97%	1.38
194133	Low back pain	1,481,098	19.56%	1.28
25297	Acute pharyngitis	1,422,280	18.78%	1.46



# Conclusions

- The OHDSI tools were **successfully implemented** in SIDIAP
- Useful for **quality control** of the mapping to the OMOP-CDM.
- **Further steps:**
  - Quality control of **other transformed domains** (drugs, measurements)
  - **Replication** of a scientific study.
- Others could benefit from a fully tested and reproducible **Docker container deployment** strategy.



# Empirical assessment of OHDSI case-based methods and case-population for the identification of drug-related outcome in the French nationwide healthcare database (SNDS)

**Nicolas Thurin**<sup>1, 2</sup>, Régis Lassalle<sup>1</sup>, Patrick Blin<sup>1</sup>, Marine Pénichon<sup>1</sup>, Martijn Schuemie<sup>3</sup>, Joshua J Gagne<sup>4</sup>, Jeremy A. Rassen<sup>5</sup>, Jacques Benichou<sup>6, 7</sup>, Alain Weill<sup>8</sup>, Cécile Droz-Perroteau<sup>1</sup>, Nicholas Moore<sup>1, 2</sup>

<sup>1</sup>Bordeaux PharmacoEpi, INSERM CIC1401, Université de Bordeaux, Bordeaux, France; <sup>2</sup>INSERM U1219, France; <sup>3</sup>OHDSI, New York, NY, USA; <sup>4</sup>Division of Pharmacoepidemiology and Pharmacoeconomics, Department of Medicine, Brigham and Women's Hospital and Harvard Medical School, Boston, MA, USA; <sup>5</sup>Aetion, Inc., New York, NY, USA; <sup>6</sup>CHU de Rouen, Rouen, France; <sup>7</sup>INSERM U1181, University of Versailles, St-Quentin-en-Yvelines, France; <sup>8</sup>Caisse Nationale de l'Assurance Maladie, Paris, France



# Disclosure statement

- Based on  Lcapone
- Funded by the French Ministry of Health (PREPS, 14-0635)
- Designed, conducted and analysed independently by the Bordeaux PharmacoEpi platform of Bordeaux University
- Supervised by an independent scientific committee
- Registered in EMA EUPAS n°13031





# Background

- Risk identification performances
  - Depends on the method
  - Depends on the method settings
  - Depends on the environment = the **database**
- Tools need to be tested and assessed *in real life* to ensure the generation of meaningful point estimates



# SNDS

- French Nationwide Healthcare System Database
  - 66.6 million persons (99% of the French population)
  - Individual pseudonymised information on
    - Drug dispensings
    - Hospital discharge diagnoses
    - Procedures
    - Deaths
    - Costs
    - *etc.*
- Database extraction accessible for public health purposes after approval by
  - Data protection agency (CNIL)
  - National Health data institute (INDS)



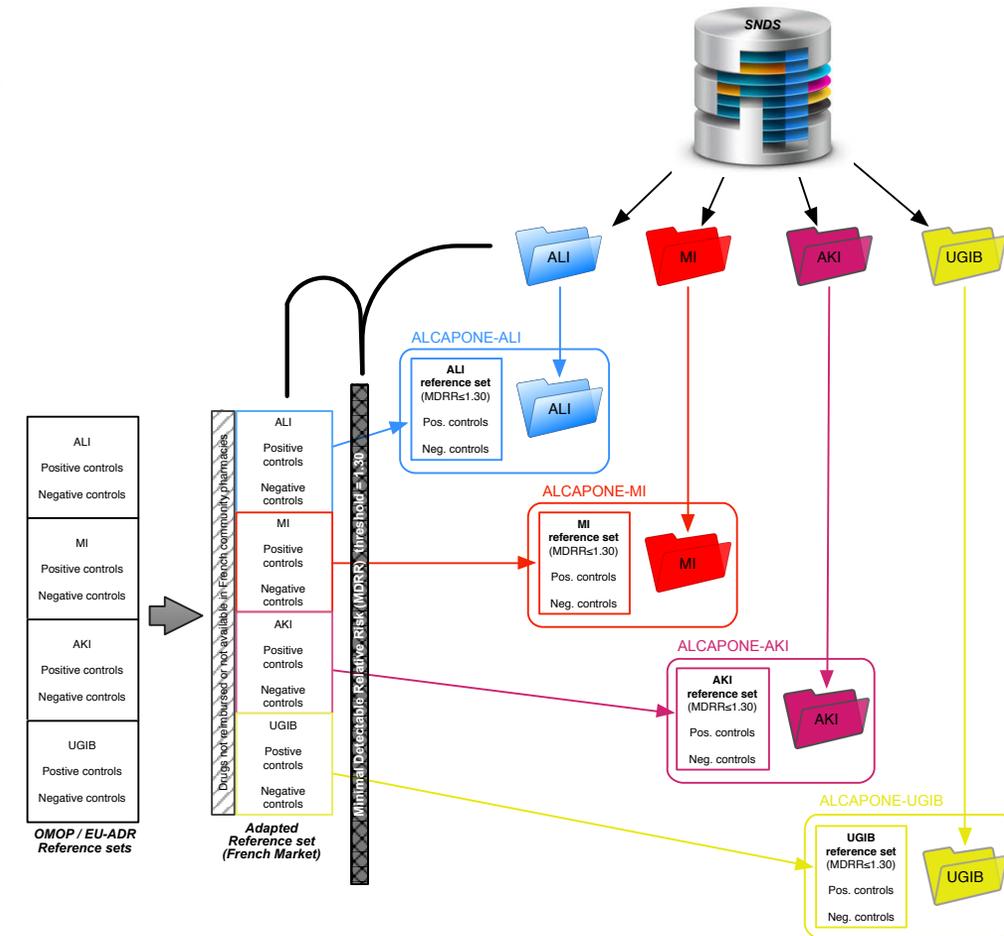
# Objectives

- To evaluate and compare the performances in the SNDS of
  - SCCS (Self-controlled case series)
  - CC (Case-control)
  - CP (Case-population)
- For the identification of
  - ALI (Acute liver injury)
  - AKI (Acute kidney injury)
  - MI (Myocardial infarction)
  - UGIB (Upper gastrointestinal bleeding)



# Methods

- 273 drug-outcome pairs
  - Adapted from OMOP and EU-ADR reference sets
    - 4 health outcomes of interest
    - 139 positive and negative controls
  - Restricted to the pairs with  $MDRR < 1.30$
- SNDS data extractions based on cases
  - ALI
  - AKI
  - MI
  - UGIB

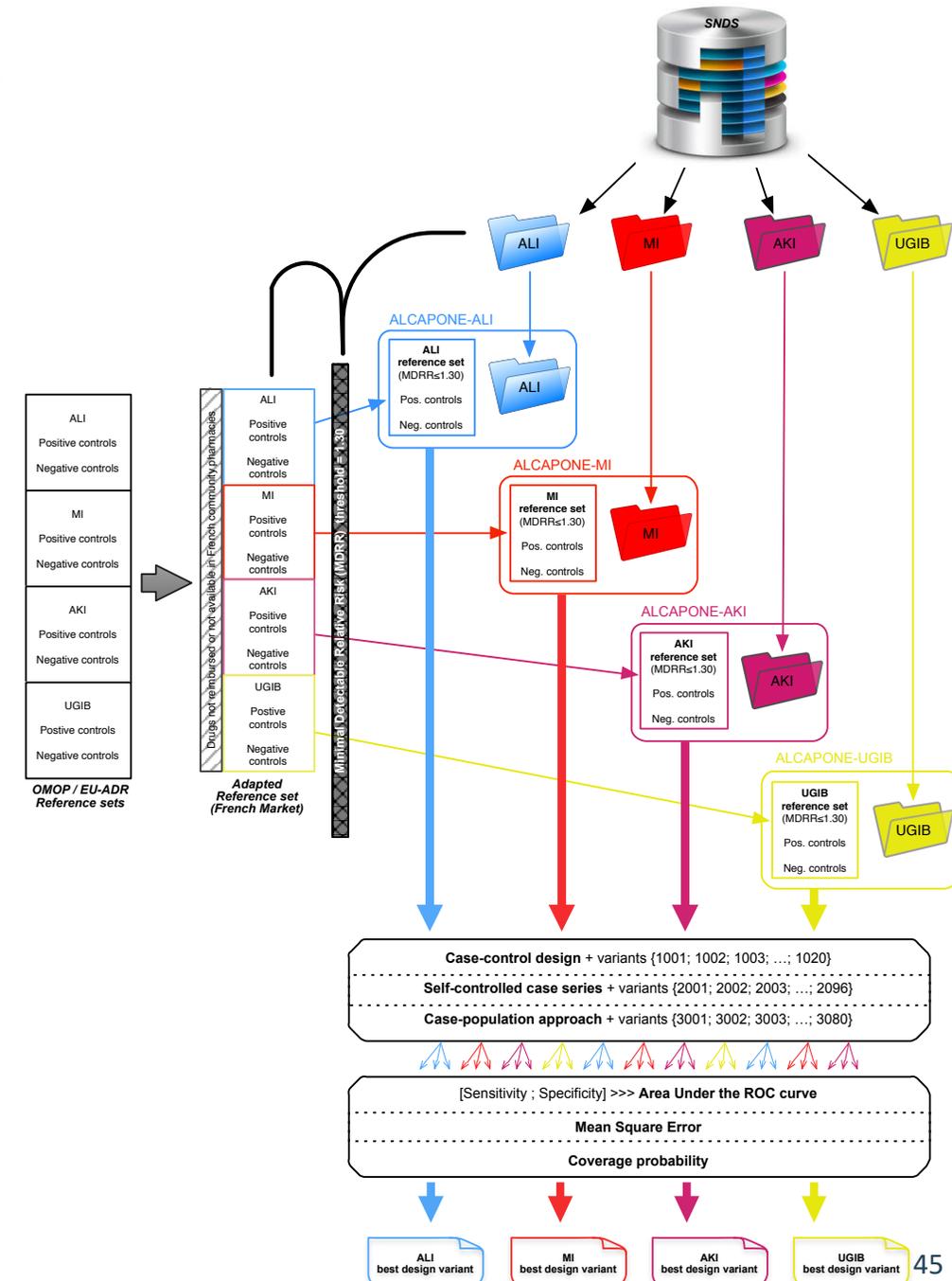




# Methods

- Detection of drug-outcome pairs *via*
  - 96 SCCS variants
  - 20 CC variants
  - 80 CP variants

➔ Generation of one point estimate per pair for each variant (26 068)
- Performance assessment of the variants
  - Discriminant ability: AUC
  - Accuracy (negative controls): MSE, coverage probability





# Results

## Raw data extractions (SNDS)

## Reference set

Patients	Outcomes	HOI	Drug controls (+/-)	French market Reference set	Number of detectable controls (MDRR<1.30) in the data extraction			
					raw sample	1/3 <sup>rd</sup> sample	1/10 <sup>th</sup> sample	1/20 <sup>th</sup> sample
5 152	5 225	ALI	+	58	18			
			-	23	7			
304 369	354 109	MI	+	28	25			26
			-	42	36			20
12 317	12 633	AKI	+	22	17	11		
			-	36	13	10		
139 172	156 057	UGIB	+	22	22		19	
			-	42	36		22	

UGIB



First occurrence, 30d from dispensation first day, adjusted on multiple drugs

All occurrences, 60d risk window, 15d exclusion period, per-user approach, control data stratified on age and gender, RR predicted

up to 2 controls per case, first occurrence, 7d risk window, matched on age and gender, unmatched cases removed

MI



All occurrences, 30d from dispensation first day, adjusted on age and seasonality

All occurrences, 7d risk window, Person-time approach, CPR

up to 10 controls per case, first occurrence, 30d risk window, matched on age and gender, unmatched cases removed

ALI

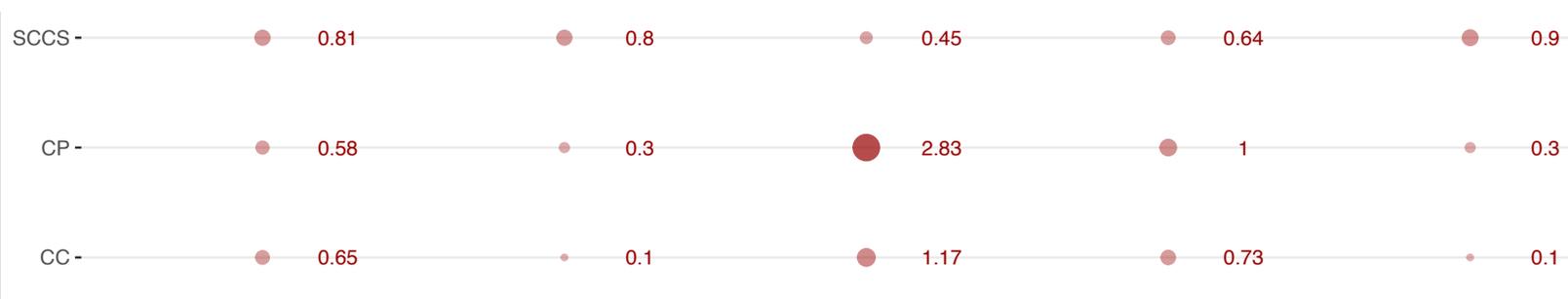


First occurrence, Period of dispensation, No adjustment

First occurrence, 7d risk window, Person-time approach, Raw, CPR

up to 2 controls per case, All occurrences, 7d risk window, matched on age and gender, unmatched cases removed

AKI



All occurrences, Period of dispensation, adjusted on seasonality and multiple drugs

First occurrence, 7d risk window, Person-time approach, RR predicted

up to 10 controls per case, first occurrence, 60d risk windows, 15d exclusion period, matched on age and gender, unmatched cases removed

UGIB

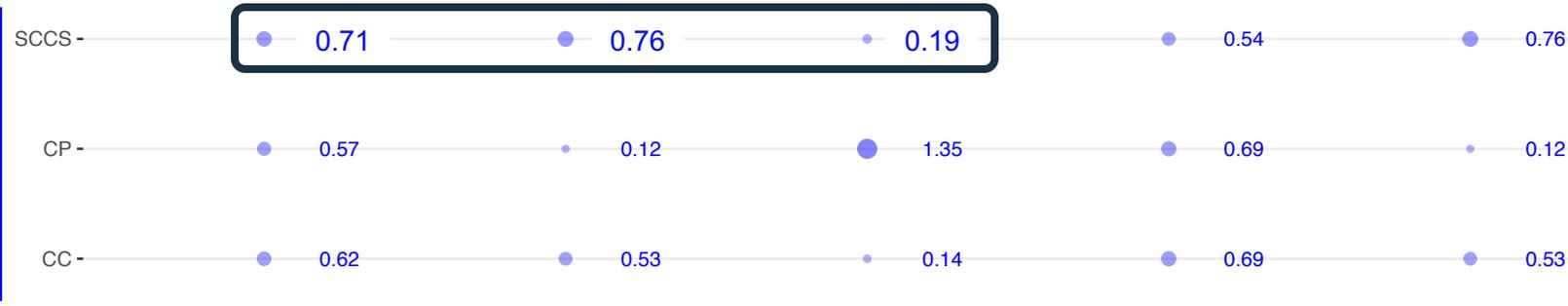


First occurrence, 30d from dispensation first day, adjusted on multiple drugs

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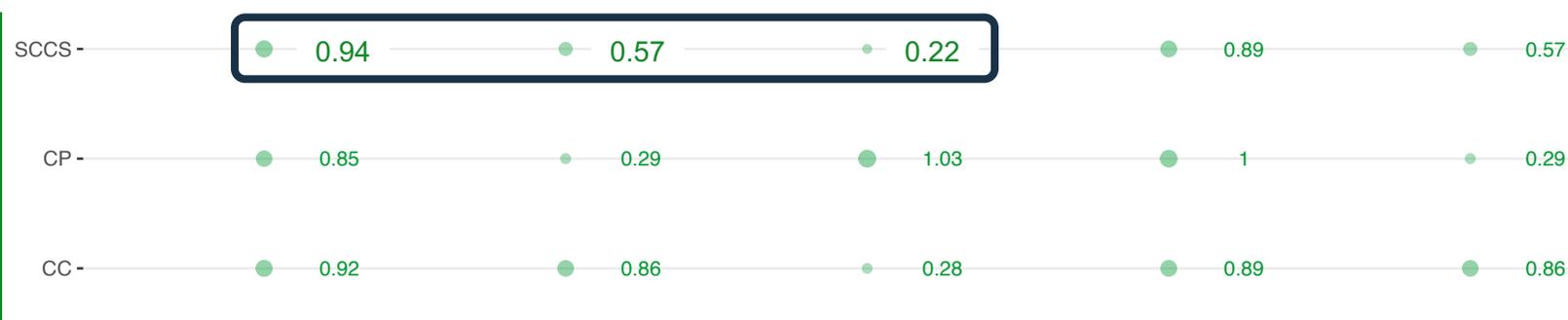


All occurrences, 30d from dispensation first day, adjusted on age and seasonality

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up to 2 controls per case, All occurrences, 7d risk window, matched on age and gender, unmatched cases removed

AKI



All occurrences, Period of dispensation, adjusted on seasonality and multiple drugs

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up to 10 controls per case, first occurrence, 60d risk windows, 15d exclusion period, matched on age and gender, unmatched cases removed

UGIB

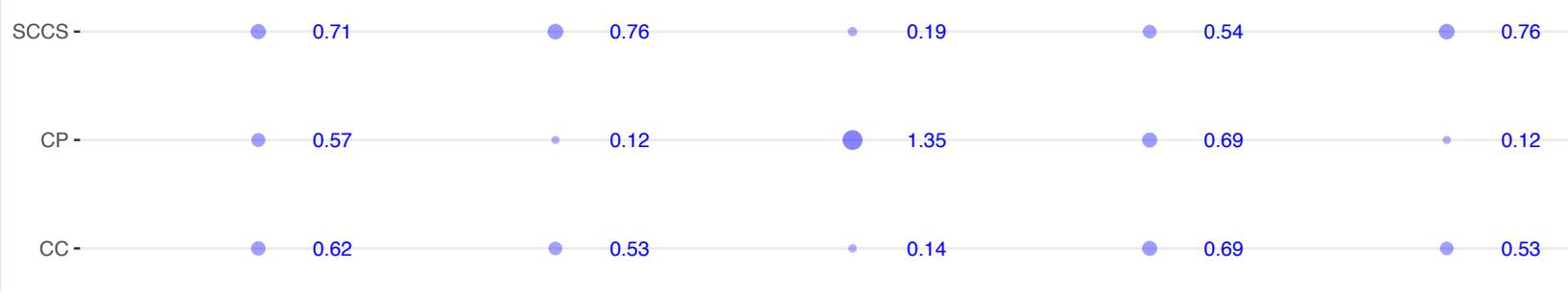


First occurrence, 30d from dispensation first day, adjusted on multiple drugs

All occurrences, 60d risk window, 15d exclusion period, per-user approach, control data stratified on age and gender, RR predicted

up to 2 controls per case, first occurrence, 7d risk window, matched on age and gender, unmatched cases removed

MI

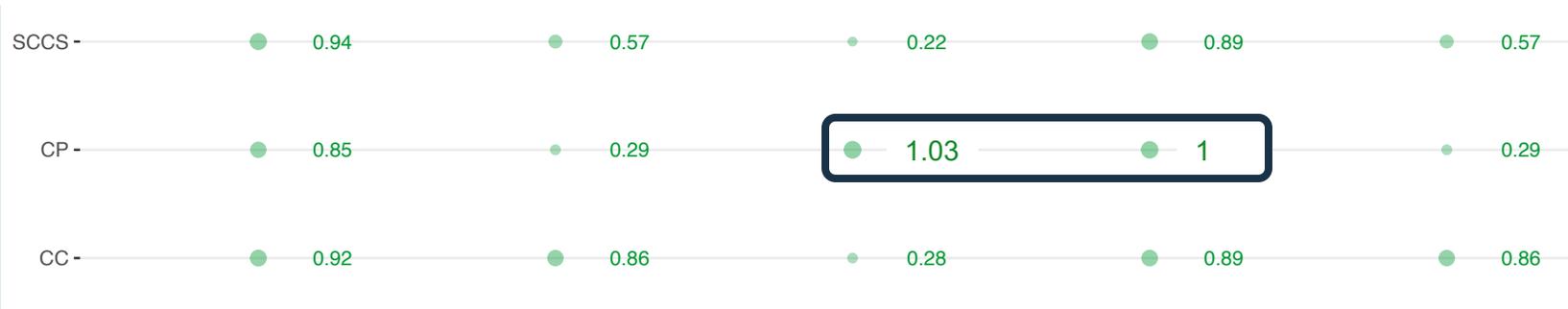


All occurrences, 30d from dispensation first day, adjusted on age and seasonality

All occurrences, 7d risk window, Person-time approach, CPR

up to 10 controls per case, first occurrence, 30d risk window, matched on age and gender, unmatched cases removed

ALI



First occurrence, Period of dispensation, No adjustment

First occurrence, 7d risk window, Person-time approach, Raw, CPR

up to 2 controls per case, All occurrences, 7d risk window, matched on age and gender, unmatched cases removed

AKI

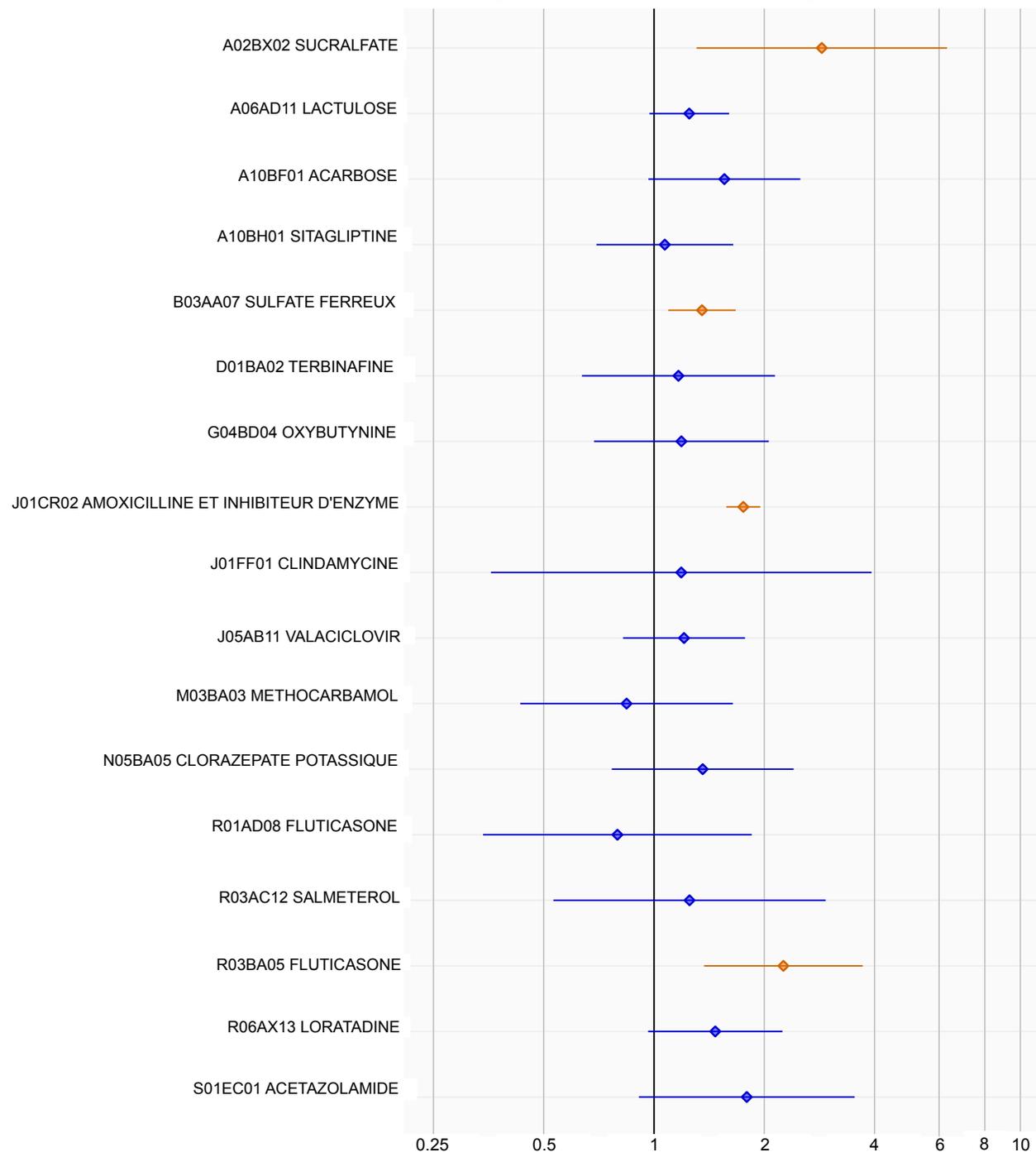


All occurrences, Period of dispensation, adjusted on seasonality and multiple drugs

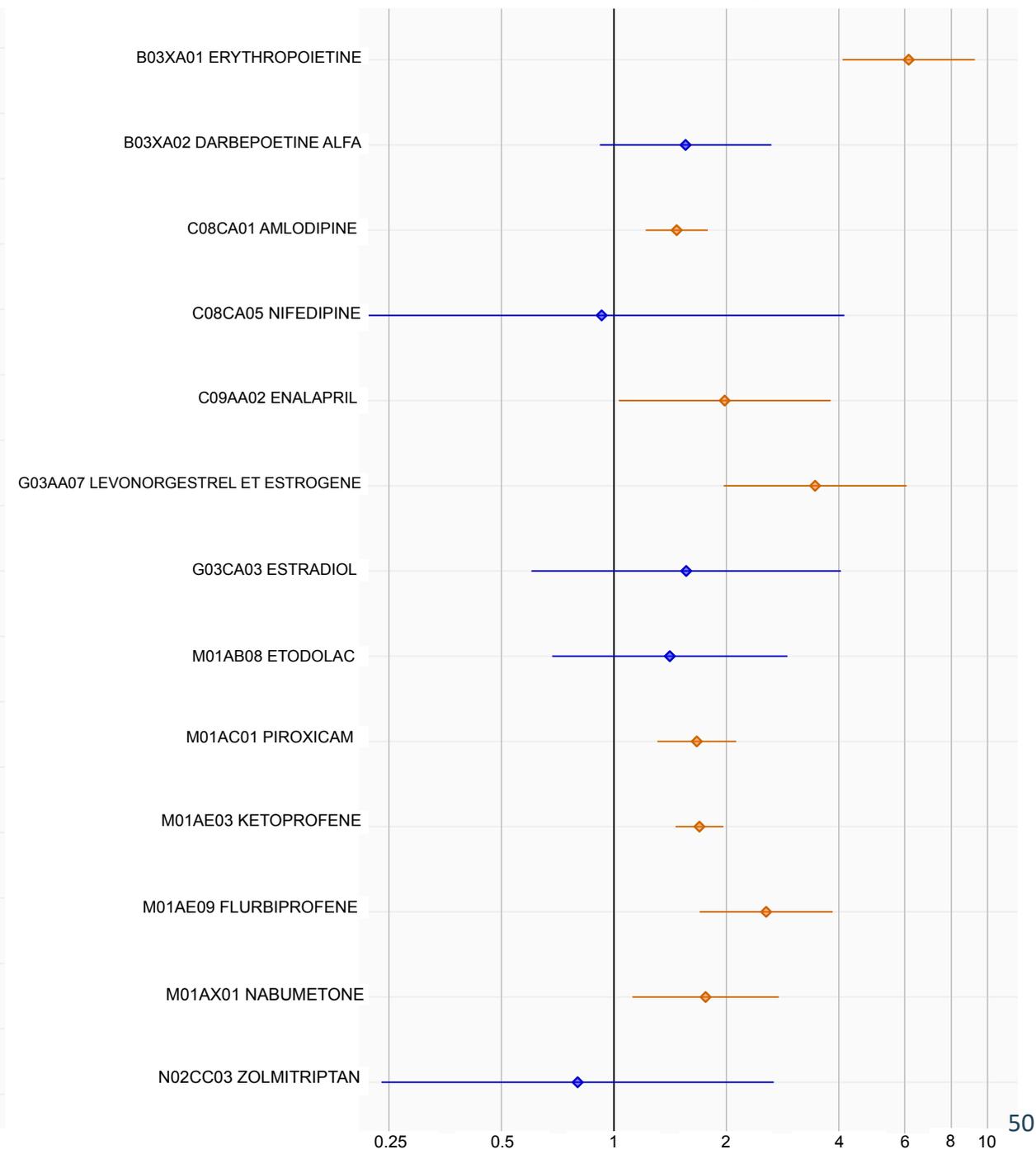
First occurrence, 7d risk window, Person-time approach, RR predicted

up to 10 controls per case, first occurrence, 60d risk windows, 15d exclusion period, matched on age and gender, unmatched cases removed

MI 1005 negative controls distribution, SCCS design # 2023



MI 1005 positive controls distribution, SCCS design # 2023





# Conclusion

- Ability to implement OHDSI Methods Library in the SNDS
- First overview of CP performances
- SCCS achieves better performances across all outcomes with
  - High discriminative ability
  - High predictive accuracy
- Reference methods and settings for the identification of drug related outcome in the SNDS
- Application for routine alert generation



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Phone: +33 (0)5 57 57 46 75 – Fax: +33 (0)5 57 57 47 40

# The future of Personalized Surgery in Denmark using OMOP and the OHDSI community tools to predict 90-days mortality after colorectal cancer surgery.

**Rosen A, MD<sup>1</sup>, Derian N, PhD<sup>1,2</sup>, Grafkin P, MSc<sup>3</sup>, Allakhverdiiev E<sup>3</sup>, MD, Klebanov G, MSc<sup>3</sup>, Drakos I, PhD<sup>1,2</sup>, Gögenur I, MD<sup>1</sup>**

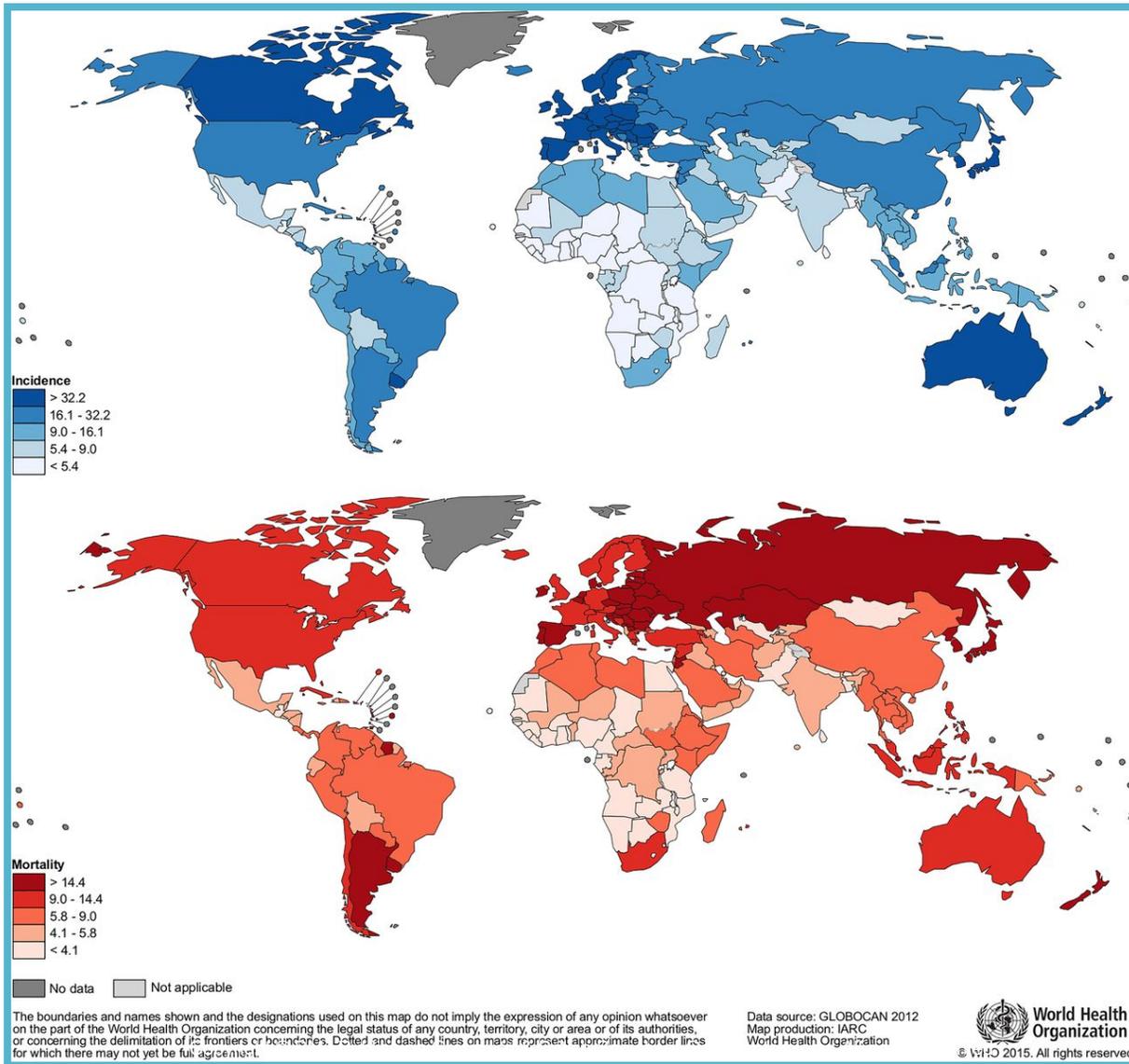
<sup>1</sup>Center for Surgical Science, Denmark; <sup>2</sup>Department for Personalized Surgery, CSS, Region Zealand, Denmark; <sup>3</sup>Odysseus Data Services, Inc, MD, USA.



**CENTER FOR  
SURGICAL  
SCIENCE**

**Presented by Prof. Ismail Gögenur, MD  
Director of the Center for Surgical Science (CSS)**

# Worldwide colorectal cancer incidence and mortality rates



Age adjusted according to the world standard population, per 100 000 in males in 2012 (GLOBOCAN 2012).

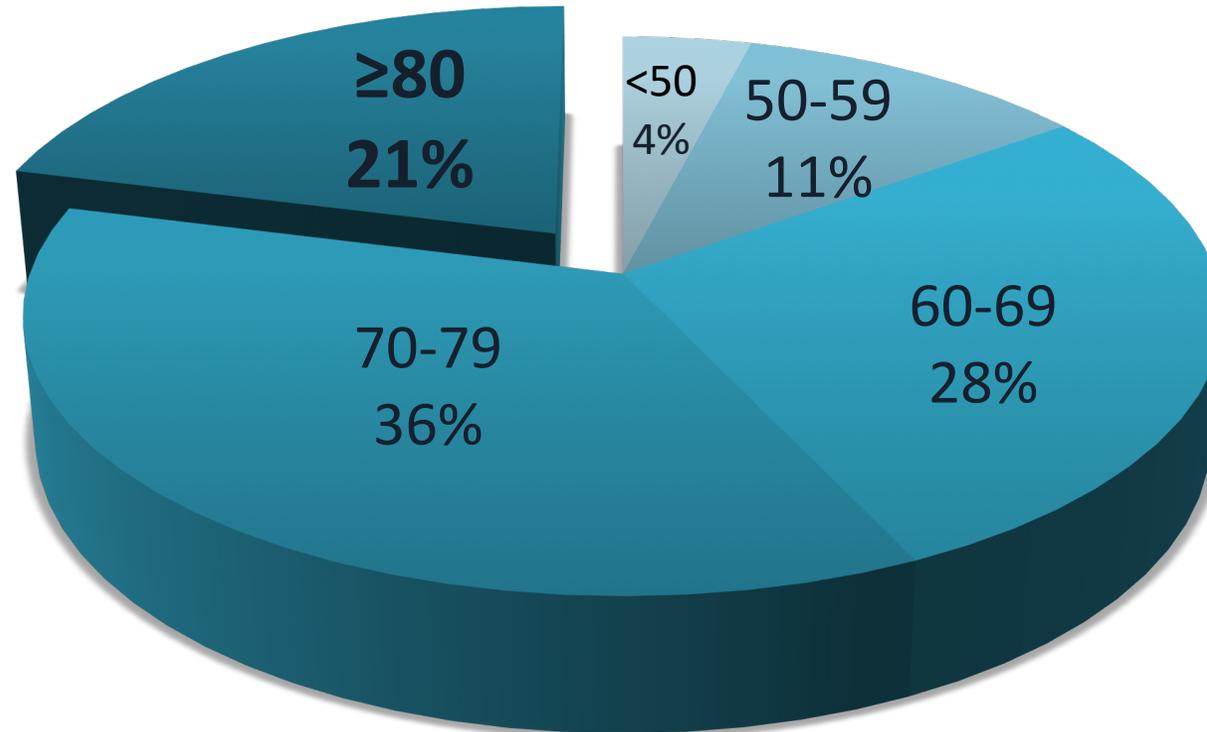
## DENMARK

- Incidence > 32.2
- Mortality > 14.4



# Age distribution in patients with CRC in Denmark (2016)

## Colorectal Cancer patients

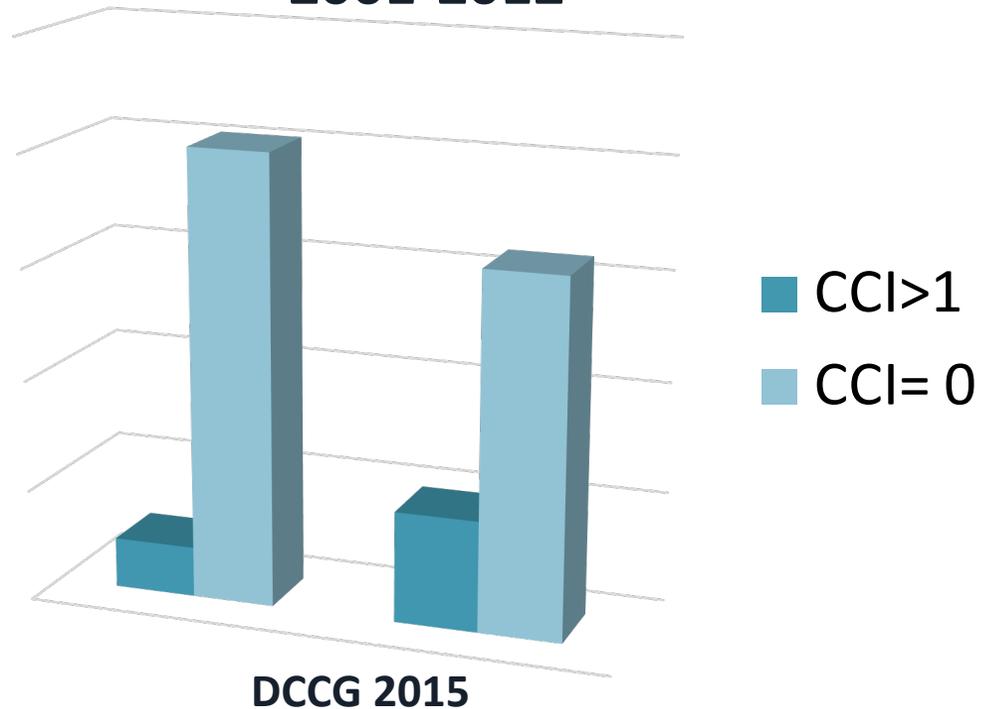


DCCG year report 2016

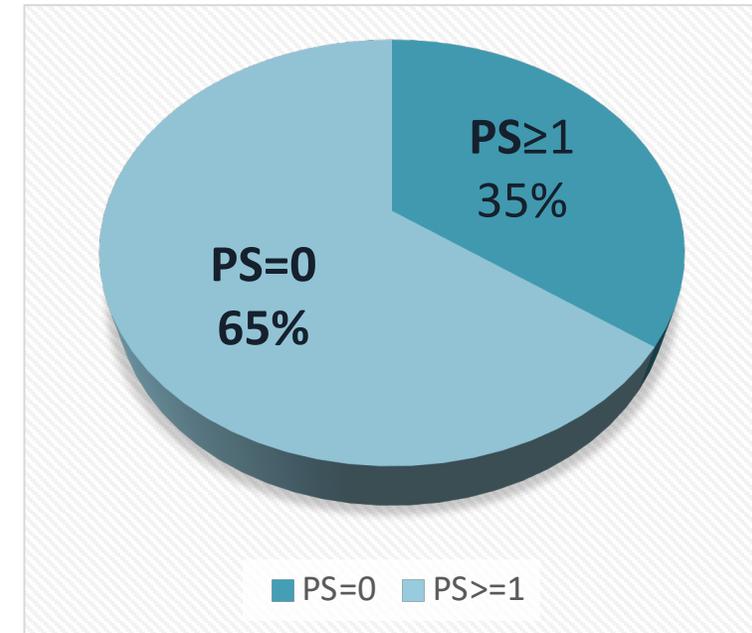


# Performance Status effect on mortality

Comorbidity in Denmark  
2001-2012



Performance Status



1 year mortality increasing 10-15 % for every increase in Performance Status (independent of UICC stage)



# Zealand University Hospital data



N = 587 CRC surgery (2015-17)



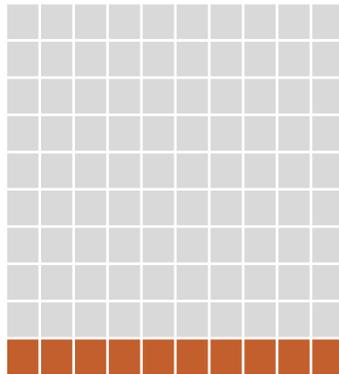
> 96 % MIS



LOS Colon = 2 days

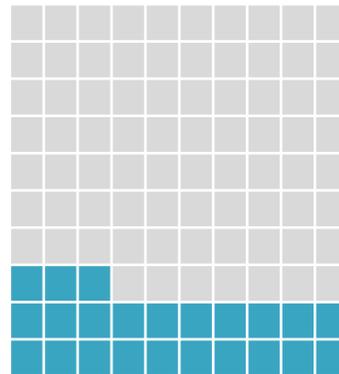


LOS Rectum = 4 days



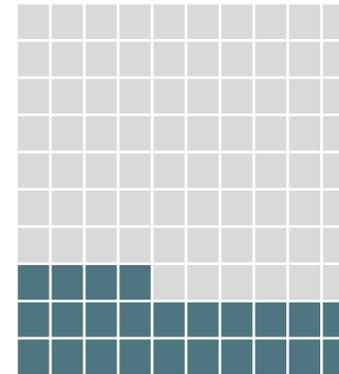
**10%**

Reoperated



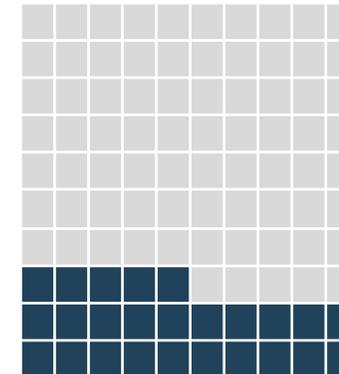
**13%**

Readmitted



**14%**

LOS > 14 days



**25%**

Complications

Bennedsen et al Col Dis 2018



# Surgery is the ~~only~~ main curative treatment possibility but...



33% of the total hospital budget is used on complications!



5% of the patients is accountable for 23% of total hospital budget

Goveart et al EJSO 2015



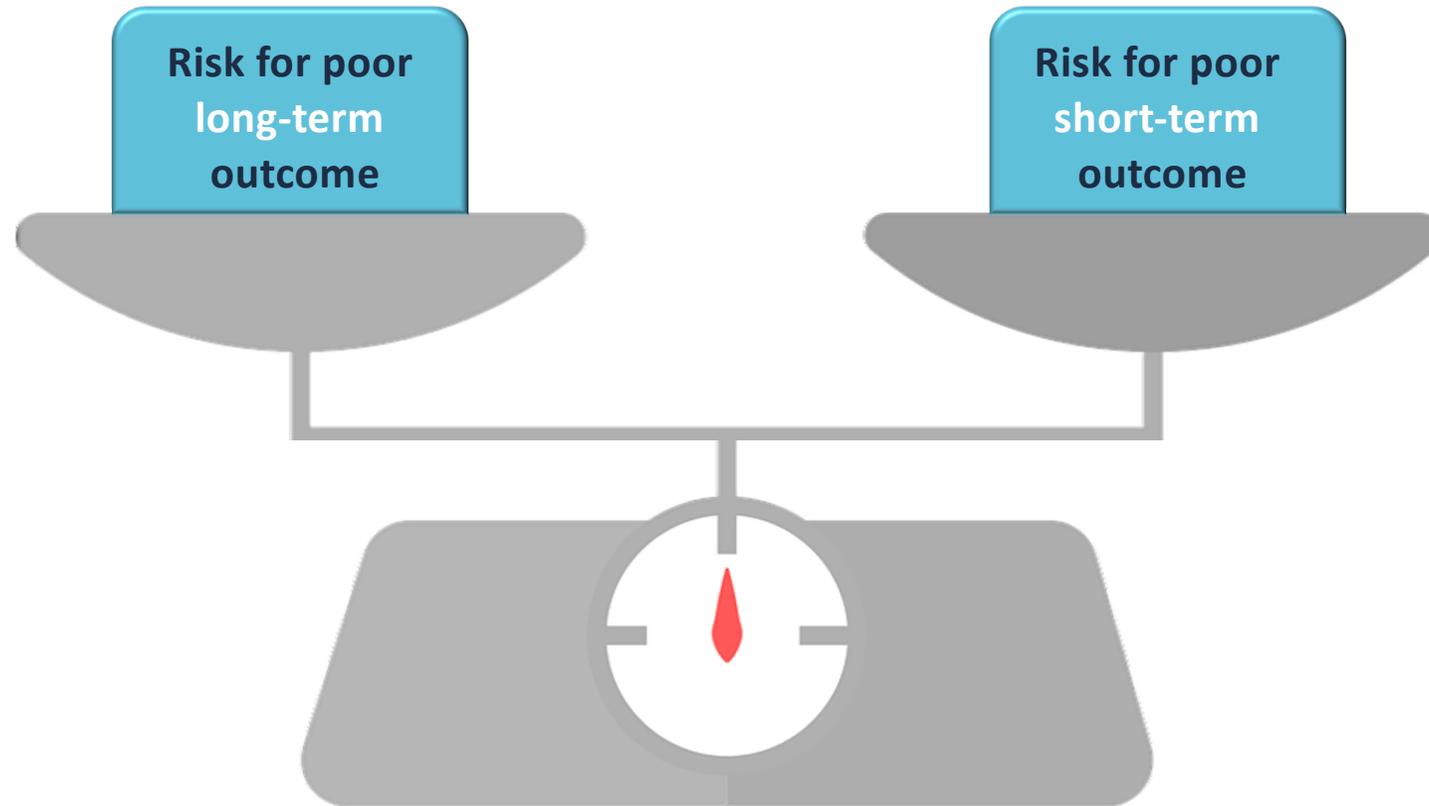
# Identification of the patient with high risk is essential!



PERSONALIZED  
SURGERY?

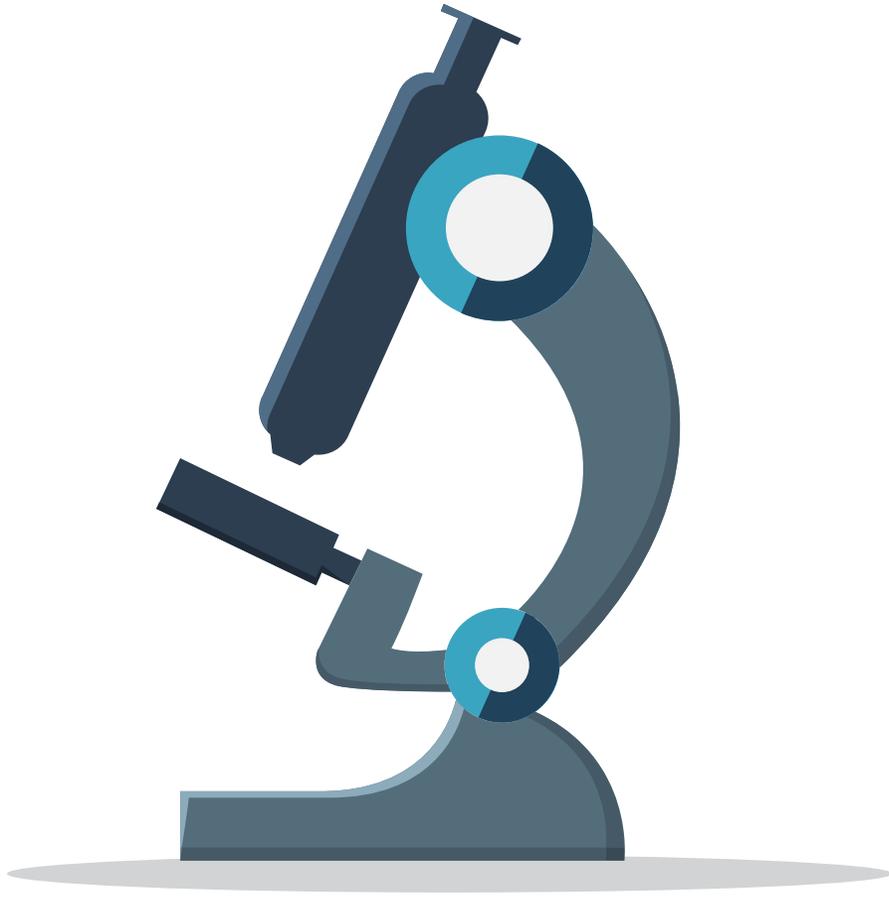


# PERSONALIZED SURGERY

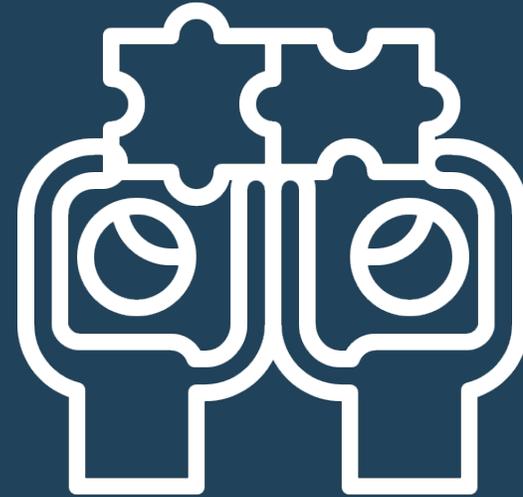




# PERSONALIZED SURGERY

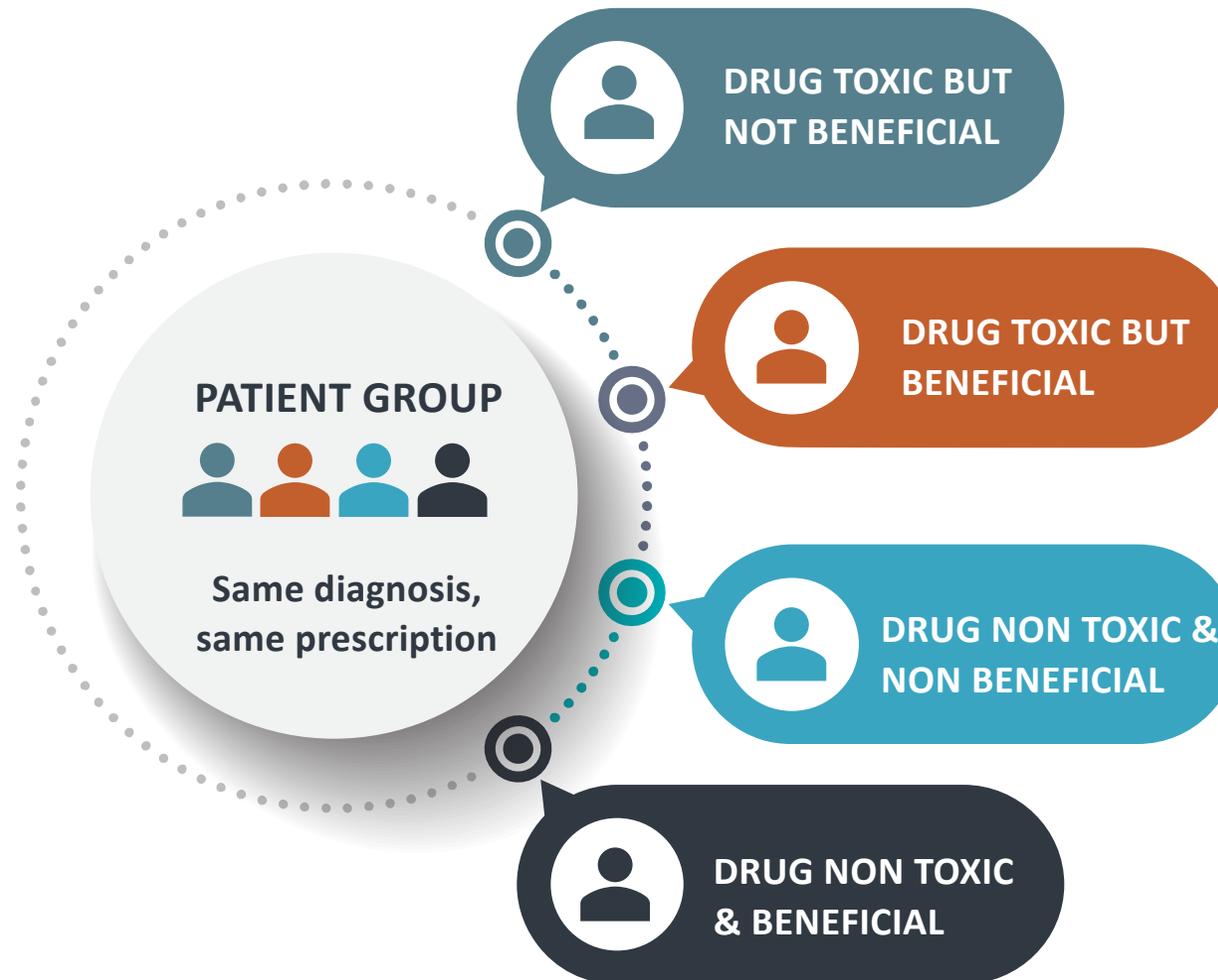


Major recent progress in the understanding and treatment of patients with colorectal cancer needs to be integrated in a **PERSONALIZED** surgical approach.



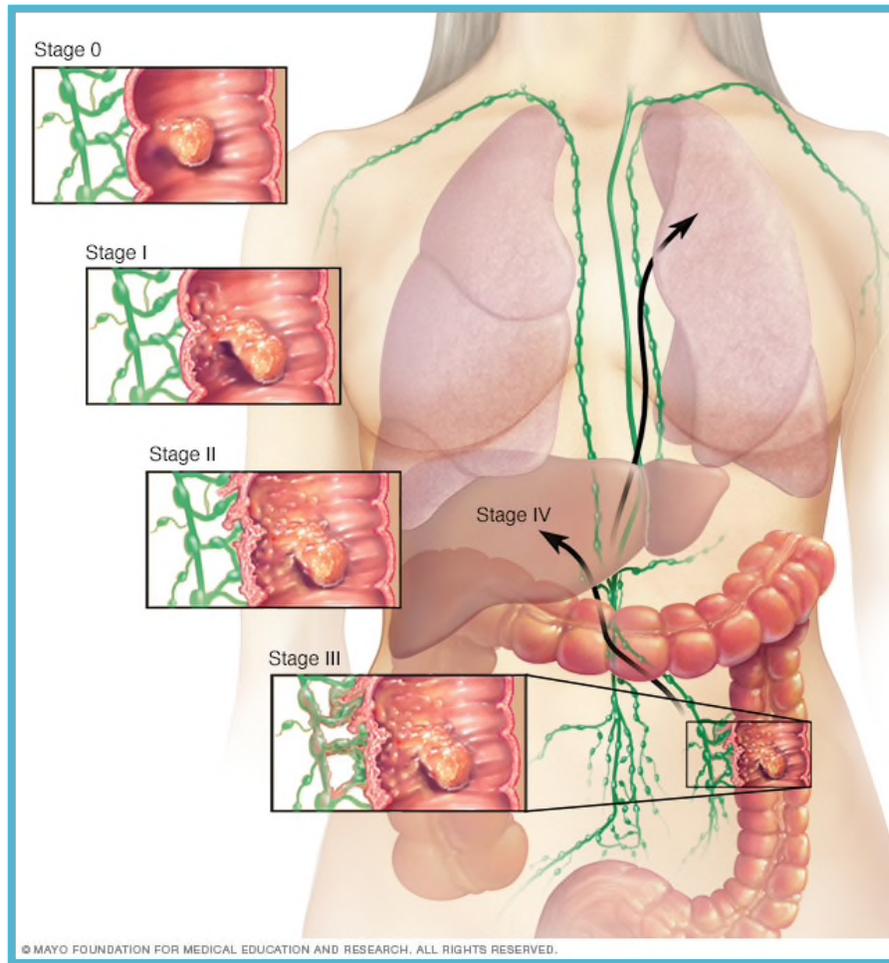


# Prevention of over-treatment

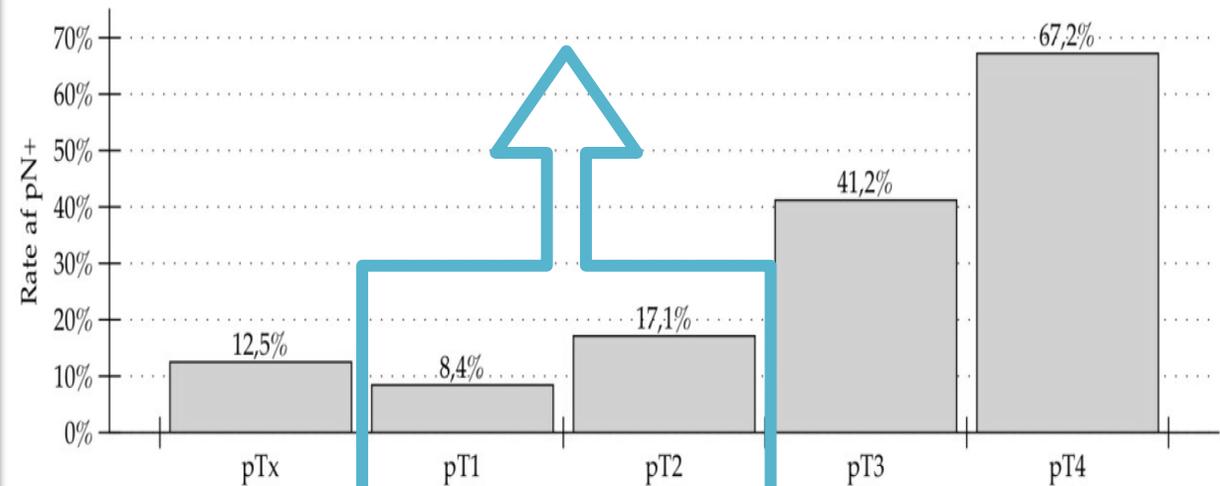




# Overtreatment in CRC surgery

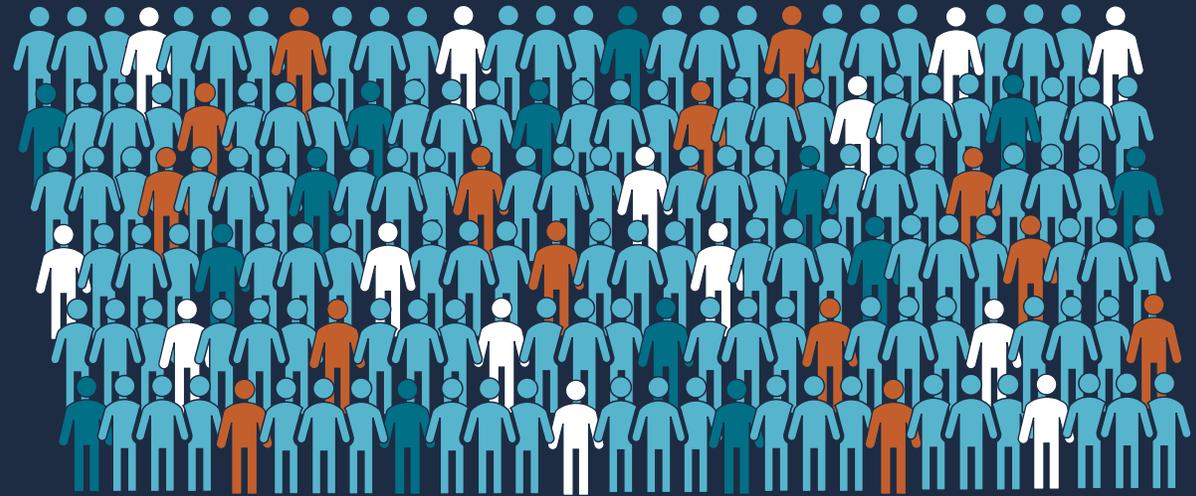


Overtreatment?



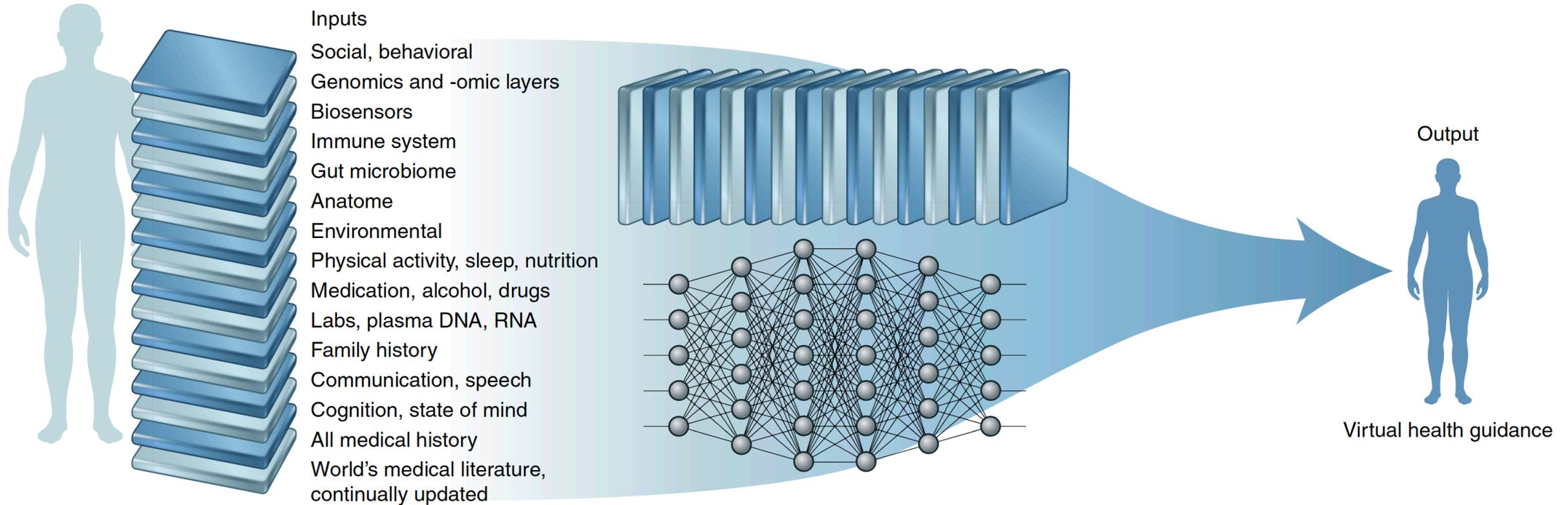


# Patients like me





# Increased quality and granularity of information versus improved perioperative patient care





# The Project Goal



Creating a platform where both PHENOTYPIC and OMIC data contribute to improve healthcare services.



# The Danish health data scene



## **Personal Identification Number**

Nationwide since 1968 (used to be regional)

## **National Electronic Health Record**

Data produced at any healthcare level is digitally stored and available both to the citizen and the treating MD.

## **National Health Data Registries**

Data from the EHR, via thorough curation and QC pipelines are forming the domain specific National Health Registries.

## **Research and Medicine**

Registry Data may become available for research or clinical use, after a strictly governed application process.

## **Data lifecycle**

Quality improvements performed at any stage of the health data lifecycle are reported back to the source.



# The Danish health data scene

#	Register & Database	Since
1	The Danish Register of Causes of Death	1875
2	The Cancer Registry	1943
3	The Cancer Register - Other neoplasias	1943
4	The Cancer Register - Cancer survival	1943
5	The Cancer Register - New occurrences of cancer	1943
6	The Danish Nephrology Society Land Register	1964
7	The Family Relations Database	1968
8	The Pathology Register	1970
9	The Medical Birth Registry	1973
10	The Register of legally induced abortions	1973
11	The Children's Death by Accident Register	1975
12	The National Patient Registry	1976
13	National Patient Register - Activity on diagnosis group	1976
14	National Patient Register - Activity on diagnosis level	1976
15	National Patient Register - Operations	1976
16	National Patient Register - Radiological services	1976
17	Blood spots from all new-born Danes since	1976
18	The Danish Neonatal Screening Biobank	1982
19	The Danish National Biobank	1982
20	Danish Melanoma Database	1985
21	The National Health Insurance Service Register	1990
22	Donor Register	1990
23	Database for chronic kidney failure	1990
24	The Accident Register	1990
25	Health Insurance Register	1990
26	The Danish Vascular Registry	1993
27	IVF-register (fertility)	1994
28	Medicines Register	1994
29	The Drug Statistics Register	1994
30	The Register of Medicinal Product Statistics	1994
31	The Register for Selected Chronic Illnesses	1995
32	GP Register (doctors, dentists, physiotherapists etc.)	1995
33	The Danish Diabetes register	1996
34	The Danish Register of Child and Adolescent Diabetes	1996
35	Danish register for child and youth diabetes	1996
36	Drug addicts in treatment Register	1996
37	Danish Transfusion Database	1997
38	Danish Hernia Database	1998
39	The Registry of Coercive Measures in Psychiatric Treatment	1999
40	The Danish Adult Diabetes Database	1999



# The Danish health data scene

41	Coercive Psychiatry Register	1999	61	The united orthopedics Database - Danish hip arthroplasty	2005
42	Danish Heart Register	2000	62	The united orthopedics Database - Danish knee arthroplasty	2005
43	Danish Colorectal Cancer Database	2001	63	The united orthopedics Database - Danish cruciate ligament	2005
44	DUSAS (Danes treated at foreign hospitals)	2002	64	The united orthopedics Database - Danish shoulder arthropl.	2005
45	MiniPas - LPR	2002	65	Alcohol treatment register	2005
46	Danish Head and Neck Cancer Group	2002	66	The Army Register	2005
47	Danish Hysterectomy and Hysteroscopy Database	2003	67	The Conscription Register	2006
48	Emergency Surgery Database	2003	68	Database for treatment of rheumatologic patients	2006
49	Danish Stroke Register	2003	69	Danish urogynaecological databse	2006
50	Danish Childrens Cancer Register	2003	70	The Rehabilitation Register	2007
51	Danish Esophagus, Gastroesophageal transitional cancer	2003	71	Rehabilitation Register - All services	2007
52	Danish Interdisciplinary Register for Femoral Thigh Break	2003	72	Rehabilitation Register - Plans	2007
53	The Nationwide Database of Geriatrics	2004	73	Rehabilitation Register - Services on hospital	2007
54	The Tissue Register	2004	74	Danish Ultrasound scannings during pregnancy database	2008
55	Danish Anaesthesia Database	2005	75	Danish intensive database	2008
56	Danish Gynaecological Cancer Database	2005	76	Danish Quality Database for cervix screening	2008
57	The Hematologic Common Database - Acute leukemia	2005	77	Danish Quality Database for Mammography Screening	2008
58	The Hematologic Common Database - Chronic myeloid disorders	2005	78	Danish Sarcoma Database	2009
59	The Hematologic Common Database - Lymphoma	2005	79	The Children's Database	2009
60	The Hematologic Common Database - Multiple myeloma	2005	80	The Child Database (Children's health) - First living year	2009



# The Danish health data scene

81	The Child Database (Children's health) - Early and late primary school	2009
82	Danish Breast Cancer Operative Group	2010
83	Danish Database for Bariatric Surgery	2010
84	Danish Quality Database of Birth	2010
85	The Organ Donation Database	2010
86	Danish Palliative Database	2010
87	National database for Sleep Apnea	2010
88	Follow-up Program for Cerebral Palsy	2010
89	Attention Deficit Hyperactivity Disorder Database	2011
90	Danish Depression database	2011
91	Danish Liver and Biliary Cancer Database	2011
92	Dansk Pancreas Cancer Database	2011
93	DRG (diagnosis related groups)	2013
...	...	...



# Using OHDSI OMOP CDM and community tools as part of the PM infrastructure

-  DCCG
-  DAD
-  MiBa
-  CPR
-  LPR
-  SKS
-  OpusMed
-  BEFUS
-  BC
-  BTH
-  ...
-  OpusMed+

**Colorectal Cancer**  
Detailed description of all  
pathology aspects

**Pathology**  
Hospital admissions,  
procedures and treatments  
during admission

**Medication**  
Prescriptions and administrations

## Biochemistry

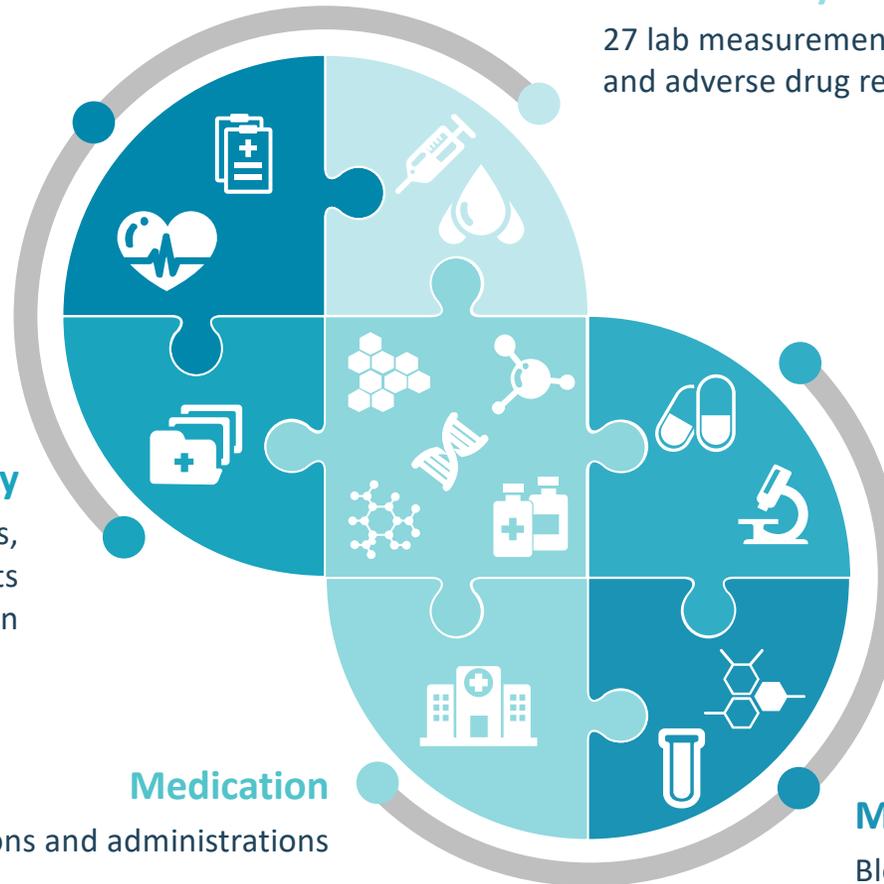
27 lab measurements targeting cancer  
and adverse drug reactions

## Anesthesia

Detailed information for colorectal  
cancer operations

## Microbiology

Blood analysis results 180 days after  
surgery





# First wave of CDM data sources

- **Danish Colorectal Cancer Group (DCCG) database**
  - 191 concept categories
- **Danish Anaesthesia Database (DAD)**
  - 114 concept categories
- **Civil Registration System (CPR)**
  - 22 concept categories
- **National Patient Registry (LPR)**
  - 46 concept categories
- **Microbiology Database (MiBa)**
  - 35 concept categories
- **Healthcare Classification System (SKS)**
  - 11 concept categories
- **Drug prescriptions and administrations**
  - 134 concept categories
- **Biochemistry LIMS**
  - 16 concept categories
- **BEFUS population study**
  - 270 concept categories

**19 565 concepts in total**

**describing 75 000 persons**

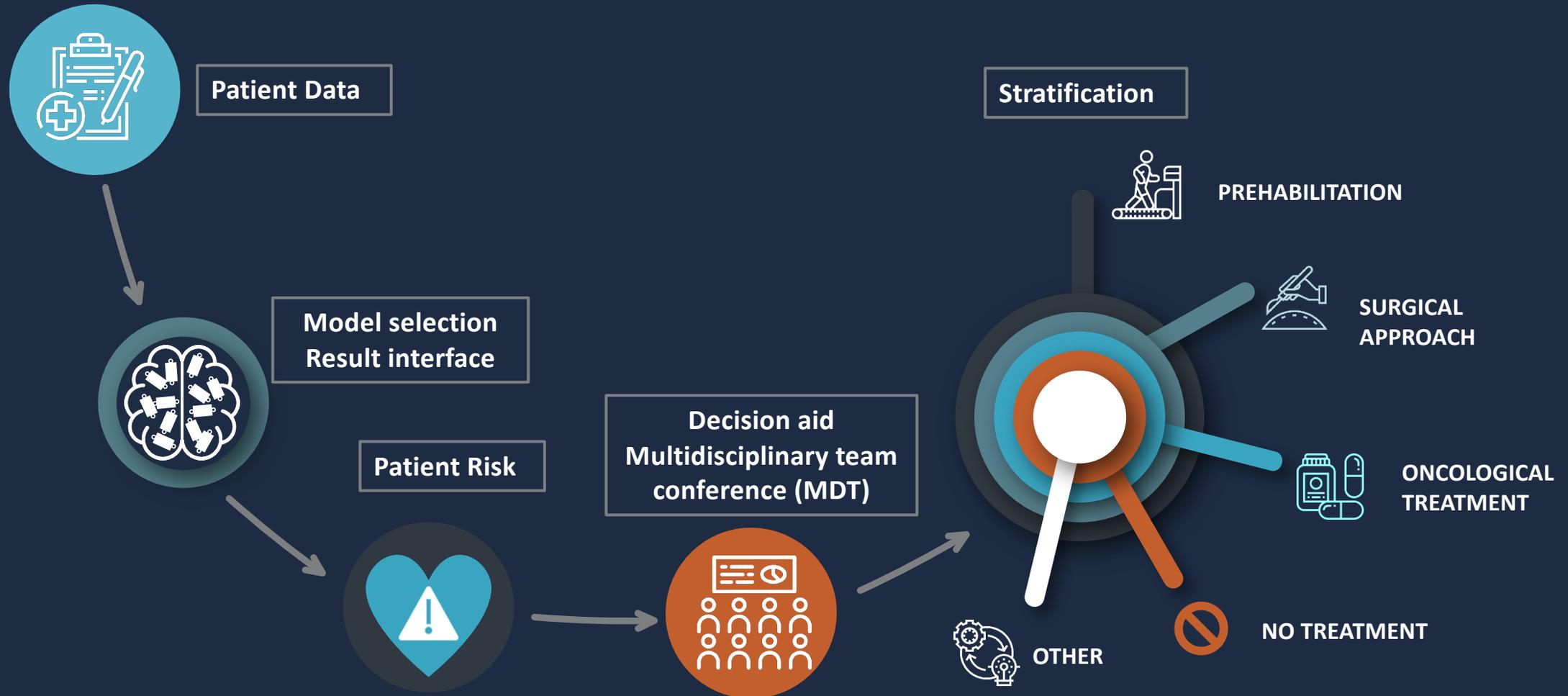


# Creating and training the prediction model



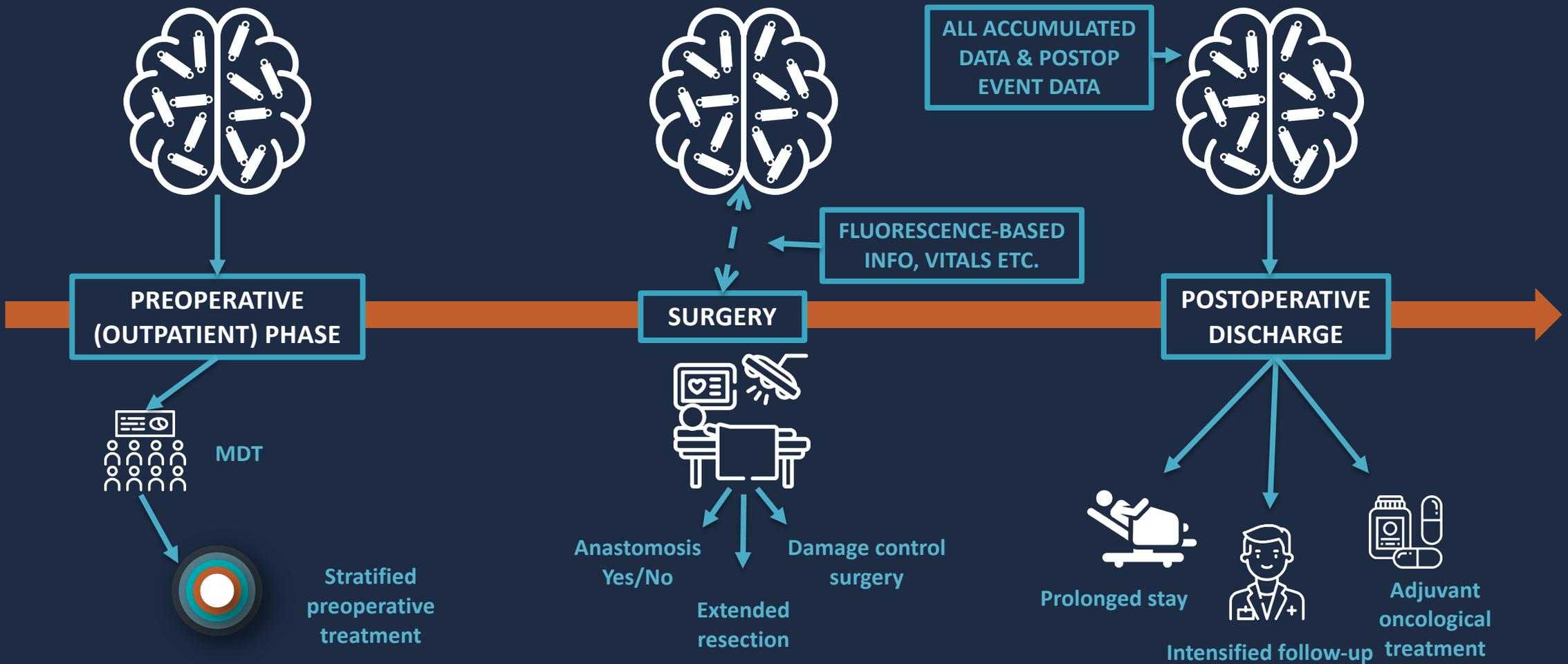


# The patient pathway



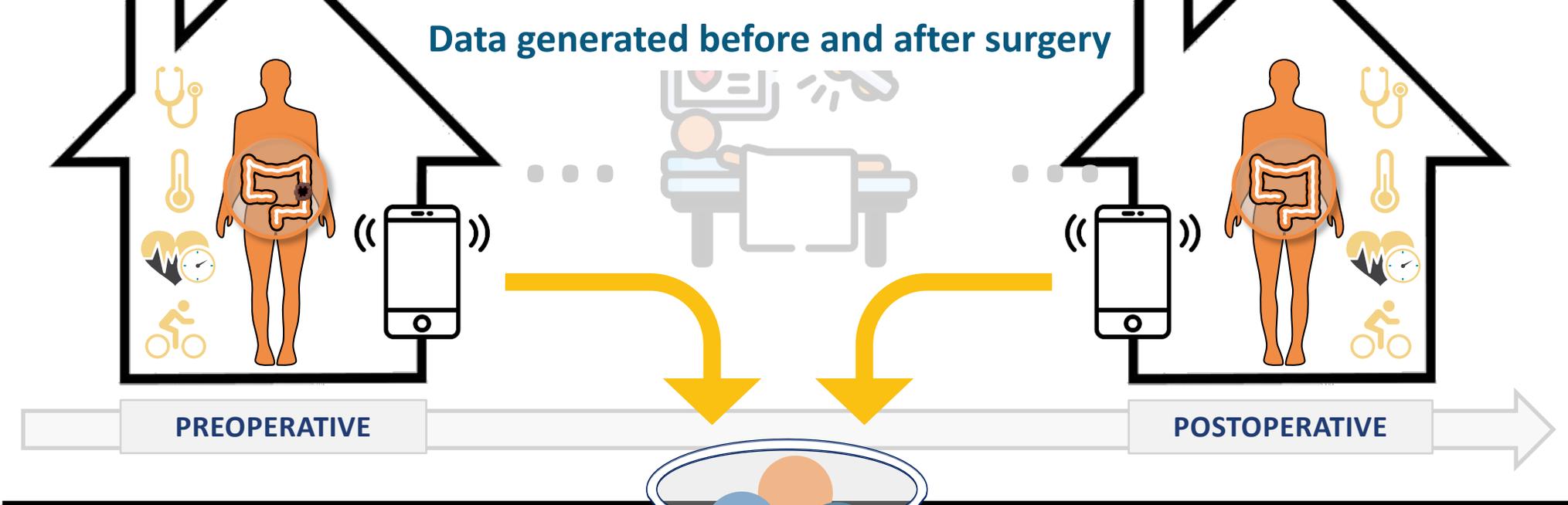


# Critical phases of the patient pathway





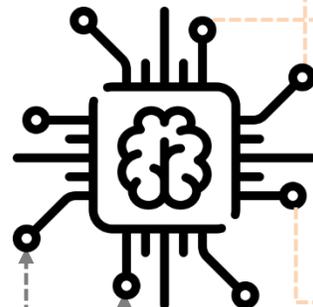
# Data generated before and after surgery



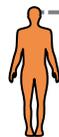
Phenotypic databases



OMICs databases

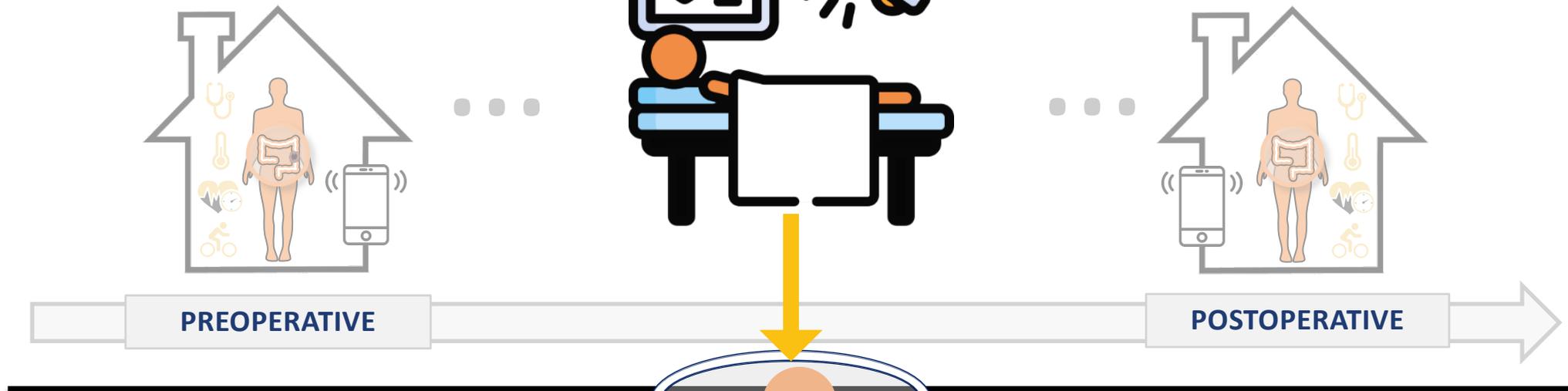


"Patients Like Me"  
machine learning bedside tools





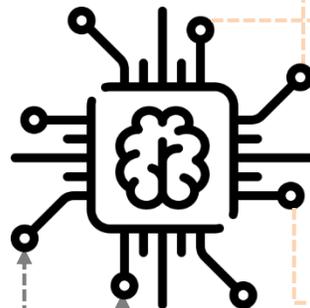
## Data generated during surgery



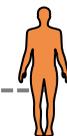
Phenotypic databases



OMICs databases



“Patients Like Me”  
machine learning bedside tools





**The future of Personalized Surgery in Denmark**  
using OMOP and the OHDSI community tools to  
predict 90-days mortality after colorectal cancer  
surgery.

**Thank you for your attention!**



**CENTER FOR  
SURGICAL  
SCIENCE**

**Presented by Prof. Ismail Gögenur, MD**  
**Director of the Center for Surgical Science (CSS)**



# 15:00 - 15:45 OHDSI Collaborator Showcase

