



CDM인프라 및 연구방법 개론

연세대학교 의생명시스템정보학교실 유승찬

chandryou@yuhs.ac



Contents

- Common Data Model (CDM) / OHDSI
- Open-source and Characterization
- Population-level estimation: Large-scale Evidence Generation and Evaluation in a Network of Databases
- Patient-Level Prediction



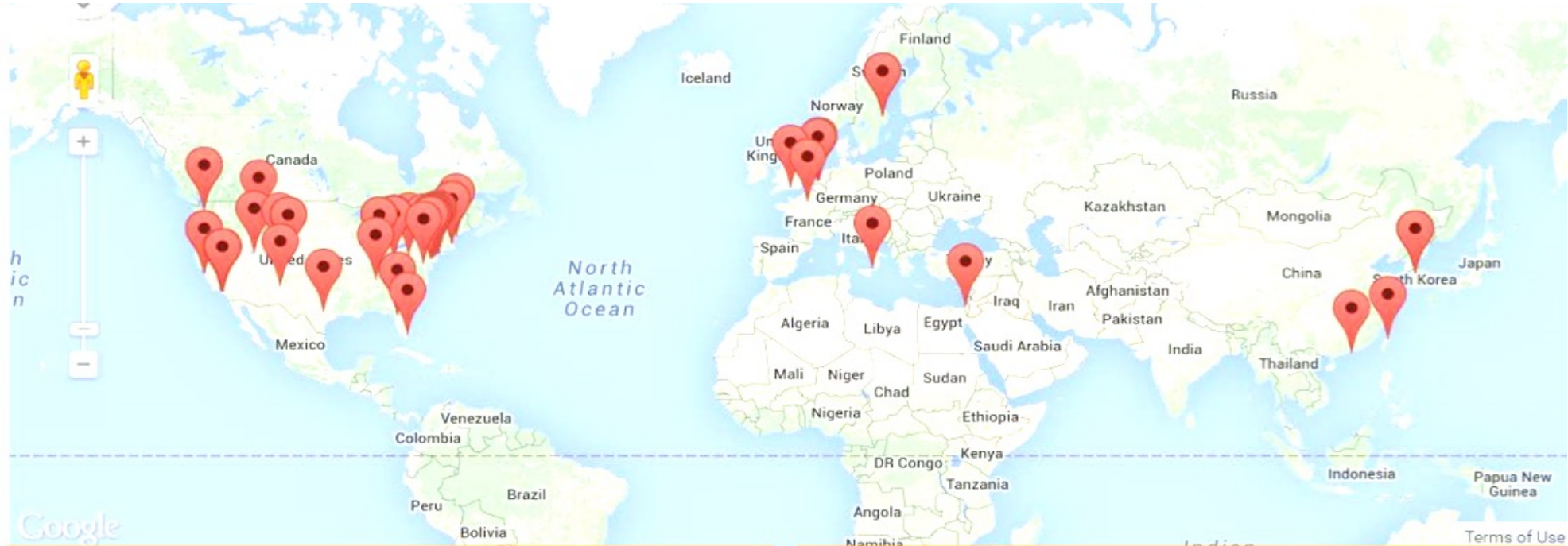
Contents

- **Common Data Model (CDM) / OHDSI**
- Characterization
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OHDSI (Observational Health Data Sciences and Informatics)

- International collaborative consortium applying open-source data analytic solutions based on **OMOP-Common Data Model** (CDM) to a large network of health databases across the world



OHDSI Collaborators:

- >100 researchers in academia, industry and government
- >10 countries

OHDSI Data Network:

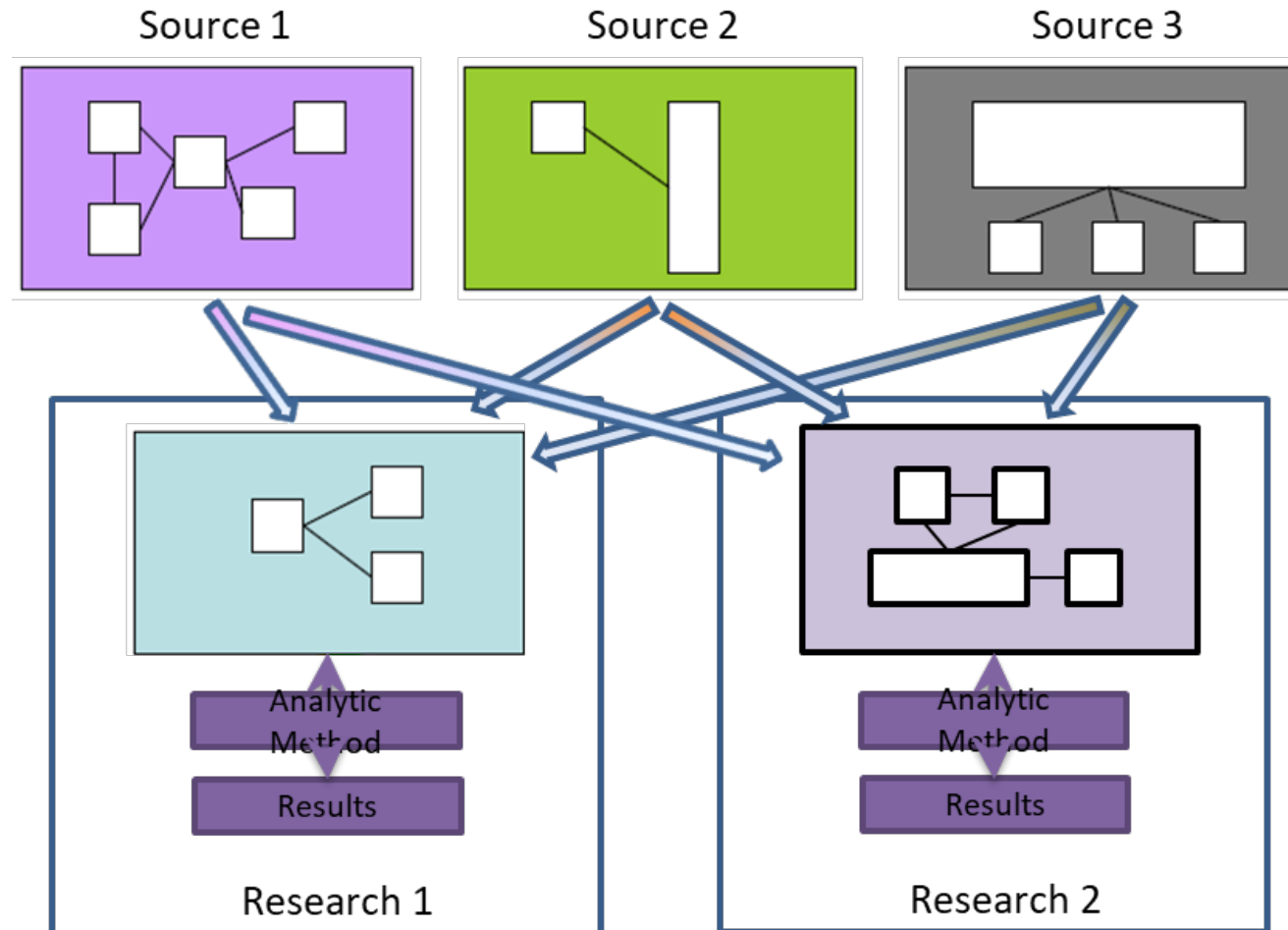
- >40 databases standardized to OMOP common data model
- >500 million patients



Why Common Data Model (CDM)?

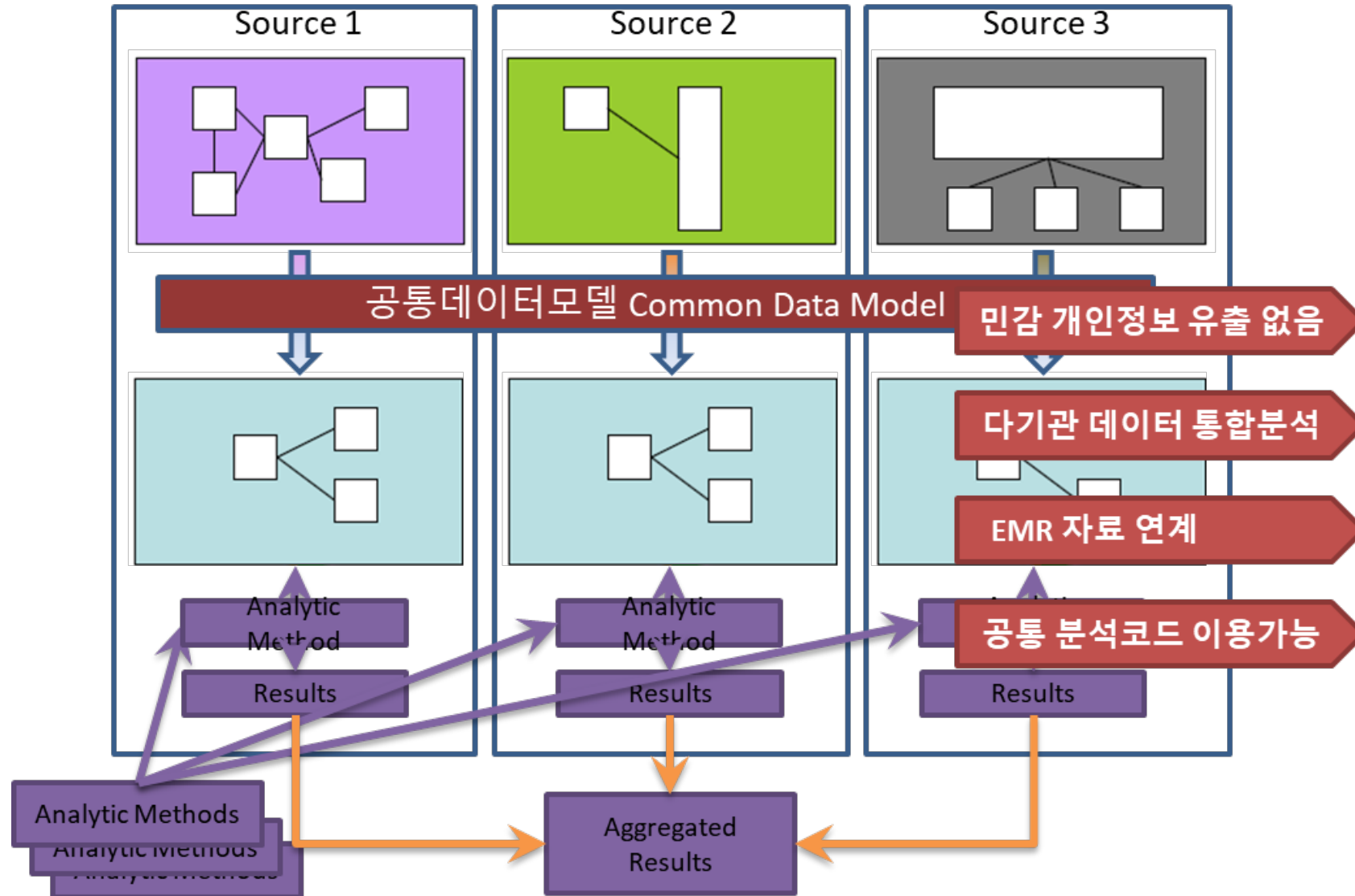
기존의 다기관 연구방법

연구 수행 때마다 데이터 모델을 맞추는 변환 작업을 수행해야 함





CDM in Distributed Research Network



기술적문제

- 데이터 구조 / 형식의 이질성
- 데이터의 질과 양
- 기술적 한계




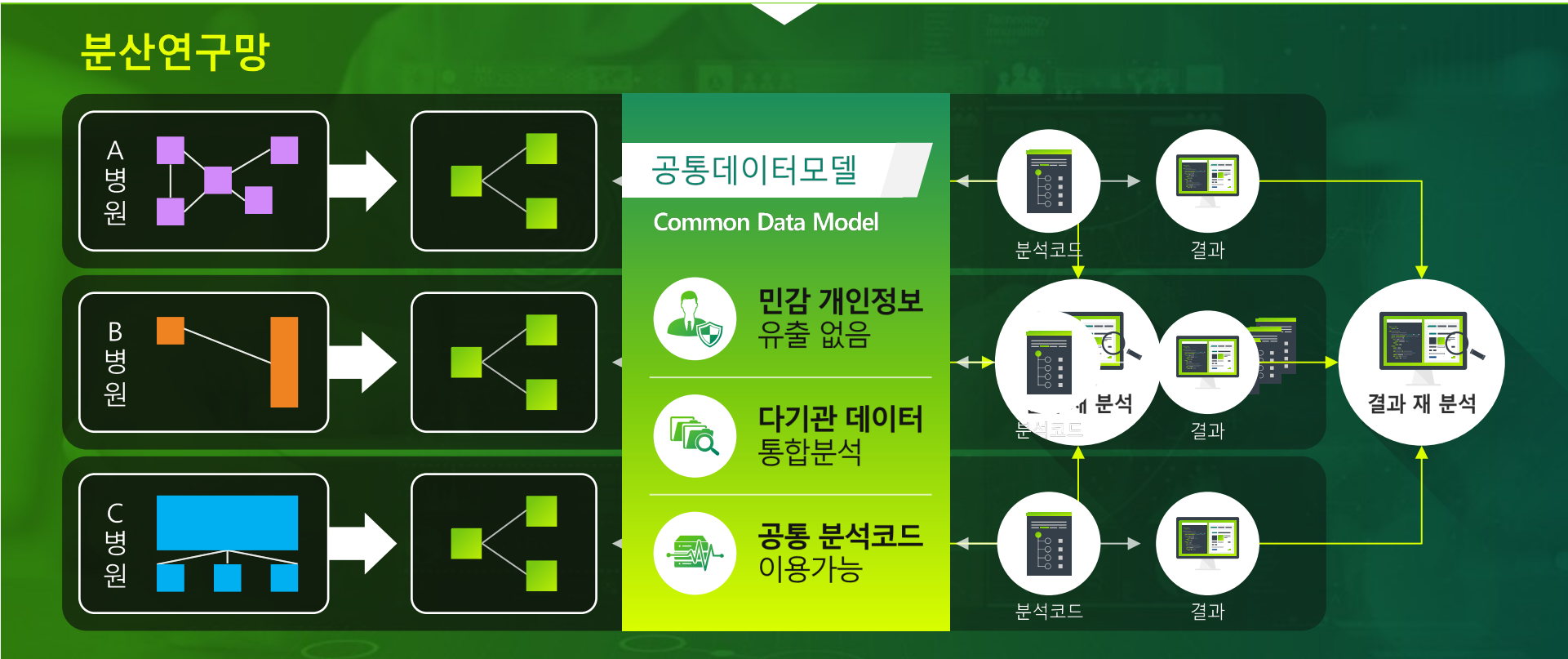
법적문제

- 개인정보보호법
- 기관의 허락



인간본성/감정적문제

- 자신에게 불리하게 사용될지
모른다는 두려움
- 데이터 소유자는 자신의 자료를
공유하고 싶어하지 않음



Various Common Data Models



Identify Candidate Data Models

4 Common Data Models



Generate & Apply Evaluation Criteria

11 Criteria, 6 Categories



Analyze Results

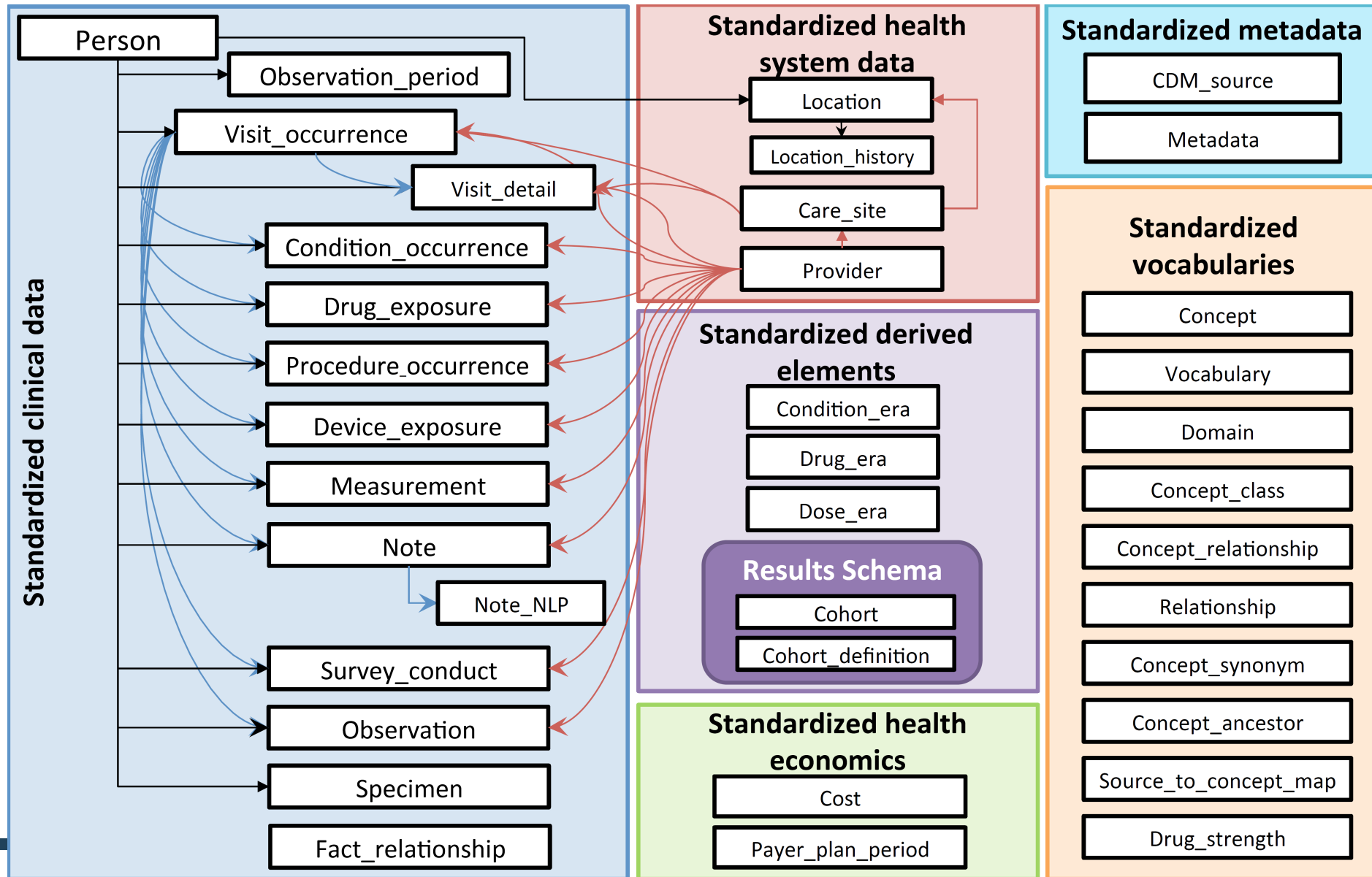
1 Model Selected



- The **OMOP CDM** accommodated the highest percentage of our data elements (76%), fared well on other requirements, and had broader terminology coverage than the other models



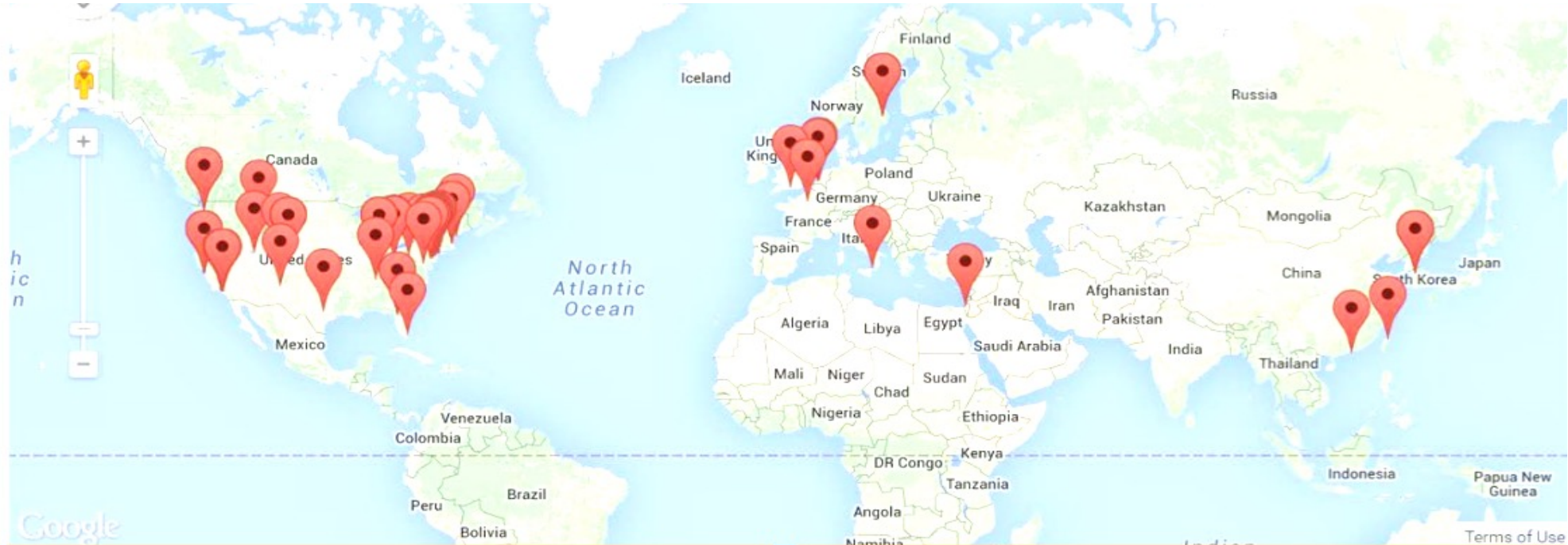
OMOP Common Data Model V6





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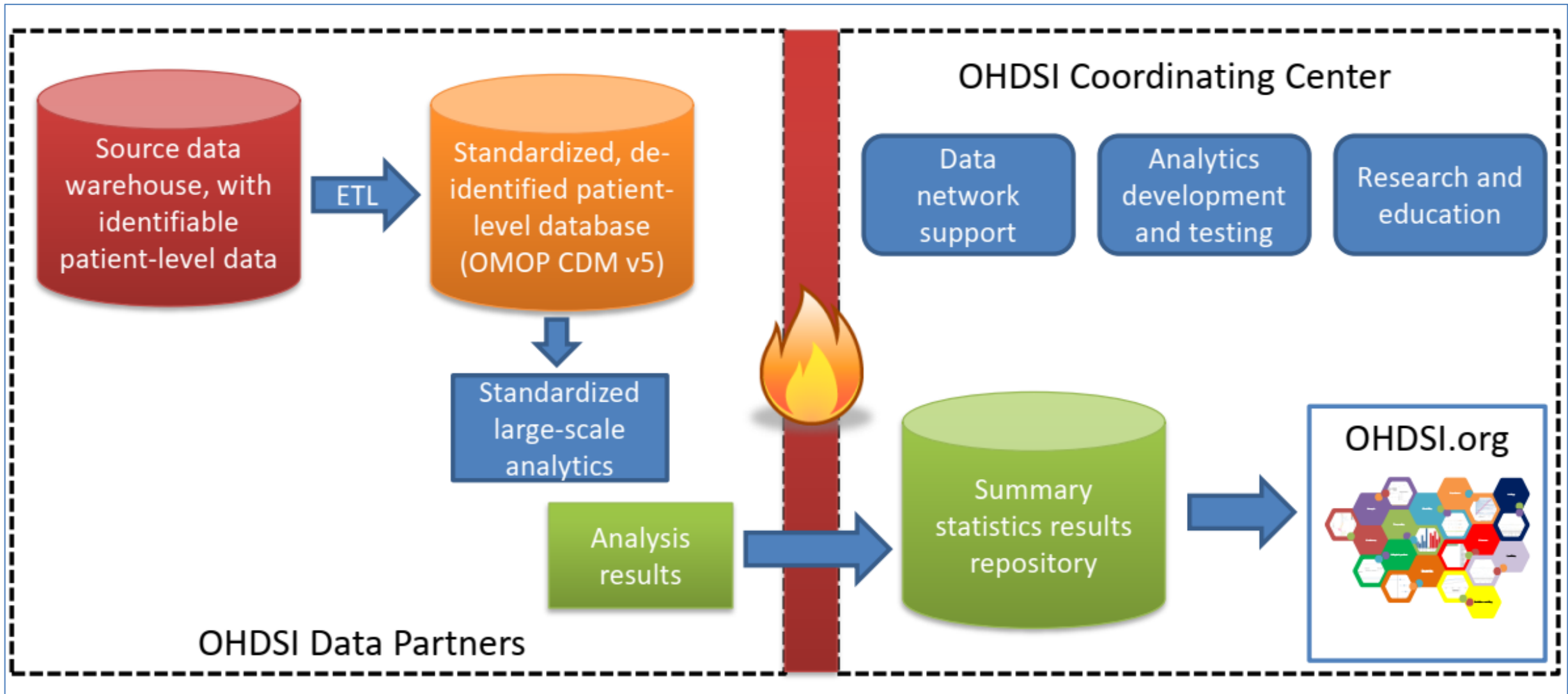
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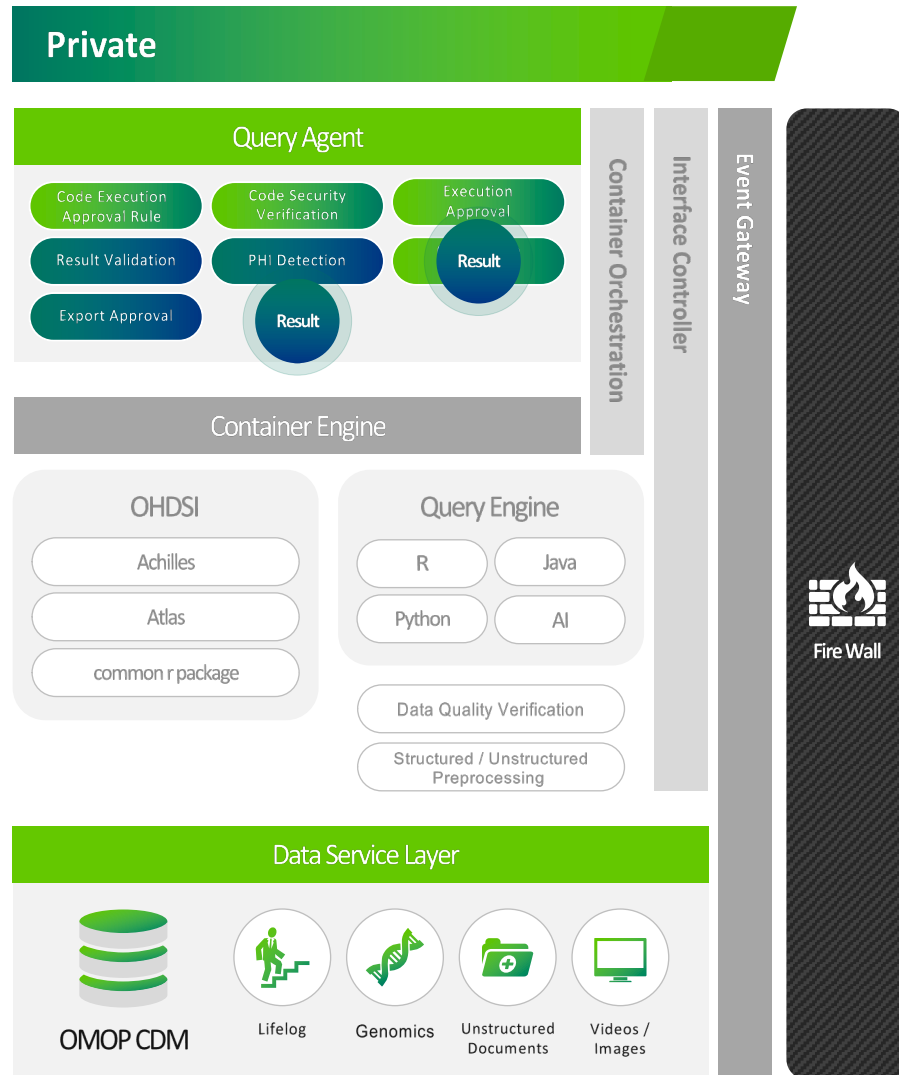


How OHDSI works

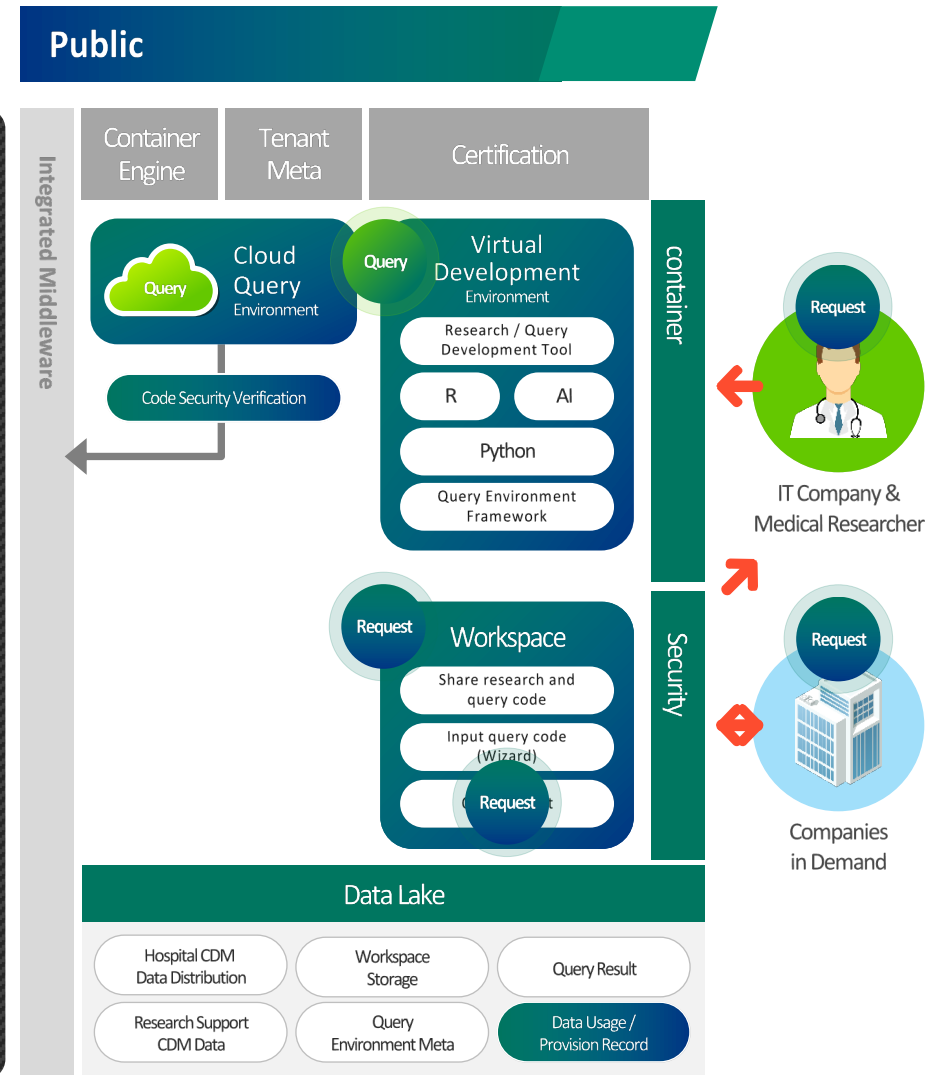


How Distributed Research Platform works?

FEEDER Node (Participating Hospital)



FEEDER Portal



국내 CDM 데이터망 구축 현황

CDM 변환 병원 목록

No.	병원 명	병원 구분	변환 환자 수
1	가톨릭대학교 성모병원	3차	3,223,259
2	강동경희대학교병원	2차	822,183
3	강동성심병원	2차	1,662,083
4	강원대학교병원	2차	510,000
5	경북대학교병원	3차	1,002,381
6	경희의료원	3차	2,101,456
7	고려대학교 안암병원	3차	1,856,484
8	고려대학교 안산병원	3차	1,465,833
9	고려대학교 구로병원	3차	2,077,344
10	국민건강보험공단 일산병원	2차	1,358,280
11	대구가톨릭대학교병원	3차	1,688,980
12	동국대학교 일산병원	2차	779,474
13	메디플렉스 세종인천병원	2차	946,000
14	부산대학교병원	3차	1,753,002

No.	병원 명	병원 구분	변환 환자 수
15	분당서울대학교병원	3차	1,734,565
16	분당차병원	2차	2,363,386
17	서울대학교병원	3차	3,068,874
18	세종부천병원	2차	946,000
19	순천향부천병원	3차	-
20	순천향천안병원	3차	-
21	순천향구미병원	2차	-
22	순천향서울병원	2차	-
23	아주대학교병원	3차	2,400,000
24	연세원주세브란스병원	2차	-
25	원광대학교병원	3차	1,001,797
26	이화여자대학교 목동병원	2차	1,745,549
27	인하대학교병원	3차	1,977,256
28	전남대학교병원	3차	2,168,701
29	전북대학교병원	3차	1,433,023
30	칠곡경북대학교병원	3차	1,002,381
31	한양대학교병원	3차	1,783,111
32	화순전남대학교병원	3차	1,725,462

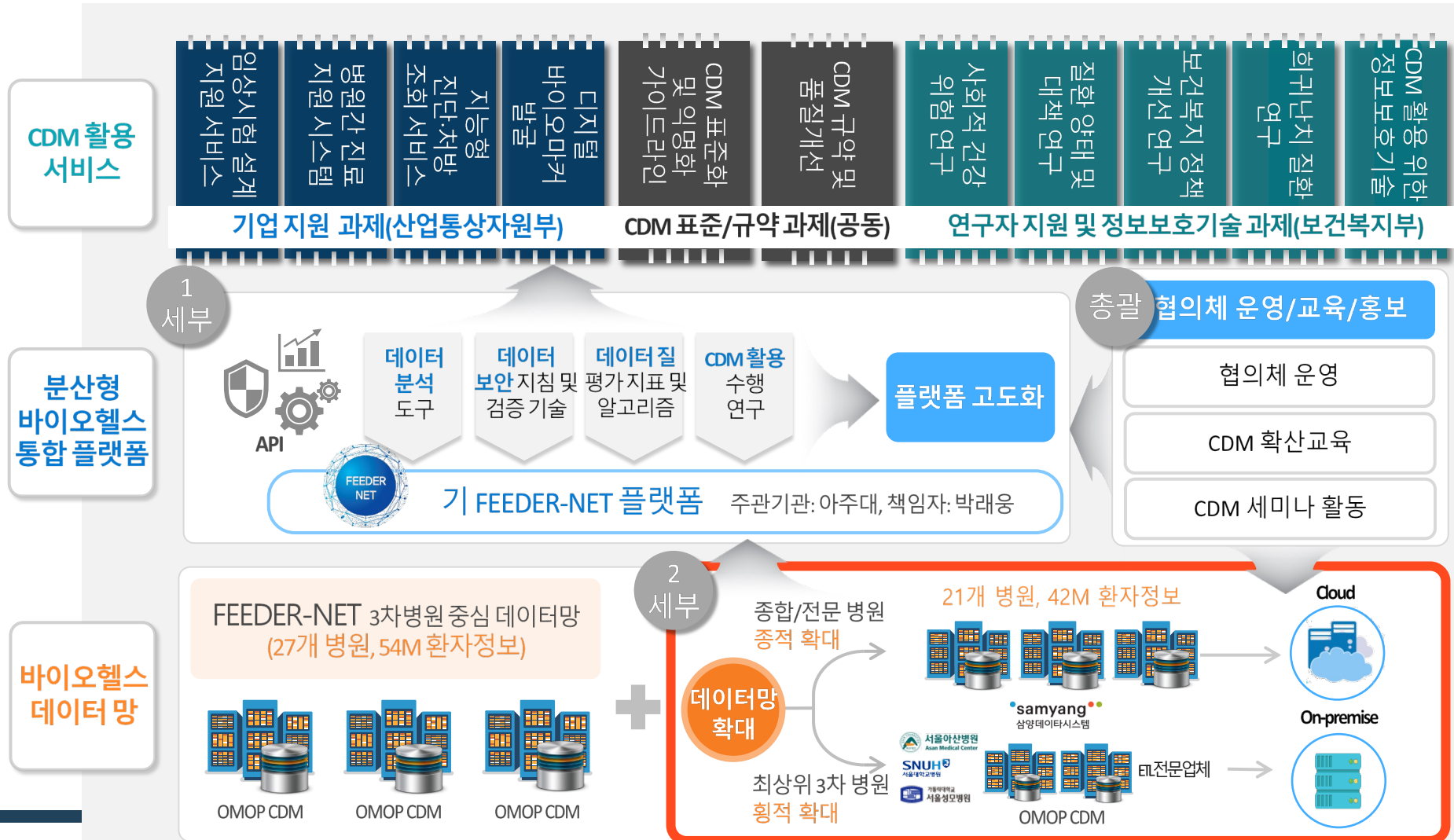
현 누적 변환 기관 수 : 32병원 (3차: 20개 / 2차: 12개)

현 누적 변환 환자 수 : 44,596,864명



공통 데이터모델 (CDM) 기반 헬스케어 융합 빅데이터 생태계 구축

산업통상자원부 CDM 사업을 통한
FEEDER-NET 확장





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Standardized data-based software 개발의 장점: Scalability

npj | Digital Medicine

www.nature.com/npjdigitalmed

ARTICLE OPEN

Scalable and accurate deep learning with electronic health records

- It is widely held that **80% of the effort in an analytic model is preprocessing, merging, customizing, and cleaning datasets**, not analyzing them for insights. **This profoundly limits the scalability of predictive models**
- It is crucial to standardize the health care data to enhance scalability of developed software

ATLAS



ATLAS English

Home

Data Sources

Search

Concept Sets

Cohort Definitions

Characterizations

Cohort Pathways

Incidence Rates

Profiles

Estimation

Prediction

Jobs

Configuration

Feedback

Home

Welcome to ATLAS.

ATLAS is an open source application developed as a part of [OHDSI](#) intended to provide a unified interface to patient level data and analytics.

Documentation

The ATLAS user guide can be found [here](#).

Getting Started

[Define a New Cohort](#) Begin performing research by defining the group of people you intend to study

[Search the Vocabulary](#) Search the different ontologies used to describe patient level data around the world

Release Notes

[ATLAS Version 2.9.0 Release Notes](#)
[WebAPI Version 2.9.0 Release Notes](#)

This latest release contains **314** feature enhancements and issue resolutions:

- [Restrict official support of RDBMS of WebAPI to Postgresql](#)
- [Samples result is not cleared/switched after switching a data source](#)
- [Release v2.8.0 \(In Progress\)](#)
- [Validating study choices](#)
- [Integrating Achilles with Atlas](#)
- [v2.8.0 regression for MS SQL CAST->TRY_CAST statement fix](#)
- [Few descriptions provided in cohort pathway](#)
- [Restrict cohort name length for PLP package creation](#)
- [OHDSI Component Dependencies](#)
- [source id should be larger than 0](#)
- [Bearer token timeout for DB authentication](#)

A free, publicly available, web-based tool developed by the OHDSI community that facilitates the design and execution of analyses on standardized, patient-level, observational data in the CDM format.

OHDSI ATLAS on GCP or AWS



OHDSI ATLAS

Odysseus Data Services, Inc

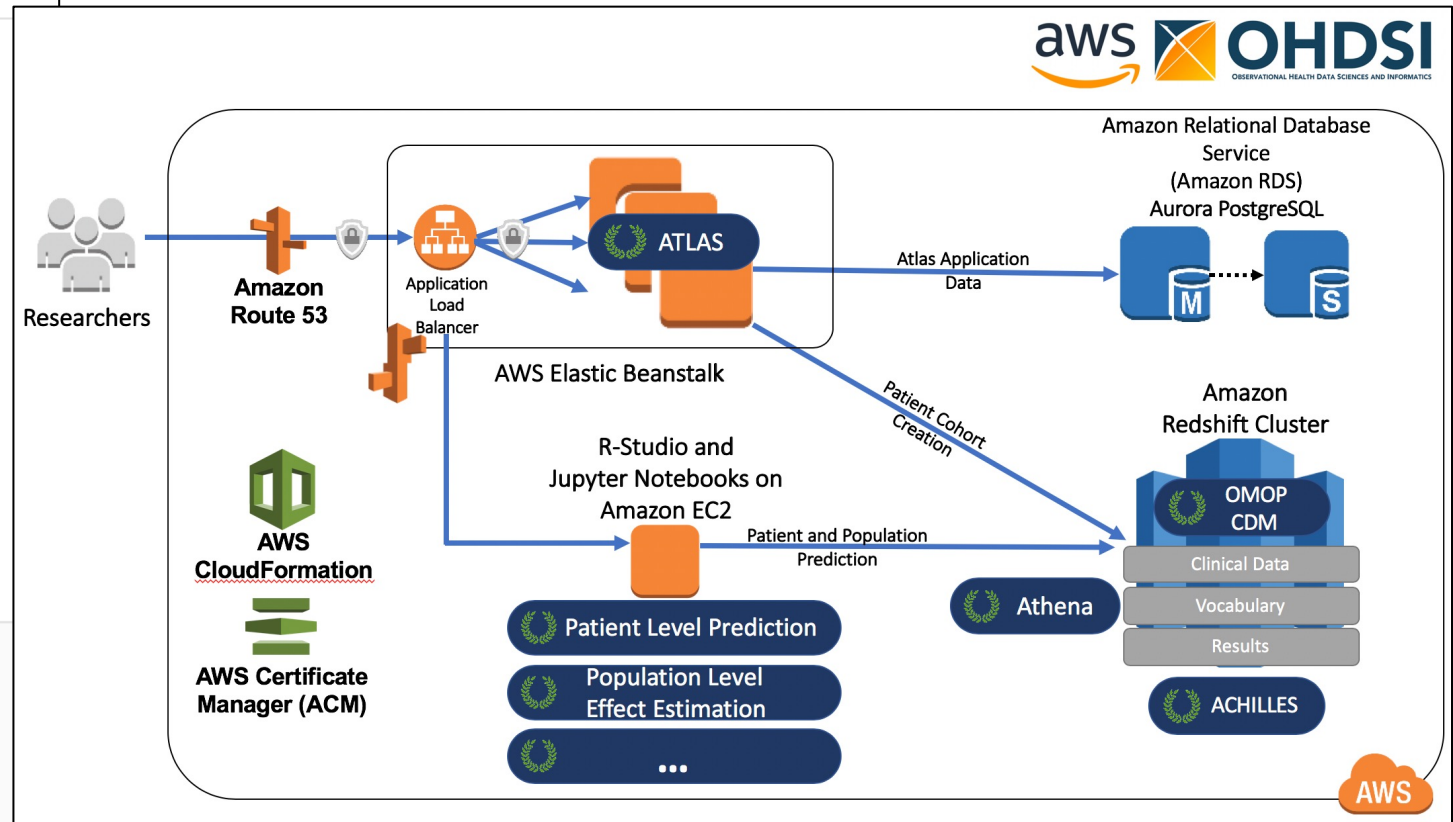
ohdsi atlas cohort

실행 이전 배포 보기

개요 가격 책정 문서 지원

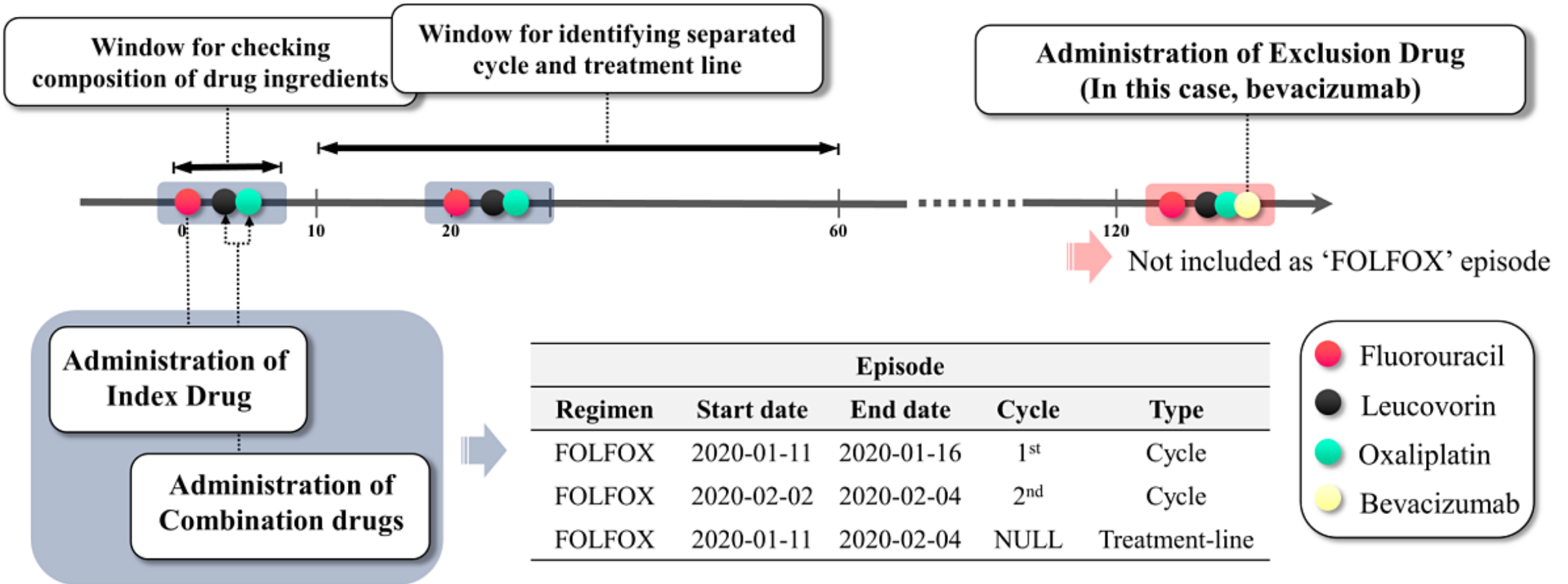
개요

ATLAS is a web-based tool developed by the OHDSI community that facilitates the design and execution of analyses on standardized, patient-level, observational data in the CDM format. This VM image comes with pre-built ATLAS and WebAPI together with SynPUF 110k dataset.



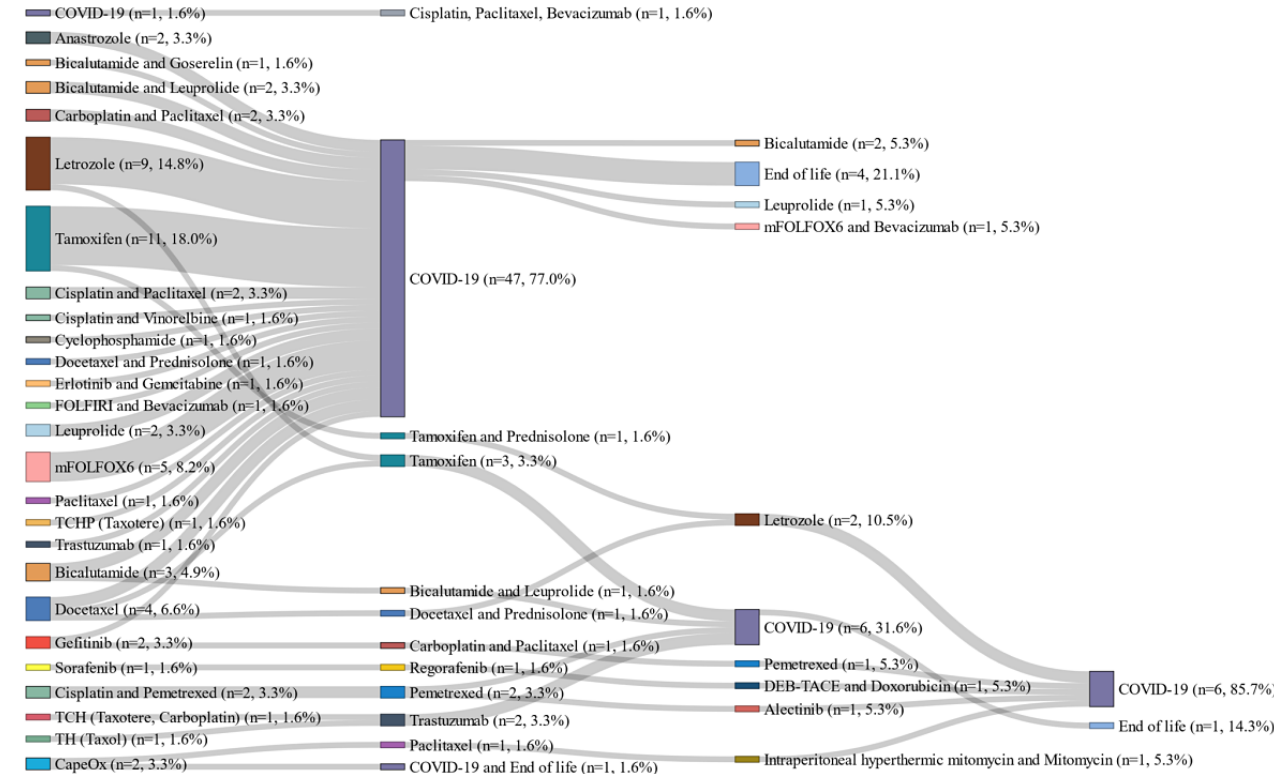
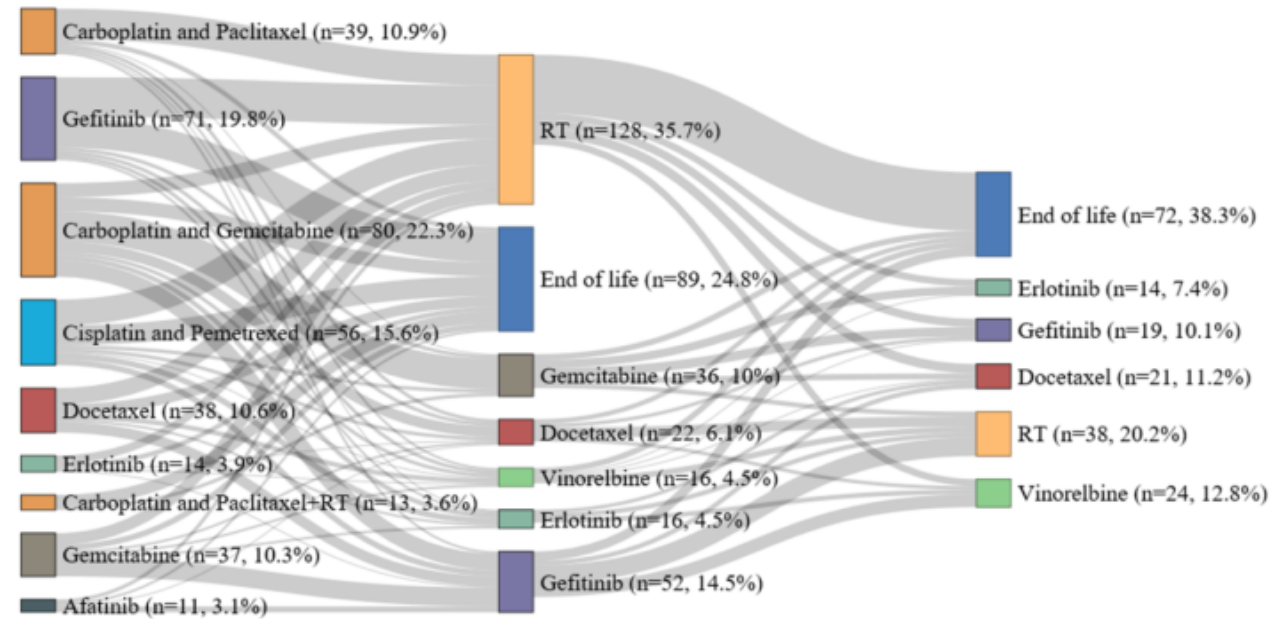


Characterization of anticancer treatment trajectory





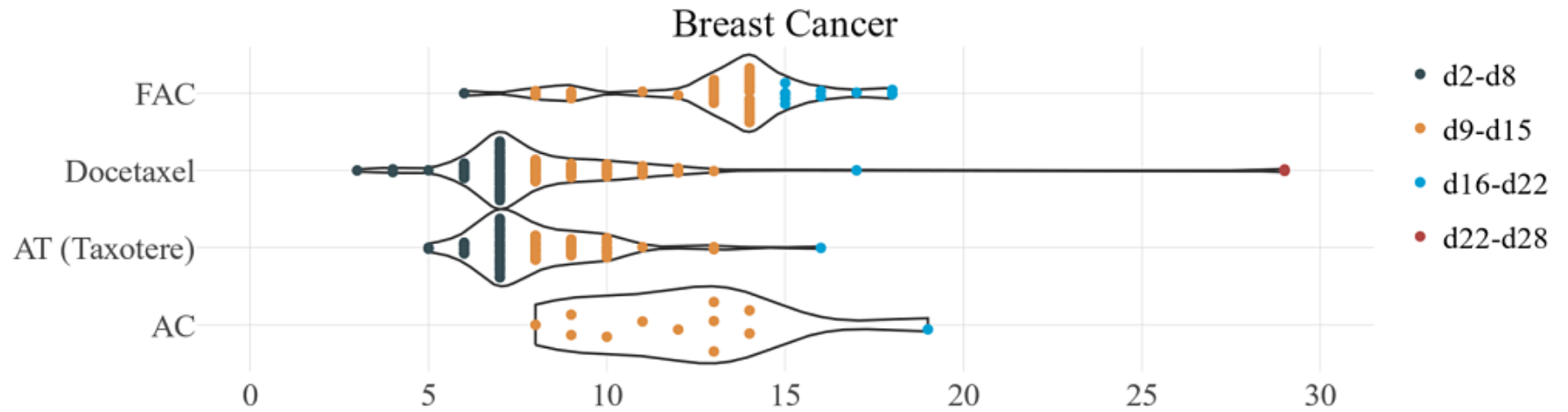
Characterization of anticancer treatment trajectory



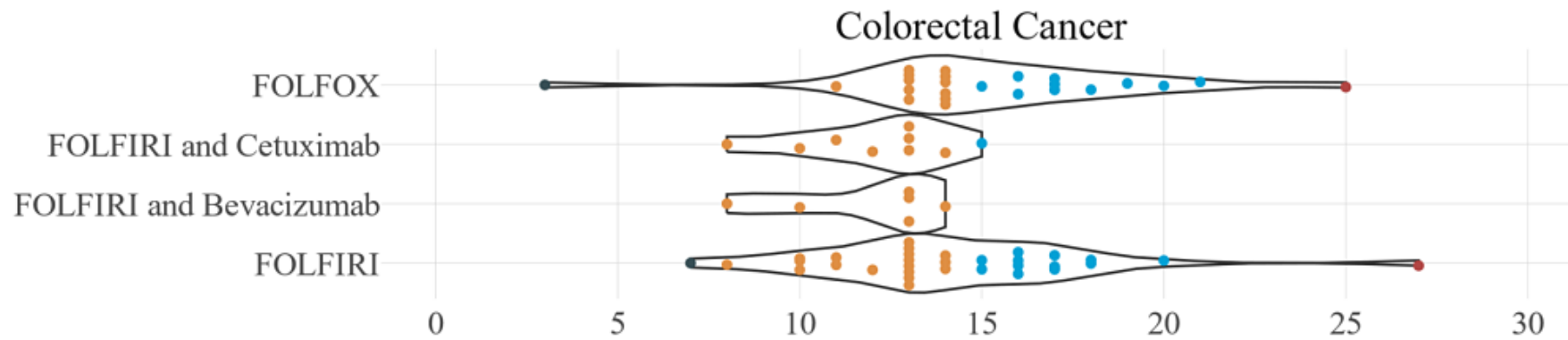


Neutropenia onset timing across various treatment

A

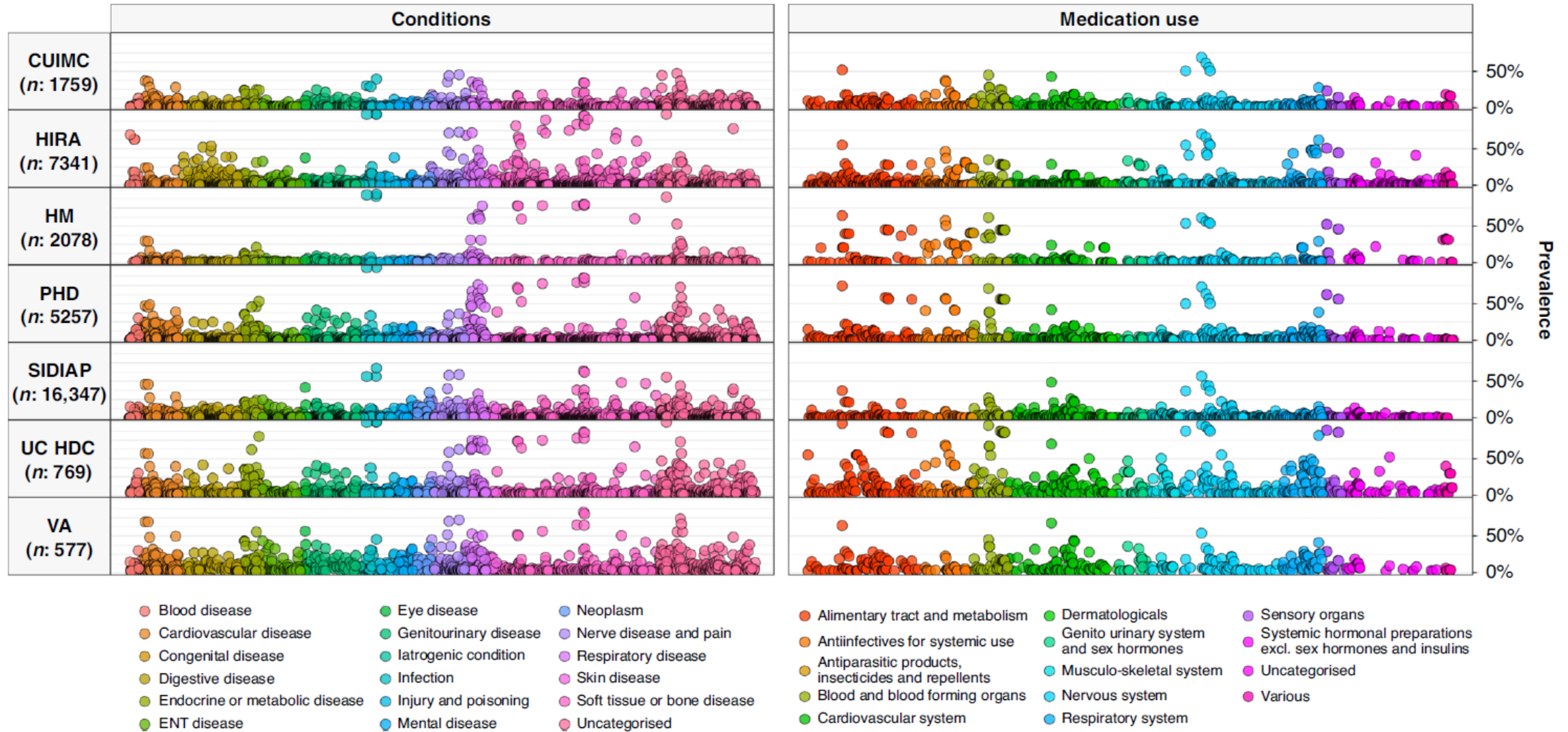


B



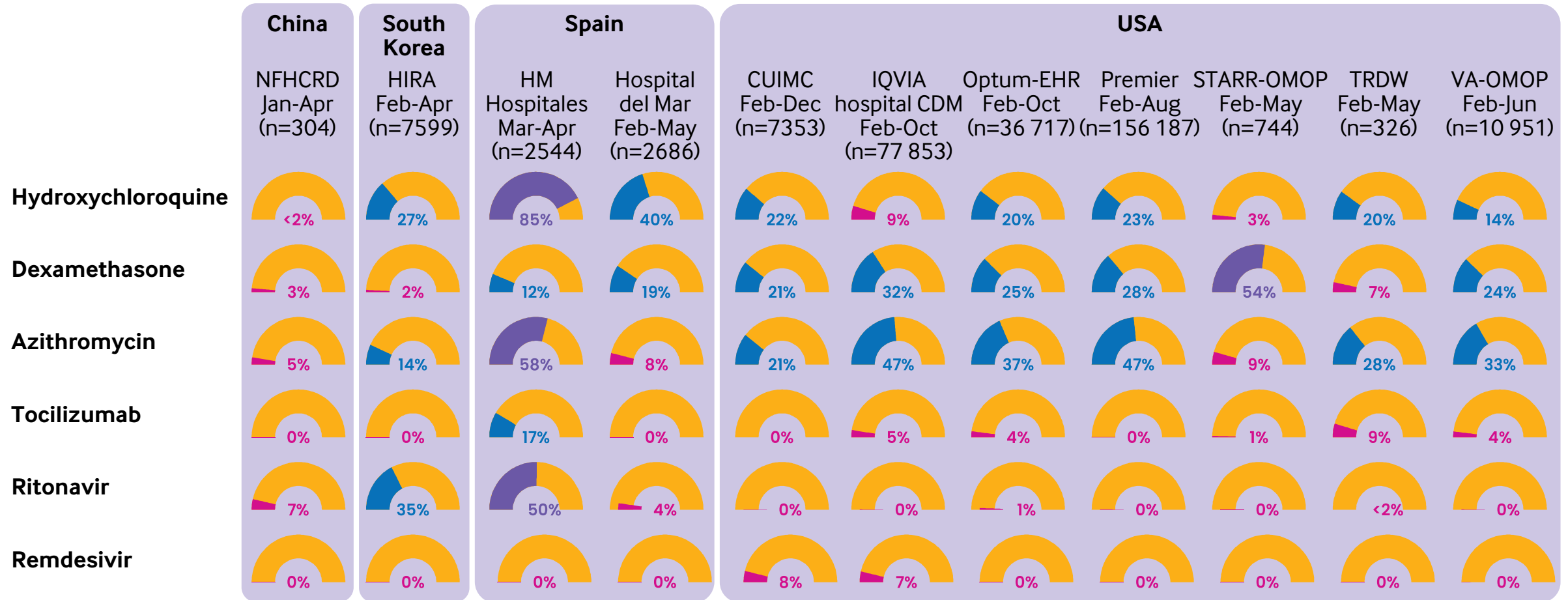


Deep phenotyping of 34,128 patients hospitalized with COVID-19 in an international network study





Use of repurposed and adjuvant drugs in hospital patients with covid-19: multinational network cohort study





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Low statistical power: current evidence from observational analyses

JAMA

Exposure to Oral Bisphosphonates and Risk of Esophageal Cancer

August 2010: “Among patients in the UK General Practice Research Database, the use of oral bisphosphonates was not significantly associated with incident esophageal or gastric cancer”

... and bisphosphonates are now commonly prescribed in elderly women; eg, in 2005, approximately 10% of UK women older than 70 years received a bisphosphonate prescription.³

Oral bisphosphonates are known to cause serious esophagitis in some users.^{4,5} Crystalline material that resembles ground alendronate tablets has been found on biopsy in patients with bisphosphonate-related esophagitis, and follow-up endoscopies have shown that abnormalities remain after the esophagitis heals.⁶ Reflux esophagitis is an established risk factor for esophageal cancer through the Barrett pathway.^{7,9} It is not known whether bisphosphonate-related esophagitis is a risk factor for

founders.

Main Outcome Measure Hazard ratio for the risk of cancer in the bisphosphonate users compared with the bisphosphonate nonusers.
Results Mean follow-up time was 4.5 and 4.4 years in the bisphosphonate and nonusers control cohorts, respectively. Excluding patients with less than 11.4 years of follow-up, there were 41 826 members in each cohort (81% were women). One hundred sixteen esophageal or gastric cancers occurred in the bisphosphonate cohort and 115 (72% were women) in the nonusers cohort. The incidence of esophageal and gastric cancer was 0.44 and 0.44 per 1000 person-years of risk in both the bisphosphonate and nonusers cohorts. The incidence of esophageal cancer alone in the bisphosphonate and nonusers cohorts was 0.44 and 0.44 per 1000 person-years of risk, respectively. The incidence of esophageal and gastric cancer combined between bisphosphonate use (adjusted hazard ratio, 0.96 [95% confidence interval, 0.77-1.49]). There also was no difference in risk of cancer by duration of bisphosphonate intake.

Conclusion Among patients in the UK General Practice Research Database, the use of oral bisphosphonates was not significantly associated with incident esophageal or gastric cancer.

BMJ

RESEARCH

Oral bisphosphonates and risk of cancer of oesophagus, stomach, and colorectum: case-control analysis within a UK primary care cohort

Jane Green, clinical epidemiologist,¹ Gabriela Czanner, statistician,¹ Gillian Reeves, statistical epidemiologist,¹ Joanna Watson, epidemiologist,¹ Lesley Wise, manager, Pharmacoepidemiology Research and Intelligence Unit,² Valerie Beral, professor of cancer epidemiology¹

¹Department of Epidemiology and Public Health, University College London, London, UK

²Medicines Division, Health Protection Agency, London, UK

Correspondence to: J Green (j.greene@ucl.ac.uk)

ABSTRACT

Objective To examine the hypothesis that risk of oesophageal, but not of gastric or colorectal, cancer is increased in users of oral bisphosphonates.

Design Nested case-control analysis within a primary care cohort of about 6 million people in the UK, with

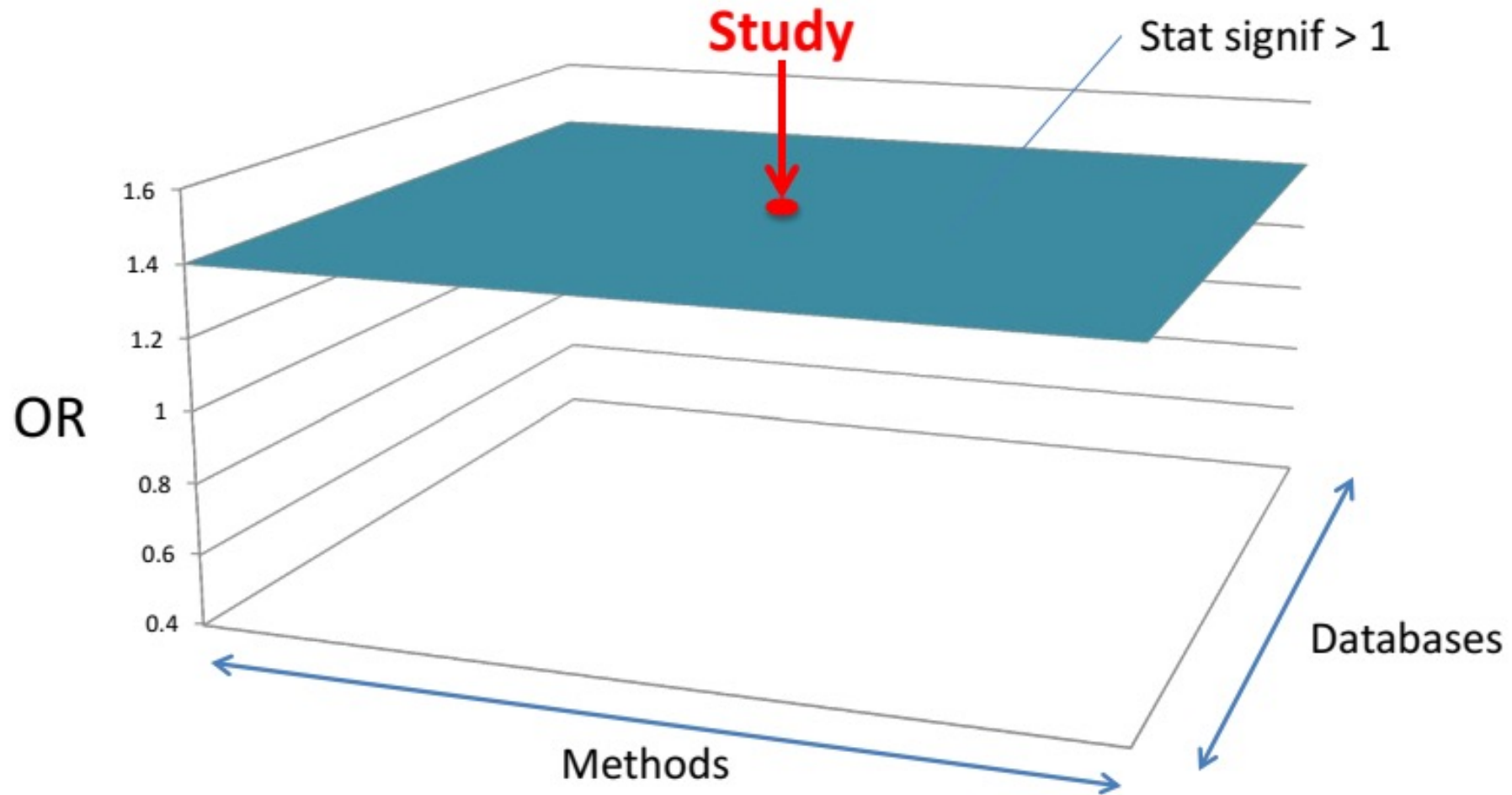
Conclusions The risk of oesophageal cancer increased with 10 or more prescriptions for oral bisphosphonates and with prescriptions over about a five year period. In Europe and North America, the incidence of oesophageal cancer at age 60-79 is typically 1 per 1000 population over five years, and this is estimated to increase to about

Cite this as: *BMJ* 2010;341:e5555

Sept 2010: “In this large nested case-control study within a UK cohort [General Practice Research Database], we found a significantly increased risk of oesophageal cancer in people with previous prescriptions for oral bisphosphonates”

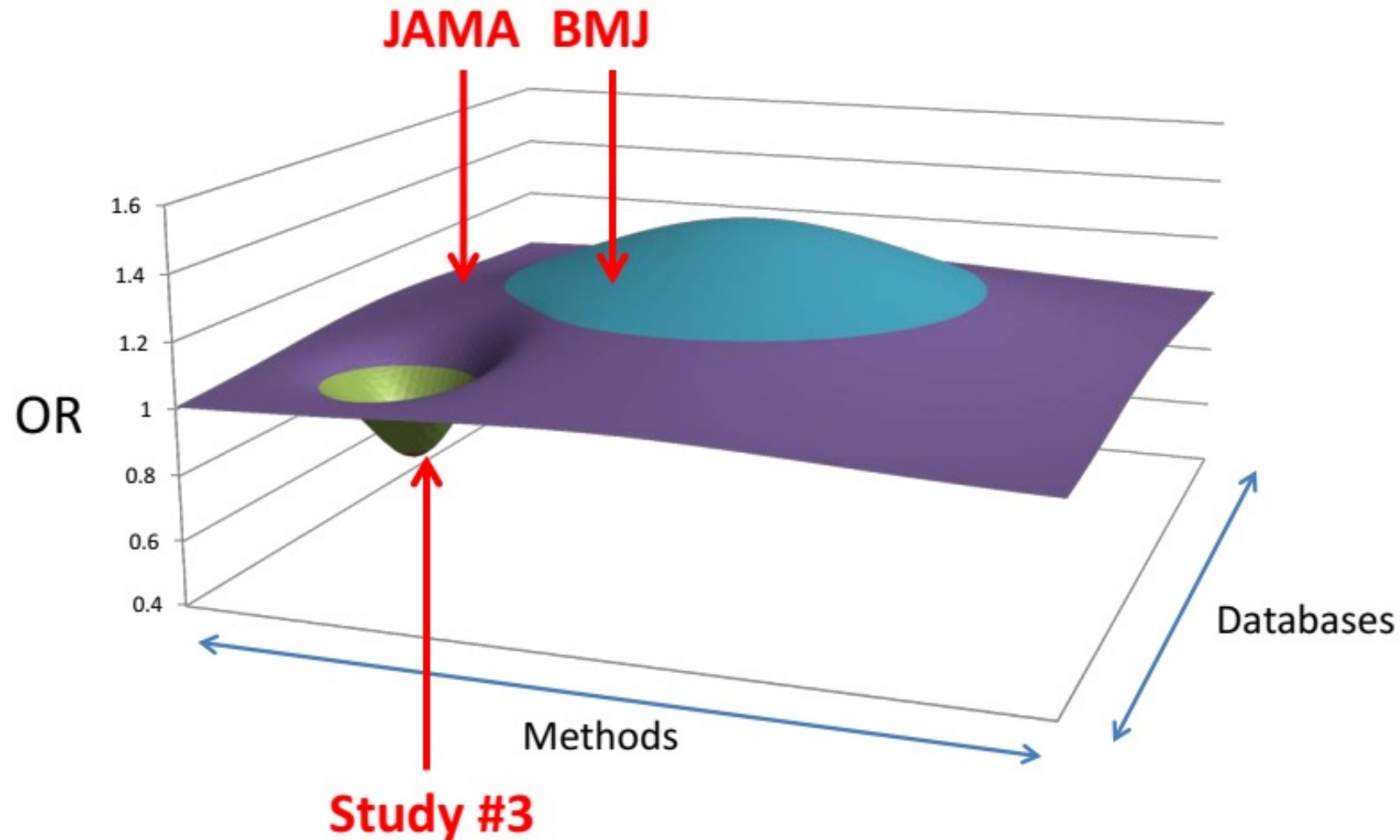


Why OHDSI: Distribution of possible results from one hypothesis



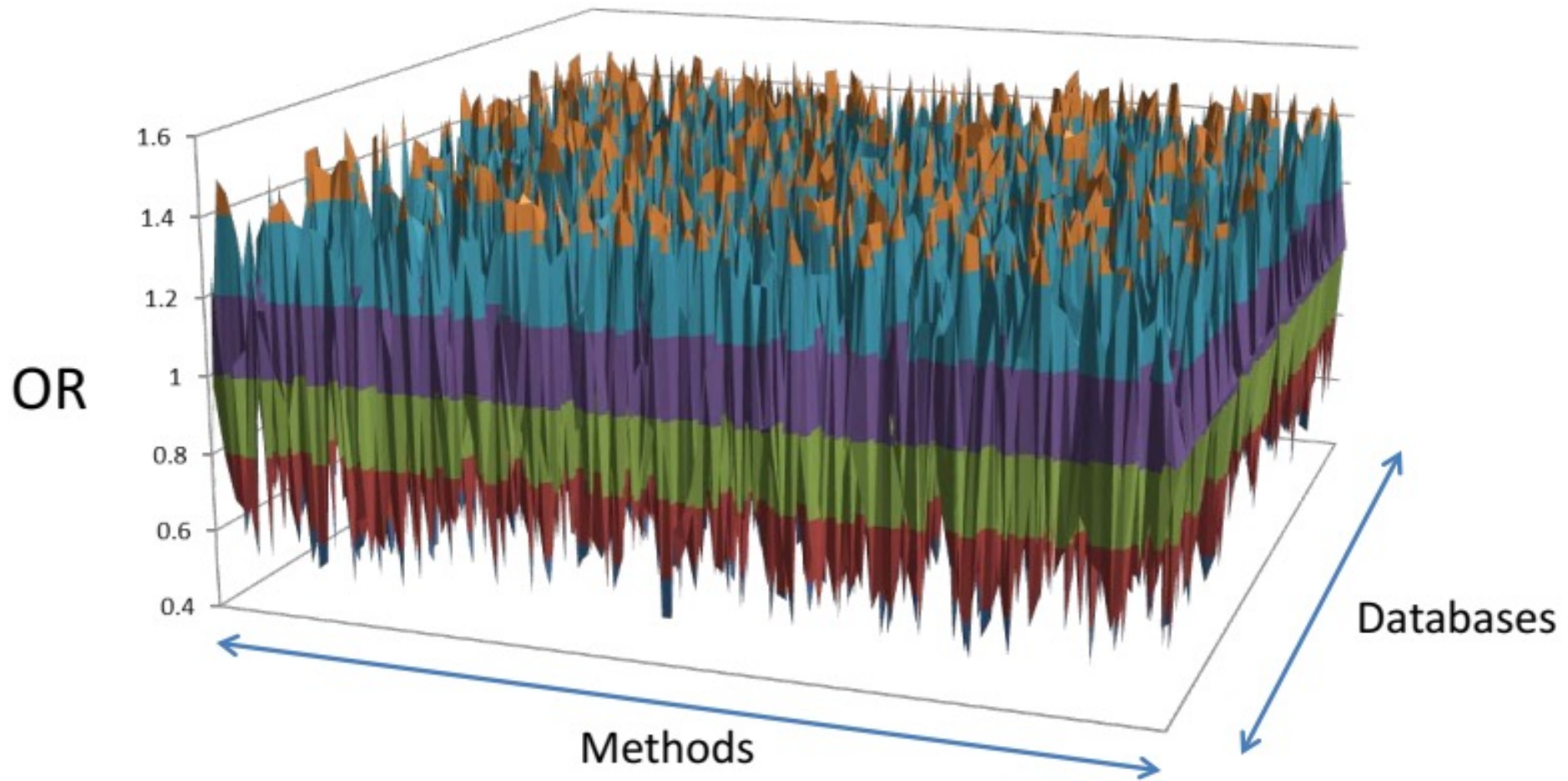


Why OHDSI: Distribution of possible results from one hypothesis





Why OHDSI: Distribution of possible results from one hypothesis





Large-scale evidence based on CDM and distributed research network

- Large-scale in terms of diverse databases
 - Heterogeneous healthcare system, enrolled patients, ethnicity, captured data
 - Korean national insurance vs US Medicare vs US private insurance data vs European administrative data vs EMR
- Large-scale in terms of analytic settings
 - Number of covariates adjusted
 - Diverse analytic settings (PS stratification vs PS matching)
- Large-scale in terms of number of comparisons
- Prespecified analytic process to avoid p -hacking



LEGEND

LARGE-SCALE EVIDENCE GENERATION AND EVALUATION IN A NETWORK OF DATABASES

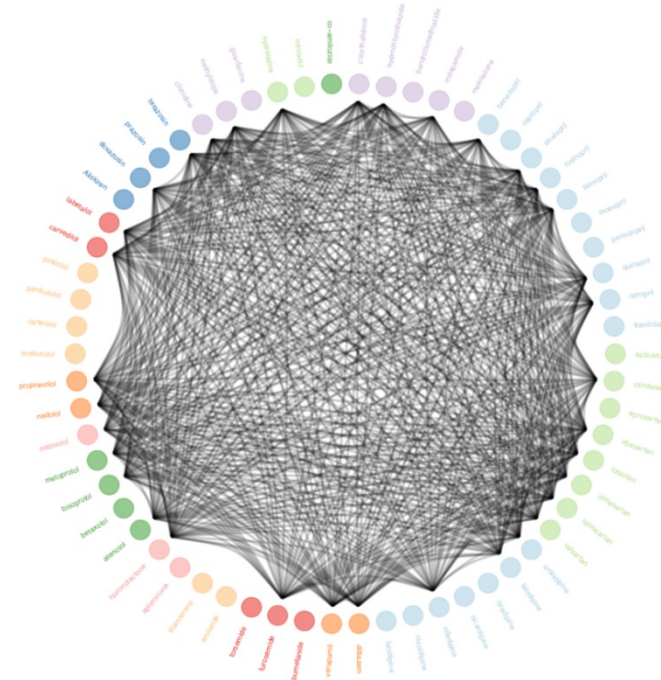


LEGEND knowledge base for hypertension

Head-to-head HTN drug comparisons



- Trials: 40
- $N = 102 - [1148] - 33K$



- Comparisons: 10,278
- $N = 3502 - [212K] - 1.9M$

LEGEND-HTN: Thiazide is better than ACEi for first-line anti-hypertension treatment

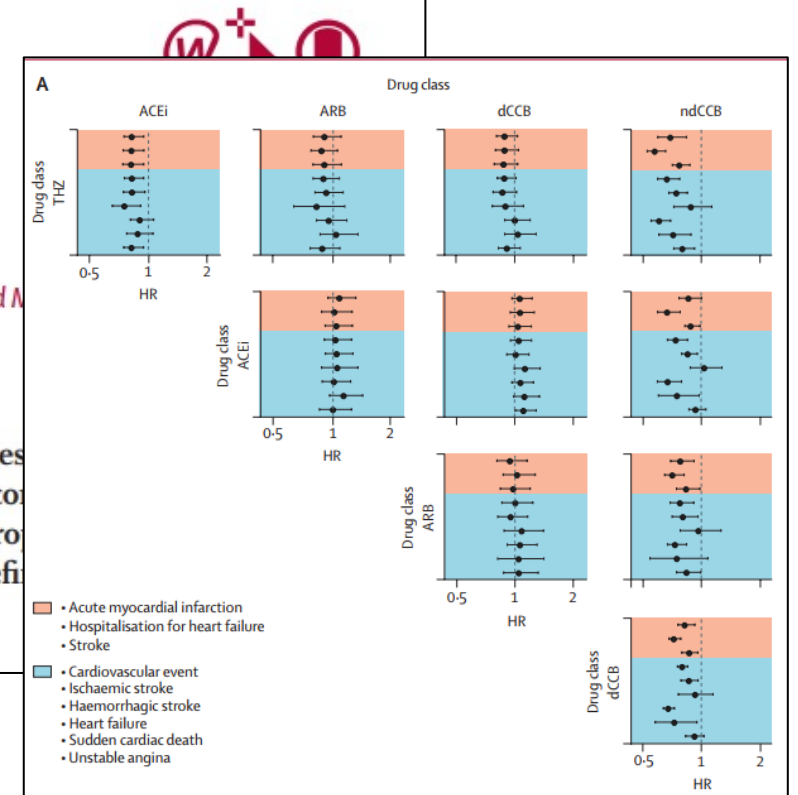
Articles

Comprehensive comparative effectiveness and safety of first-line antihypertensive drug classes: a systematic, multinational, large-scale analysis

Marc A Suchard, Martijn J Schuemie, Harlan M Krumholz, Seng Chan You, Ruijun Chen, Nicole Pratt, Christian G Reich, Jon Duke, David M George Hripcsak, Patrick B Ryan

Summary

Background Uncertainty remains about the optimal monotherapy for hypertension, with current guidelines recommending any primary agent among the first-line drug classes thiazide or thiazide-like diuretics, angiotensin-converting enzyme inhibitors, angiotensin receptor blockers, dihydropyridine calcium channel blockers, and non-dihydropyridine calcium channel blockers, in the absence of comorbid indications. Randomised trials have not further refined choice.







Association of Ticagrelor vs Clopidogrel With Net Adverse Clinical Events in Patients With Acute Coronary Syndrome Undergoing Percutaneous Coronary Intervention

Seng Chan You, MD, MS; Yeunsook Rho, PhD; Behnood Bikdeli, MD, MS; Jiwoo Kim, MS; Anastasios Siapos, MSc; James Weaver, MSc; Ajit Londhe, MPH; Jaehyeong Cho, BS; Jimyung Park, BS; Martijn Schuemie, PhD; Marc A. Suchard, MD, PhD; David Madigan, PhD; George Hripcsak, MD, MS; Aakriti Gupta, MD, MS; Christian G. Reich, MD; Patrick B. Ryan, PhD; Rae Woong Park, MD, PhD; Harlan M. Krumholz, MD, SM

IMPORTANCE Current guidelines recommend ticagrelor as the preferred P2Y12 platelet inhibitor for patients with acute coronary syndrome (ACS), primarily based on a single large randomized clinical trial. The benefits and risks associated with ticagrelor vs clopidogrel in routine practice merits attention.

OBJECTIVE To determine the association of ticagrelor vs clopidogrel with ischemic and hemorrhagic events in patients undergoing percutaneous coronary intervention (PCI) for ACS in clinical practice.

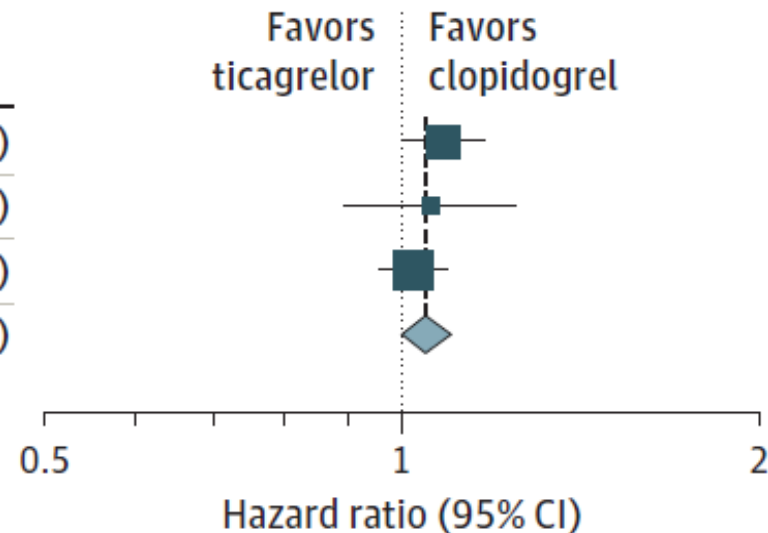
-  [Editorial page 1](#)
-  [JAMA Patient Page page 1](#)
-  [Audio and Supplemental content](#)
-  [CME Quiz at \[jamacmelookup.com\]\(https://jamacmelookup.com\) and CME Questions page 0](#)

<https://data.ohdsi.org/TicagrelorVsClopidogrel/>

<https://github.com/ohdsi-studies/ticagrelorVsClopidogrel/>

Risk of the Primary Outcome (NACE) at 1 Year

Source	No. of events/total No.		Hazard ratio (95% CI)
	Ticagrelor	Clopidogrel	
Optum electronic health record	1307/16 414	1192/16 414	1.08 (1.00-1.17)
IQVIA hospital	294/3998	272/3998	1.06 (0.90-1.24)
Health Insurance Review and Assessment	1883/10 878	1826/10 878	1.02 (0.96-1.09)
Overall: $I^2 = 0.0\%$; $P = .06$	3484/31 290	3290/31 290	1.05 (1.00-1.10)



inhibitor for patients with acute coronary syndrome (ACS), primarily based on a single large randomized clinical trial. The benefits and risks associated with ticagrelor vs clopidogrel in routine practice merits attention.

OBJECTIVE To determine the association of ticagrelor vs clopidogrel with ischemic and hemorrhagic events in patients undergoing percutaneous coronary intervention (PCI) for ACS in clinical practice.

- [← JAMA Patient Page page 1](#)
- [+ Audio and Supplemental content](#)
- [+ CME Quiz at jamacmelookup.com and CME Questions page 0](#)

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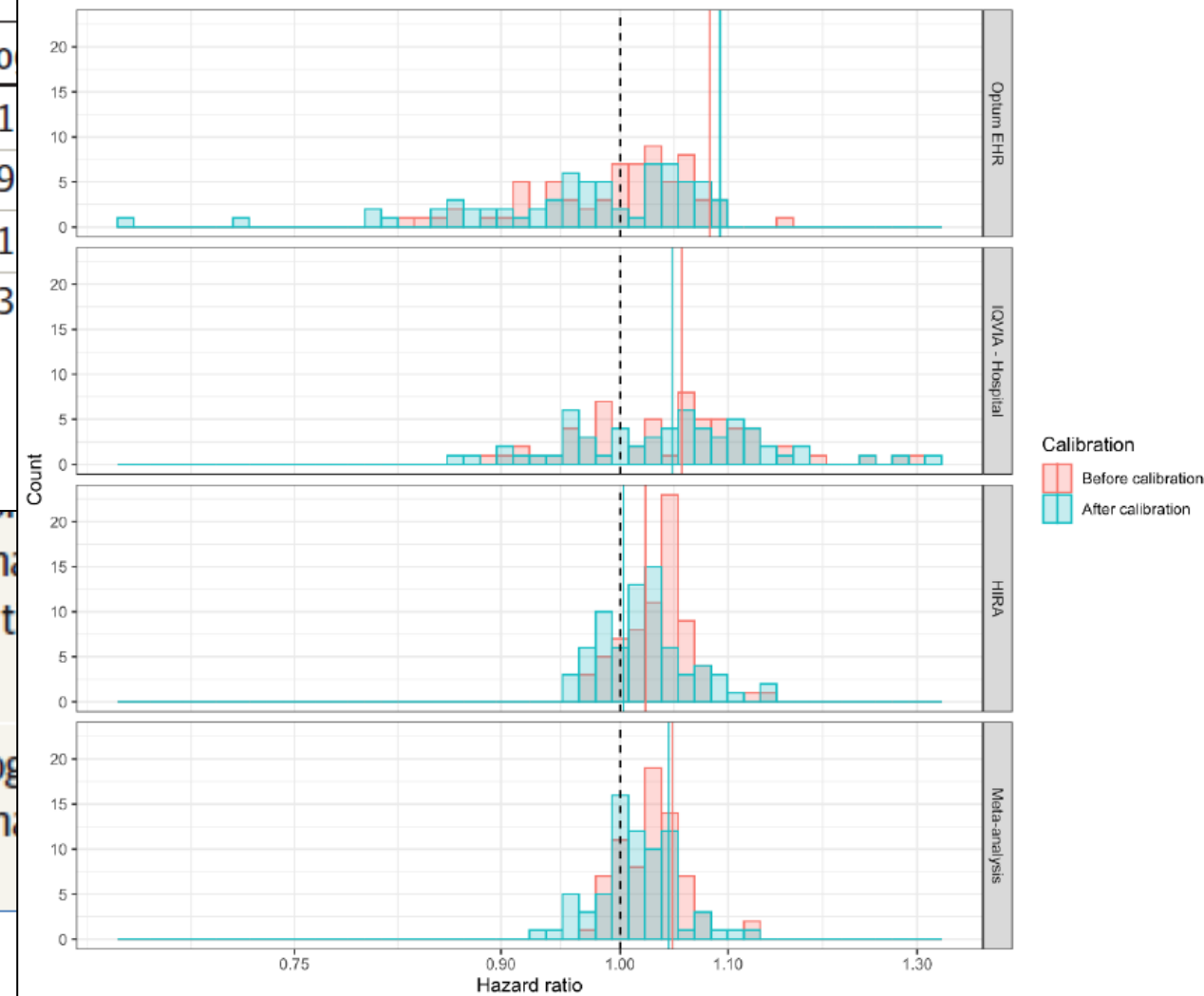
... current guidelines recommend ticagrelor as the preferred P2Y12 inhibitor for patients with acute coronary syndrome (ACS), primarily based on a randomized clinical trial. The benefits and risks associated with ticagrelor in routine practice merits attention.

OBJECTIVE To determine the association of ticagrelor vs clopidogrel on the risk of major adverse cardiovascular events (NACE) and hemorrhagic events in patients undergoing percutaneous coronary intervention in clinical practice.

<https://data.ohdsi.org/TicagrelorVsClopidogrel/>

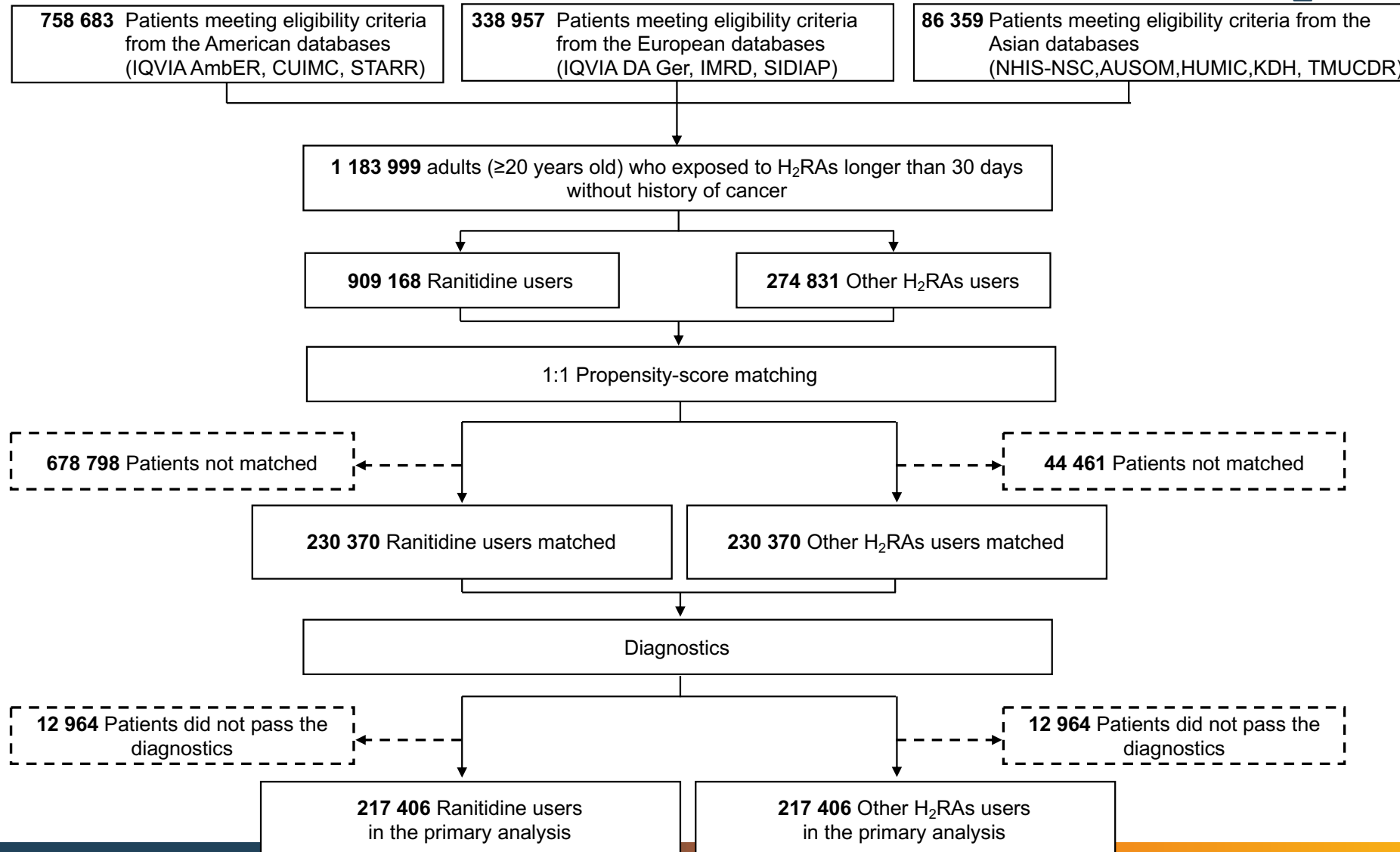
<https://github.com/ohdsi-studies/ticagrelorVsClopidogrel/>

Figure 7. Distribution of risk estimates for NACE from 144 analyses before and after empirical calibration



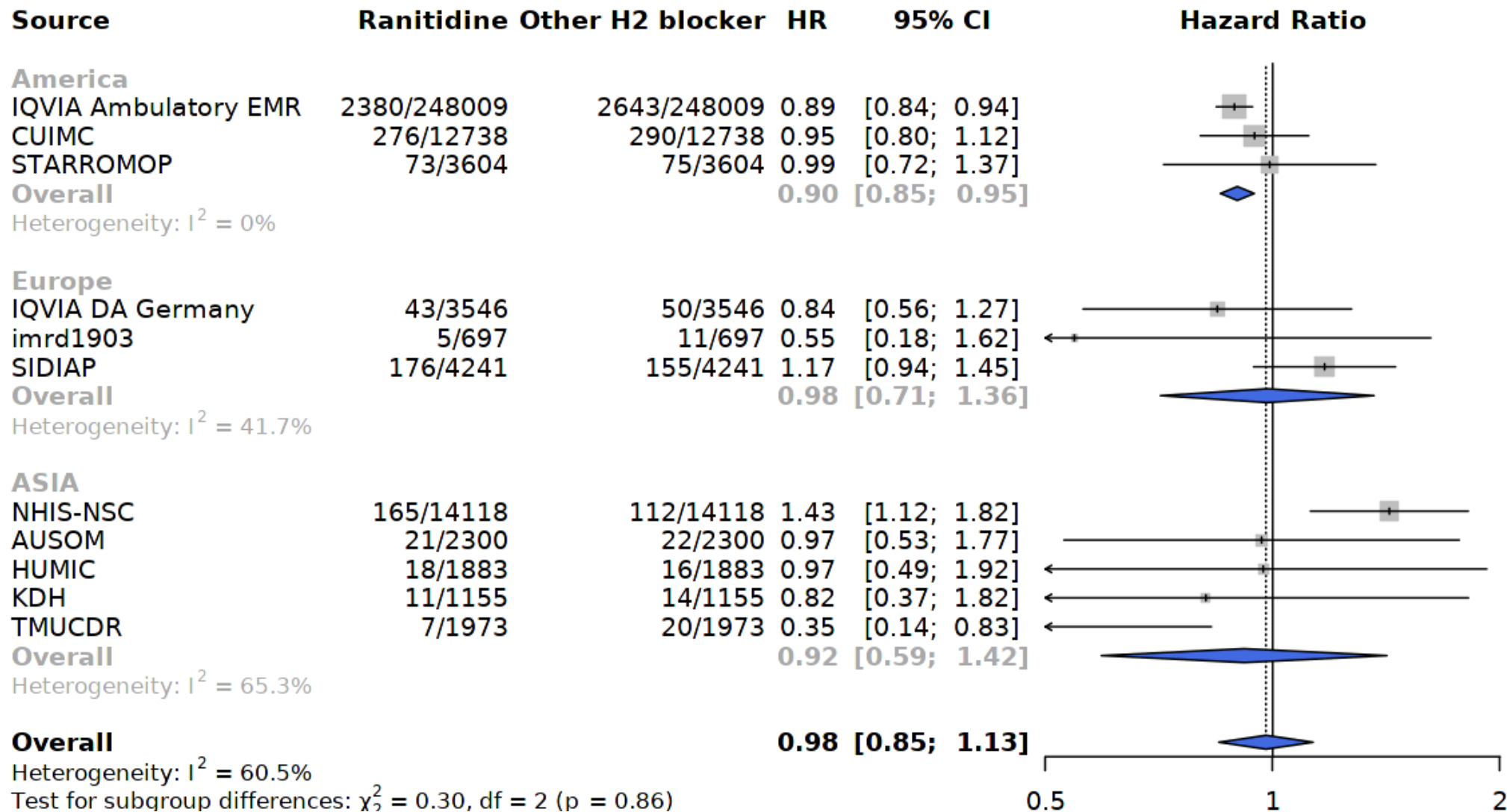


Ongoing international study: The risk of cancer in ranitidine vs other H₂RAs





The risk of cancer in ranitidine vs other H₂RAs



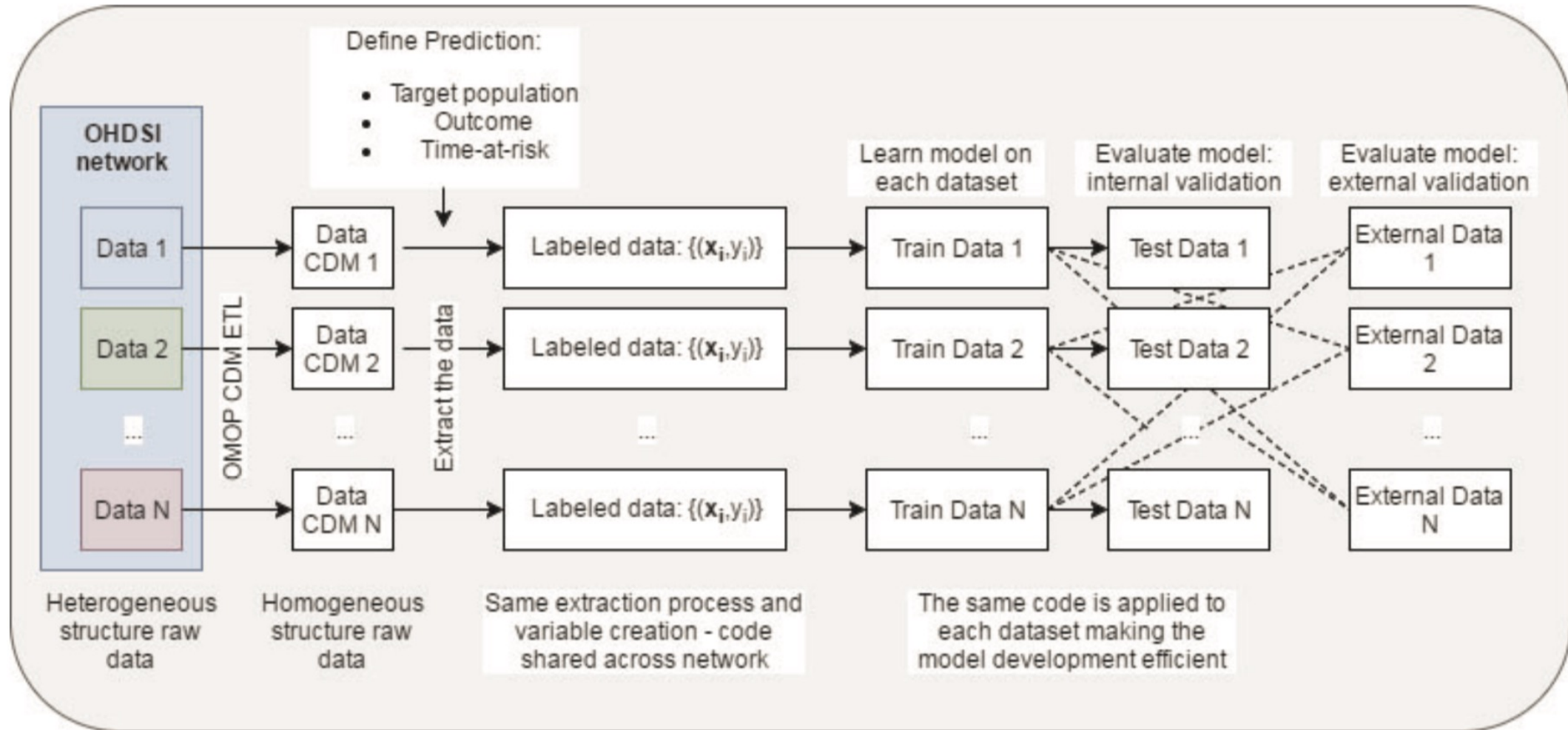


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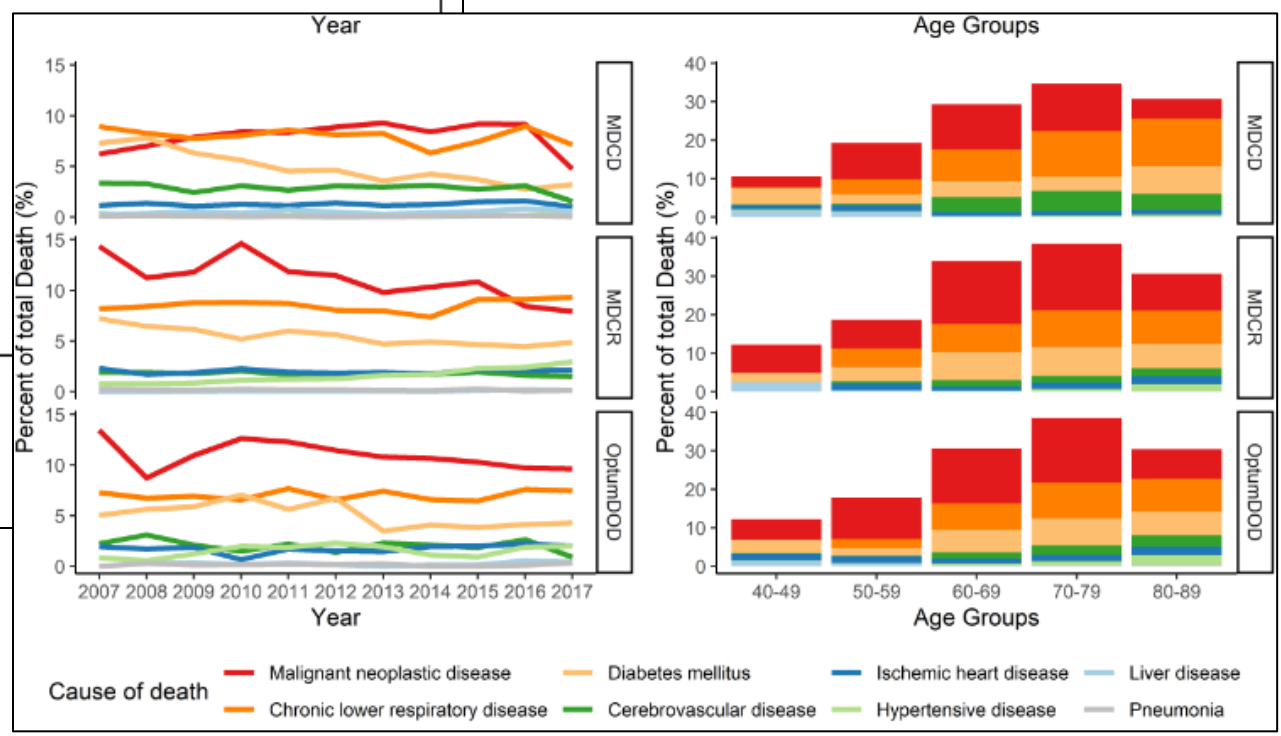
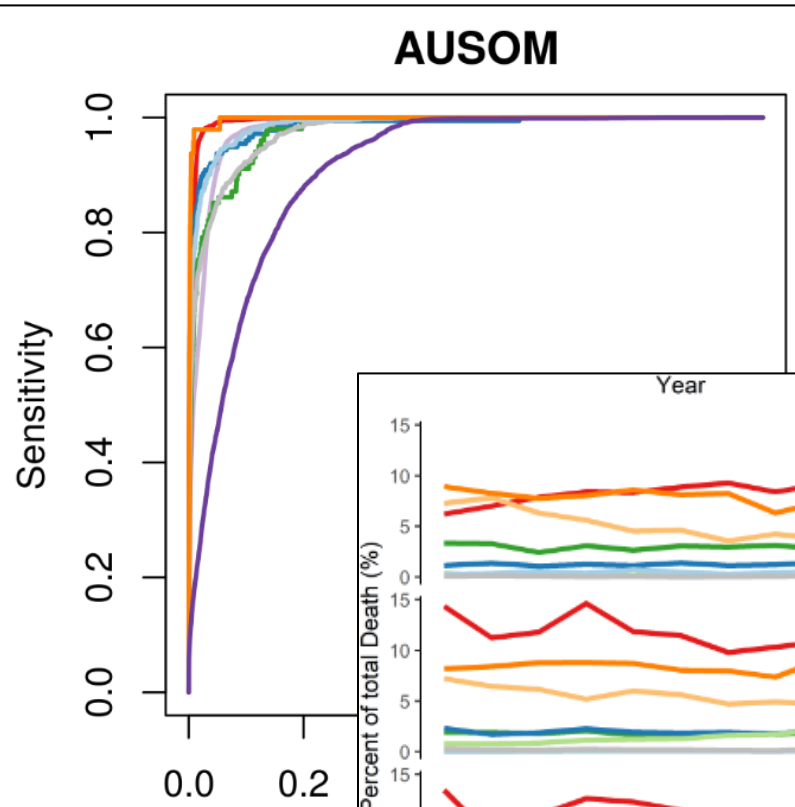
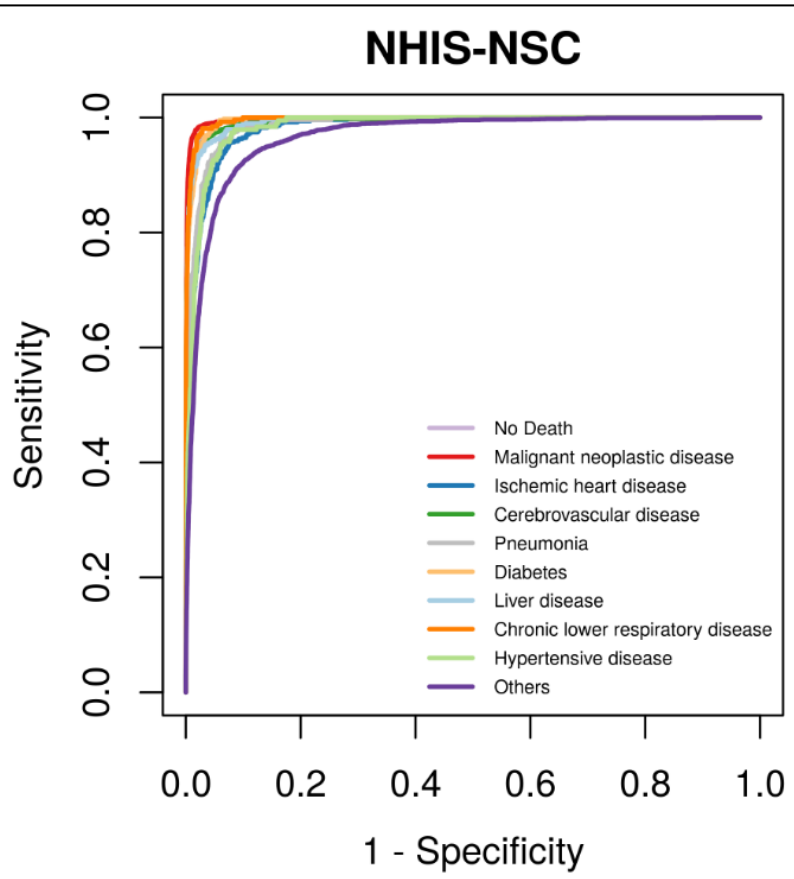


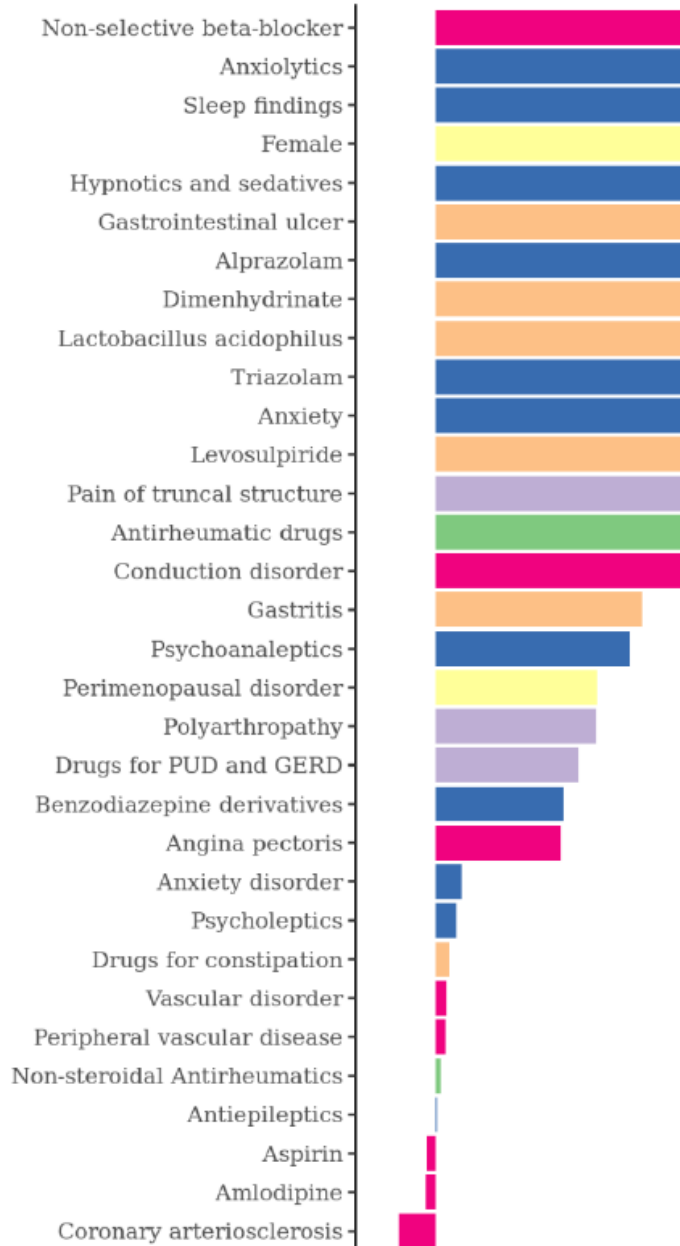
Bring the algorithm to the data, not data to the algorithm





Robust machine-learning model to predict the cause of death based on distributed research network / CDM





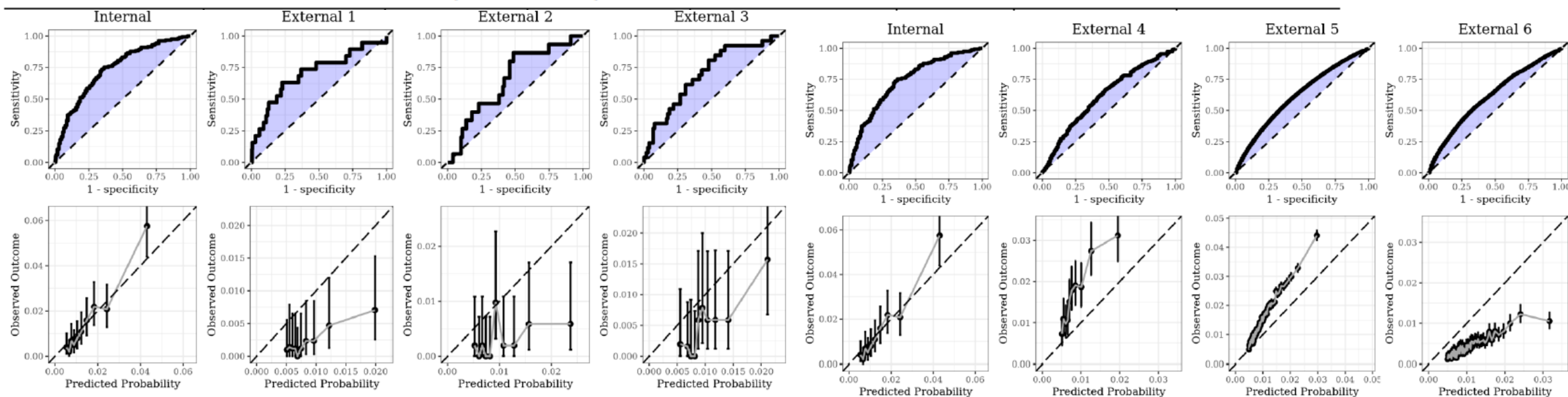
Article

Prediction of Major Depressive Disorder following beta-blocker therapy in patients with cardiovascular diseases

Suho Jin¹, Kristin Kostka², Jose D. Posada³, Yeesuk Kim⁴, Seung In Seo⁵, Dong Yun Lee⁶, Nigam H. Shah⁷, Sungwon Roh⁸, Young-Hyo Lim⁹, Sun Geu Chae¹⁰, Uram Jin¹¹, Sang Joon Son¹², Christian Reigh¹³, Peter R. Rijnbeek¹⁴, Rae Woong Park^{15,*}, and Seng Chan You^{16,*}

Table 2. Performance of the model in internal and external validations

Validation set	Name	n	Outcome	Incidence (%)	AUC	Sensitivity	Specificity
Internal	NHIS	10078	154	1.53	0.74	83.1%	49.5%
External 1	Ajou	8511	19	0.22	0.71	78.9%	49.0%
External 2	Hanyang	5112	15	0.29	0.66	86.7%	49.4%
External 3	Kandong	5097	26	0.51	0.70	80.8%	49.9%
External 4	STARR	26,258	439	1.67	0.62	77.2%	40.4%
External 5	OpenClaims	4,295,013	59,045	1.38	0.62	75.1%	40.2%
External 6	AmbEMR	883,198	3,342	0.38	0.62	75.4%	40.1%



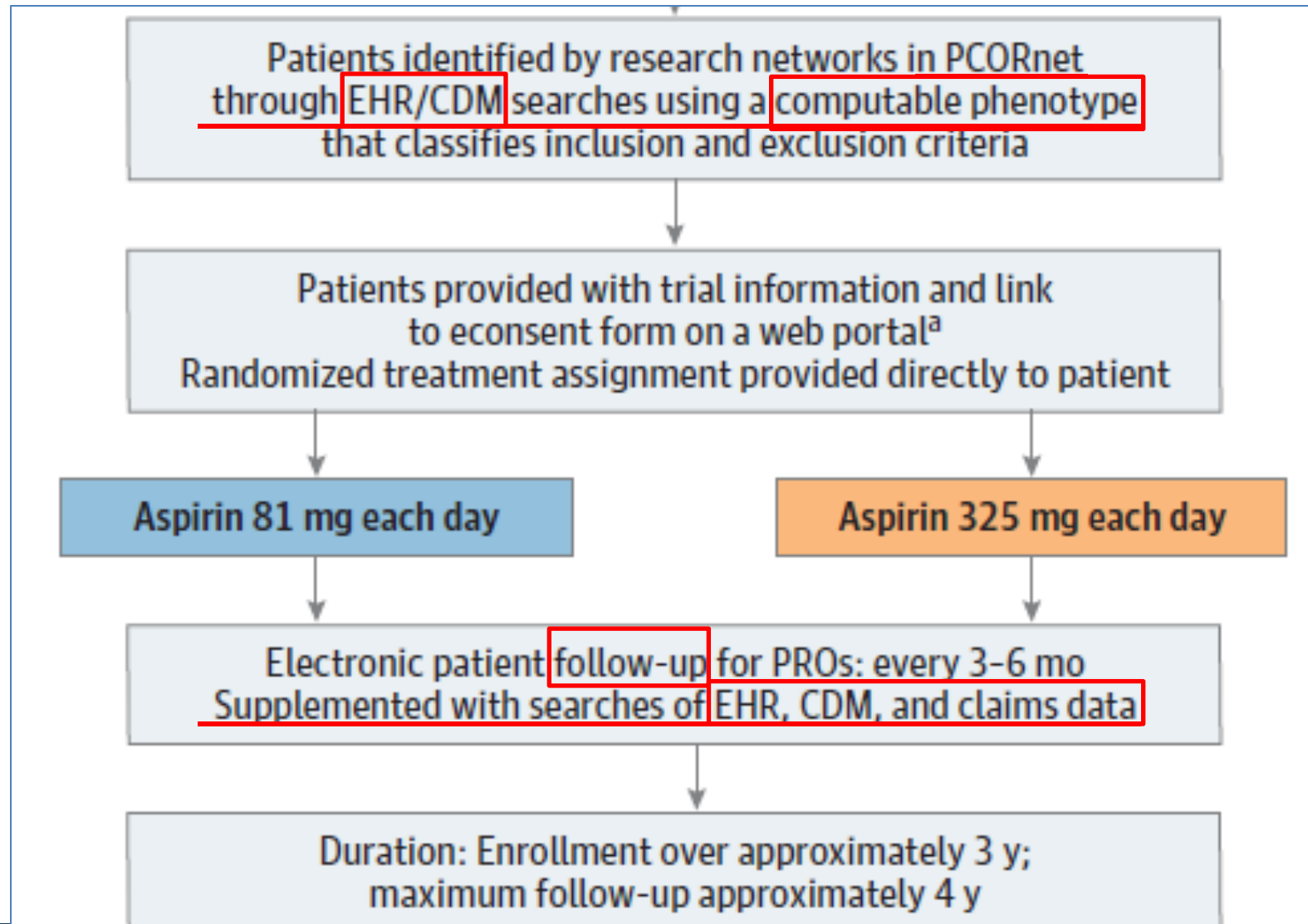
Rationale and Design of the Aspirin Dosing—A Patient-Centric Trial Assessing Benefits and Long-term Effectiveness (ADAPTABLE) Trial

DESIGN, SETTING, AND PARTICIPANTS This pragmatic, open-label, patient-centered, randomized clinical trial is being conducted in 15 000 patients within the National Patient-Centered Clinical Research Network (PCORnet), a distributed research network of partners including clinical research networks, health plan research networks, and patient-powered research networks across the United States. Patients with established ASCVD treated in routine clinical practice within the network are eligible. Patient recruitment began in April 2016. Enrollment was completed in June 2019. Final follow-up is expected to be completed by June 2020.

MAIN OUTCOMES AND MEASURES The primary efficacy end point is the composite of all-cause mortality, hospitalization for nonfatal myocardial infarction, or hospitalization for a nonfatal stroke. The primary safety end point is hospitalization for major bleeding associated with a blood-product transfusion. End points are captured through regular queries of the health systems' common data model within the structure of PCORnet's distributed data environment.



Pragmatic Clinical Trial based on **Nationwide CDM** data network





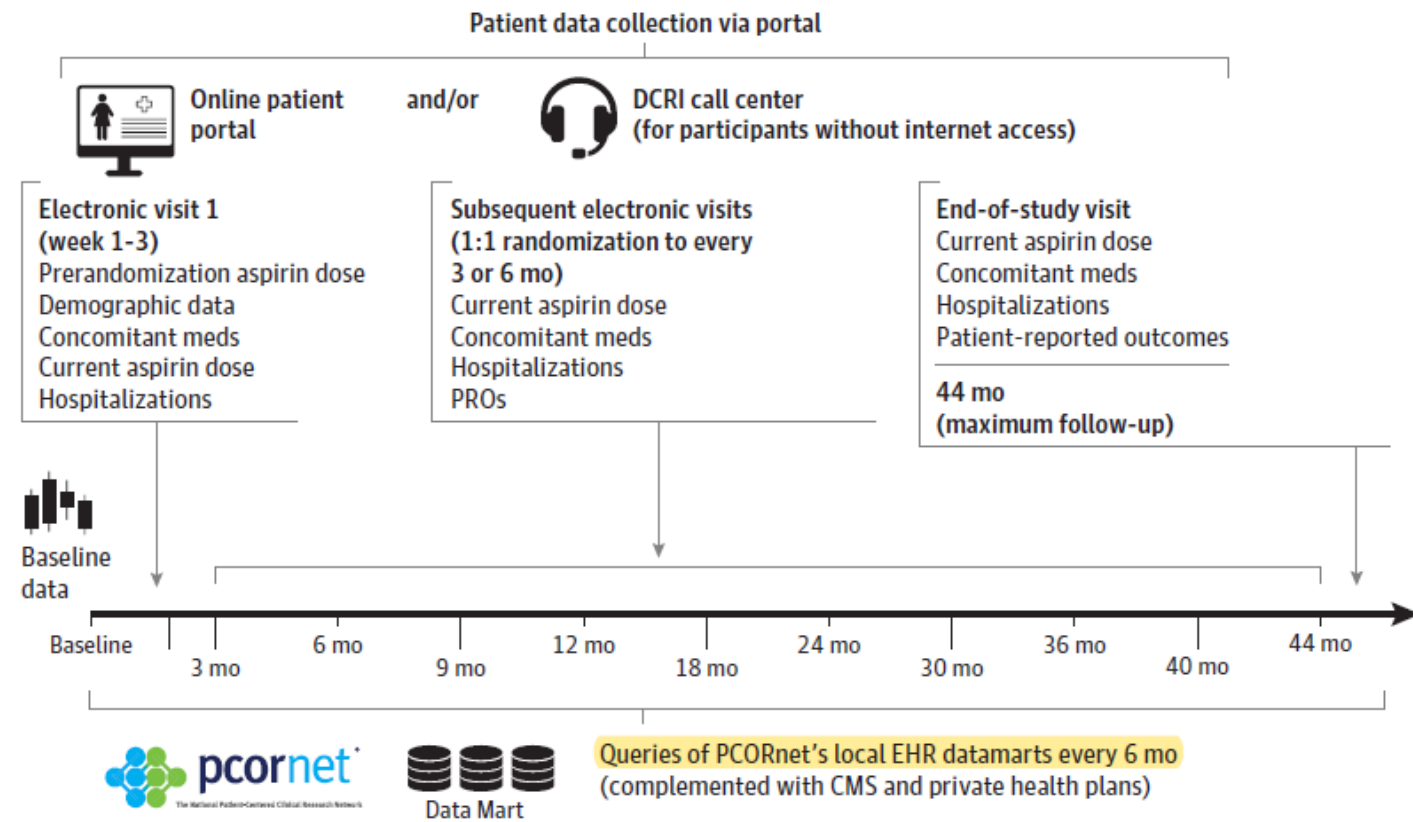
Pragmatic Clinical Trial based on Nationwide CDM data network

Annals of Internal Medicine

IDEAS AND OPINIONS

The ADAPTABLE Trial and PCORnet: Shining Light on a New Research Paradigm

Figure 3. Data Collection



15 000 Patients with known ASCVD + ≥ 1 enrichment factor

Patients identified by research networks in PCORnet through EHR/CDM searches using a computable phenotype that classifies inclusion and exclusion criteria

Patients provided with trial information and link to econsent form on a web portal^a
Randomized treatment assignment provided directly to patient

Aspirin 81 mg each day

Aspirin 325 mg each day

Electronic patient follow-up for PROs: every 3-6 mo
Supplemented with searches of EHR, CDM, and claims data

Duration: Enrollment over approximately 3 y;
maximum follow-up approximately 4 y

Primary end point:
composite of all-cause mortality,
hospitalization for MI,
or hospitalization for stroke

Primary safety end point:
hospitalization for
major bleeding



Longitudinal Expansion of Data: Integration with Standardized Nationwide Claim Data

심사평가원, '보건의료 분야 결합전문기관' 최초 지정

- 조직·인력, 시설·시스템, 개인정보 안전 및 보안 등 지정요건 충족 -

□ 건강보험심사평가원(원장 김선민, 이하 '심사평가원')이 보건복지부에서 주관한 '데이터 결합전문기관' 지정을 위한 지정심사위원회를 거쳐, 10월 29일 '보건의료 분야 결합전문기관'으로 최초 지정되었다.

○ 결합전문기관 지정은 데이터 이용 활성화를 통한 신산업 육성을 위해 가명정보*의 결합이 가능토록 개정된 데이터3법('20.8.5.시행)에 따라, 가명정보에 대한 결합전문기관을 지정하는 것으로 올해 최초 도입됐다.

사건규격 상세 (용역)

[공공기관 요청규격서]

참조번호	계약부-3452호	사건규격등록번호	923681
품명(사업명)	공통데이터모델(CDM) 표준용어 매핑사전 검증 및 데이터 변환		
배정예산액	₩ 395,000,000		
공개일시	2020/10/30 14:52	의견등록마감일시	2020/11/02 23:5
공고기관	건강보험심사평가원 편정훈(033-739-2612)		
수요기관	건강보험심사평가원		
SW사업대상여부	비대상	납품(완수)기한 (납품일수)	계약 후 90일 이내



Longitudinal Expansion of Data: Integration with Standardized Nationwide Claim Data

UPDATED. 2020-11-06 15:24 (금)

MEDICAL Observer

정책 | 학술 | 제약 | 병의원 | CME | 인터뷰 | 포토뉴스

순환기/뇌혈관 | 내분비/신장 | 소화기/류마티스 | 호흡기/알레르기/감염 | 암/혈액/희귀/소아청소년 | 피부/성형/정신

HOME > 학술 > 순환기/뇌혈관 > 내분비/신장

무작위 임상연구+리얼월드=세계 임상연구'1위'가능?

박선혜 기자 | 승인 2018.10.26 06:15 | 댓글 0

실용적(Pragmatic) RCT 연구 중요성 대두...등록사업·의료기록 등 이용해 RCT 진행
국내 전문가 "우리나라 실용적 RCT 할 수 있는 최적 조건 갖췄다"

국내 학계에서는 실용적 RCT가 우리나라에 최적화된 연구 디자인이라고 평가한다. 우리나라는 전 국민 단일 건강보험 체계로, 국민건강보험공단, 건강보험심사평가원에 국민들의 의료 데이터가 모이기 때문이다.



박 교수는 "우리나라는 건보공단 또는 심평원 자료를 통해 환자가 복용한 치료제, 입원 여부 등에 대한 정보를 모두 알 수 있다. 전 국민 의료기록이 모니터링된다"며 "때문에 환자가 병원에 방문할 때마다 일일이 예후를 확인하지 않아도 된다. 실용적 RCT를 잘할 수 있는 국가적인 시스템이 마련돼 있다. 이를 잘 활용하면 우리나라가 전 세계 임상연구 1등을 할 수 있다"고 피력했다.

김 교수는 "대규모 등록사업이나 코호트가 잘 구축돼 있으면 실용적 RCT를 시작하기 쉽다"며 "우리나라는 단일 건강보험 체계라는 점에서 다른 나라에 비해 실용적 RCT를 진행하기 훨씬 유리한 상황"이라고 강조했다.

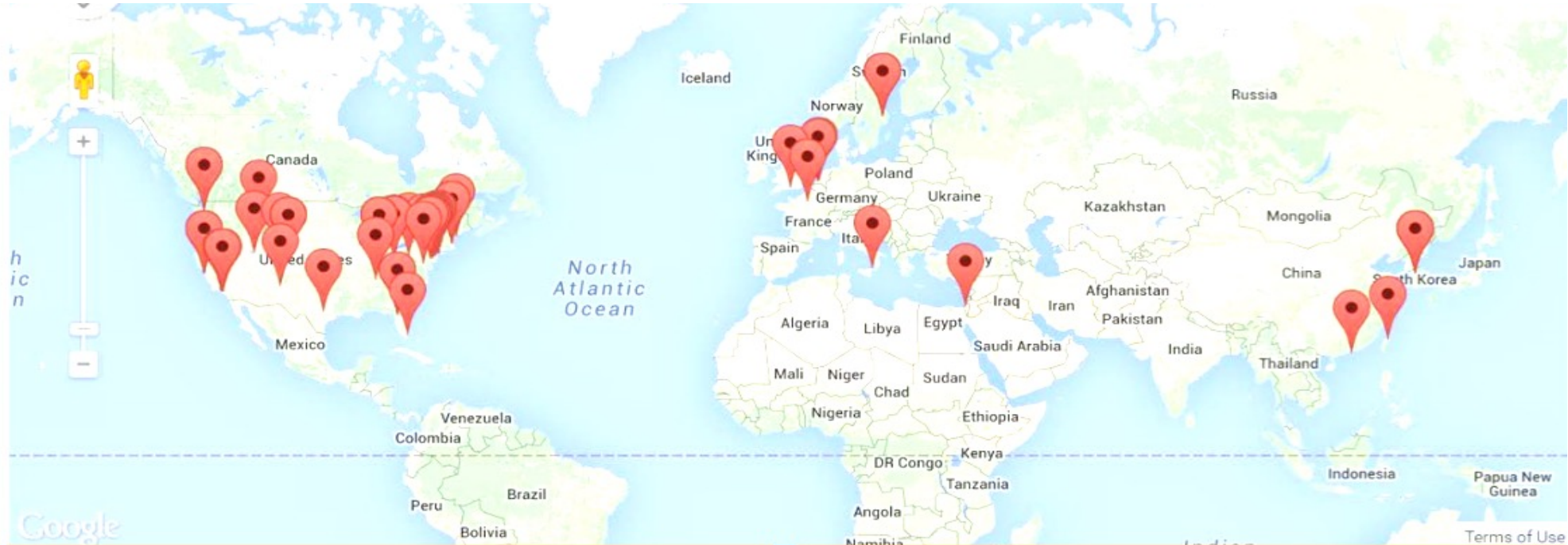
'개인정보보호법'에 발목 잡혀..."좋은 시스템이 있는데 시작하지 못한다"

하지만 이러한 장점에도 불구하고 우리나라에서는 실용적 RCT를 하기 위한 걸음마조차 떼지 못한 실정이다. 가장 큰 걸림돌은 '개인정보' 문제다. 개인정보보호법이 강화되고 개인정보 보호가 민감한 개인정보로 여겨져 환자들의 연구 참여 동의를 받기란 쉽지 않기 때문이다.



OHDSI (Observational Health Data Sciences and Informatics)

- International collaborative consortium applying open-source data analytic solutions based on **OMOP-Common Data Model** (CDM) to a large network of health databases across the world



OHDSI Collaborators:

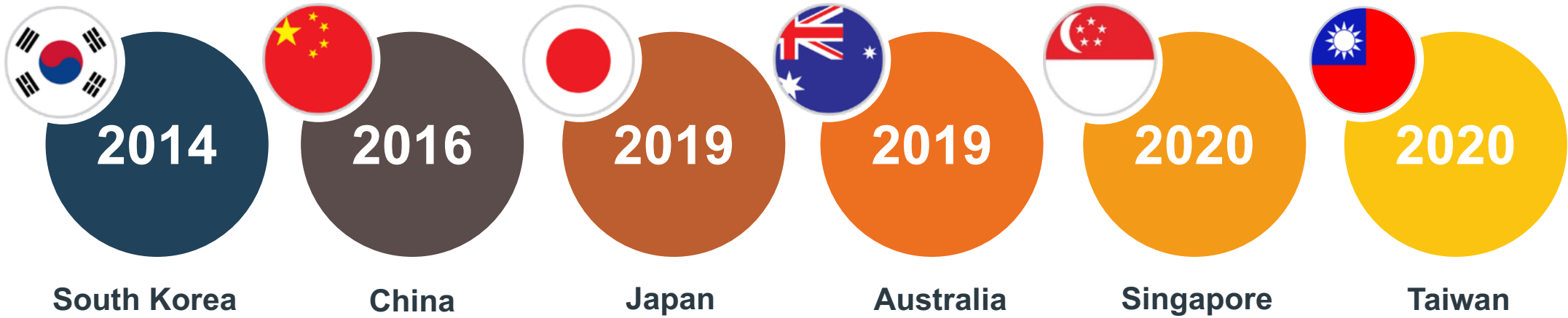
- >100 researchers in academia, industry and government
- >10 countries

OHDSI Data Network:

- >40 databases standardized to OMOP common data model
- >500 million patients



OHDSI APAC Chapters Introduction





The Book of OHDSI

The Book of OHDSI Korea

OHDSI-Korea

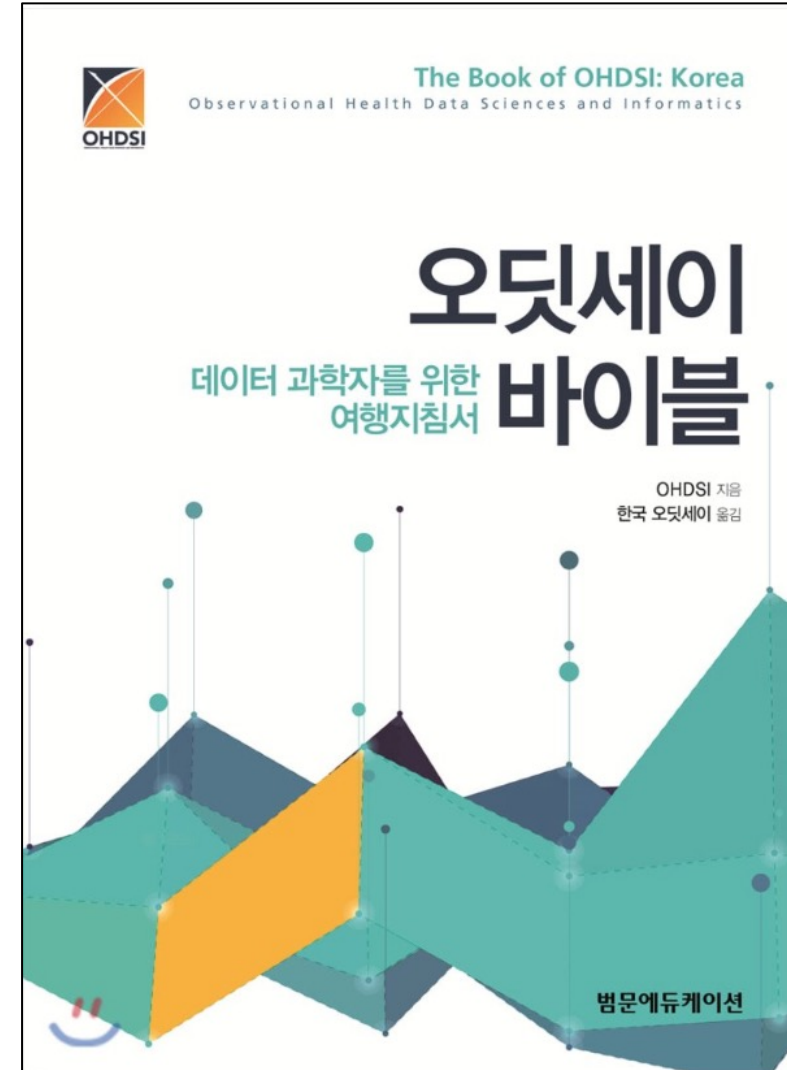
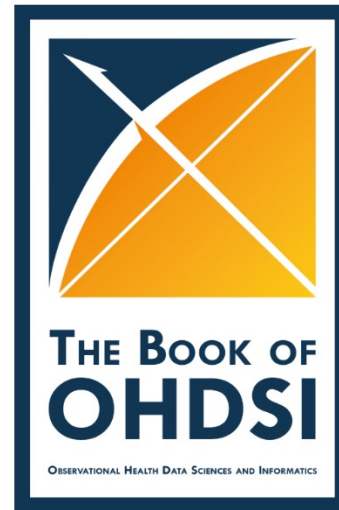
2019-10-18

서문

이 책은 관찰 보건 데이터 과학 및 정보학 (Observational Health Data Science and Informatics : OHDSI) 공동작업에 대한 내용을 담고있다. OHDSI 커뮤니티에 의해 작성된 이 책은 OHDSI 관련 모든 지식의 중앙저장소 역할을 담당하고자 쓰여졌으며 오픈소스 개발 도구들을 통해 커뮤니티에 의해 관리되는 생명력있는 문서로 계속 진화하고 있다. 또한 ohdsi-korea.github.io/TheBookOfOhdsiKorea/에서 온라인으로 항상 최신 버전의 책을 무료로 받아 볼 수 있으며 실제로 구입을 원할 경우 Amazon 등에서 구입이 가능하다.

이 책의 목표

이 책은 OHDSI 관련 모든 지식의 중앙저장소 역할을 담당하고자 쓰여졌으며 OHDSI 커뮤니티, OHDSI 데이터 표준과 OHDSI 도구들에 중점을 두었다. OHDSI의 초보자와 숙련자 모두를 위해 현실적으로 필요 이론과 사용방법에 대한 교육을 제공하는 실용적인 부분에 목표를 두고 있다. 이 책을 읽은 뒤 당신은 OHDSI란 무엇인가, 또한 그 여정에 어떻게 동참할 것인가에 관하여 이해하게 될 것이다. 또한 공통 데이터 모델(CDM)과 표준화된 용어들이 무엇인지, 이러한 것들이 관찰 보건 데이터베이스의 표준화에 어떻게 사용되는지 알게 될 것이다. 이 데이터에 대해 Clinical characterization, Population-level estimation,





*Thank
You*
for your time