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pour les sciences de la vie et de la santé

Institut Thématique Multi-Organismes
Technologies pour la santé

Interopérabilité des données pour la recherche

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Quel est l'enjeu de l'interopérabilité pour la recherche?

- Coût des données observationnelles en santé << Coût des données produites dans le cadre de recherche → opportunité pour la recherche mais problème de validité

- Données multicentriques = augmenter la validité des données

- Même format de données, même codage → même analyse possible sur de multiples sites

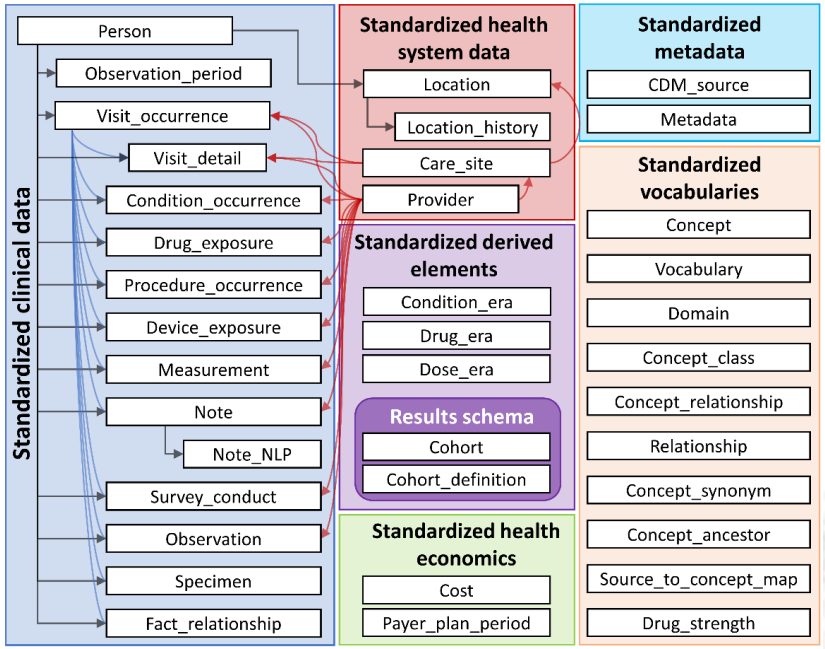
Entrepôts de données de santé interopérables = recherches multicentriques avec une grande réactivité

Interopérabilité: quelles conditions?

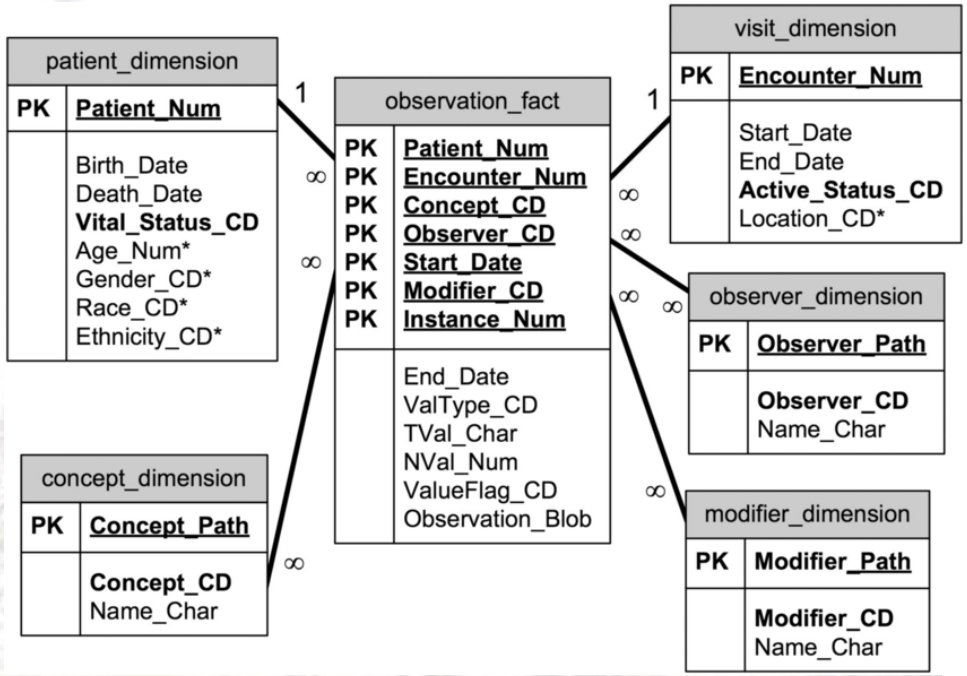
- Interopérabilité technique
- Interopérabilité syntaxique: définit le format d'échange des données
  - Exemples de format pour les entrepôts: i2b2, OMOP
- Interopérabilité sémantique: utilisation d'un vocabulaire standardisé et codé

Interopérabilité syntaxique pour les entrepôts

The Common Data Model (OMOP)



The i2b2 star schema



Interopérabilité sémantique pour les entrepôts

Données

البيانات

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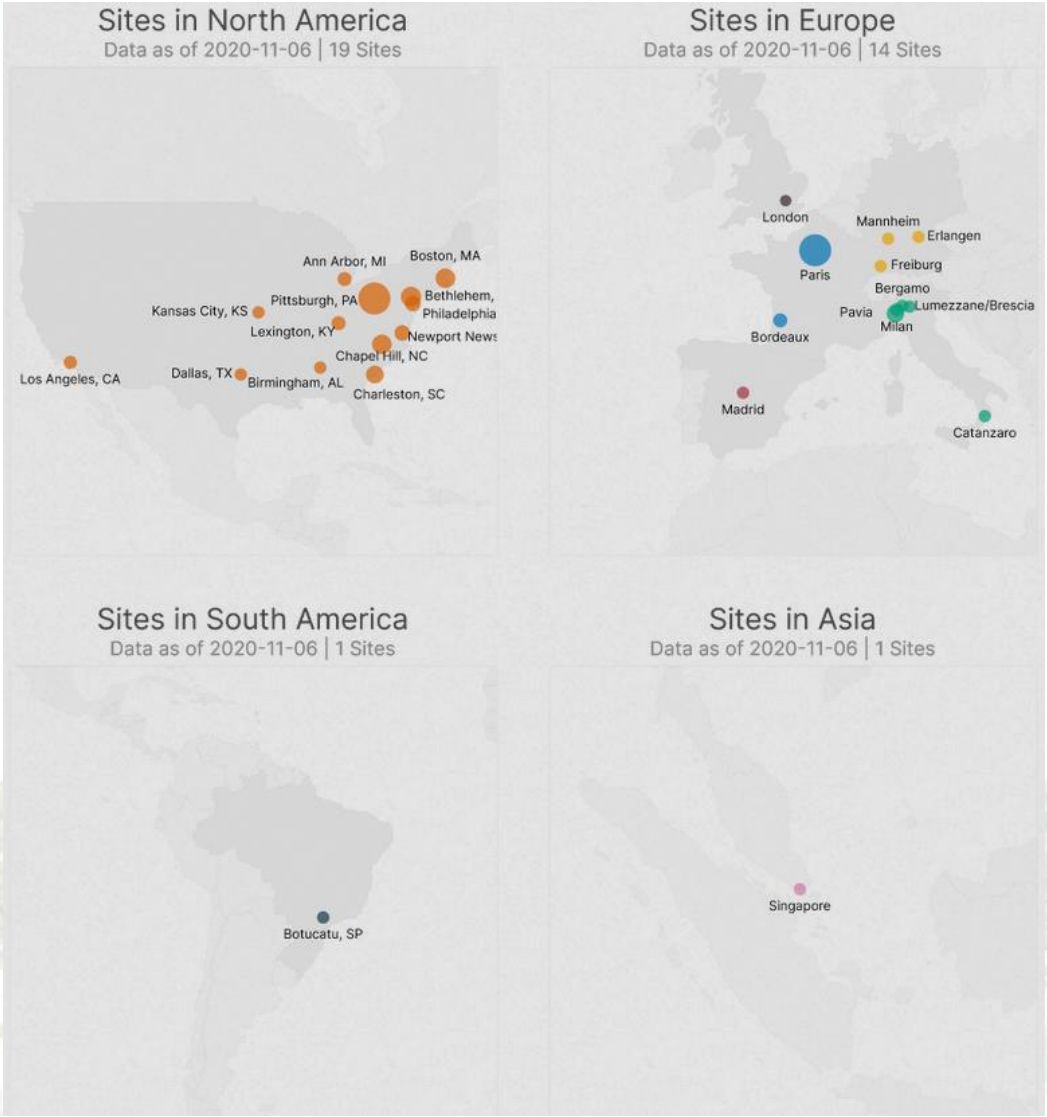
Data

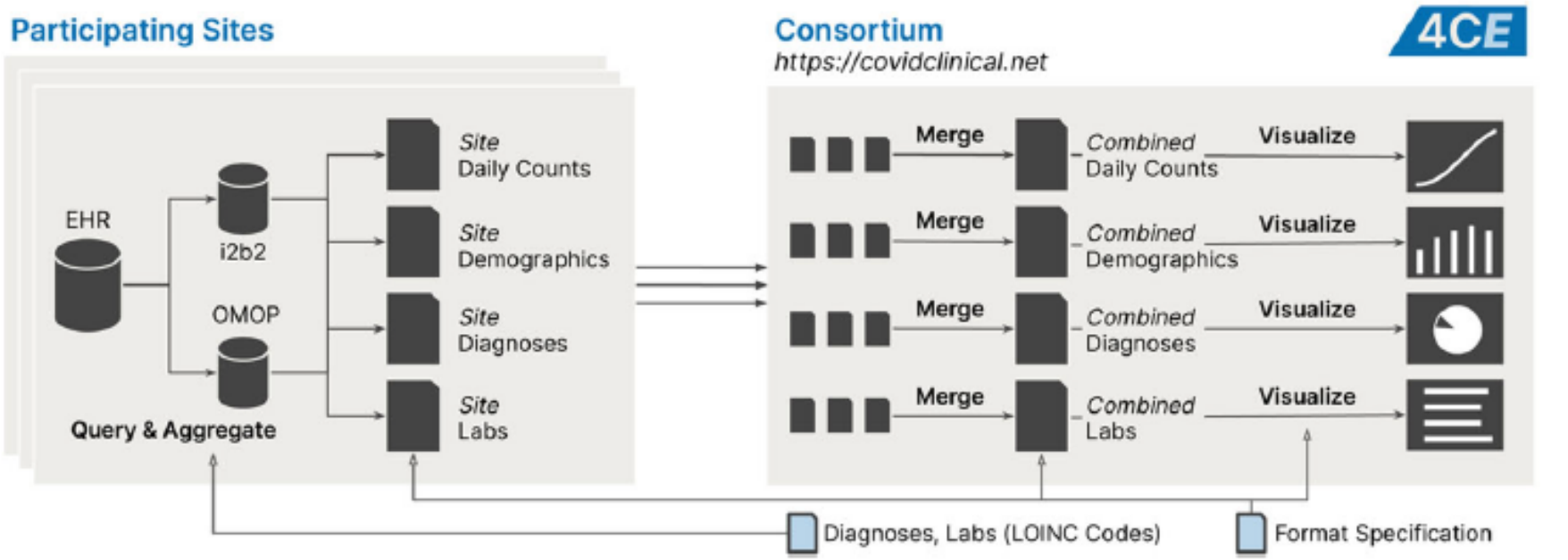
- Utilisation de terminologies
  - Exemples de systèmes de codification:
    - CIM-10 (classification internationale des maladies)
    - ATC (Système de classification anatomique, thérapeutique et chimique, en anglais : Anatomical Therapeutic Chemical)
    - LOINC (Logical Observation Identifiers Names & Codes, utilisé principalement pour le codage des actes de biologie médicale)
  -

Les initiatives de réutilisation de données d'entrepôts interopérables à l'ère du COVID: 4CE et OHDSI

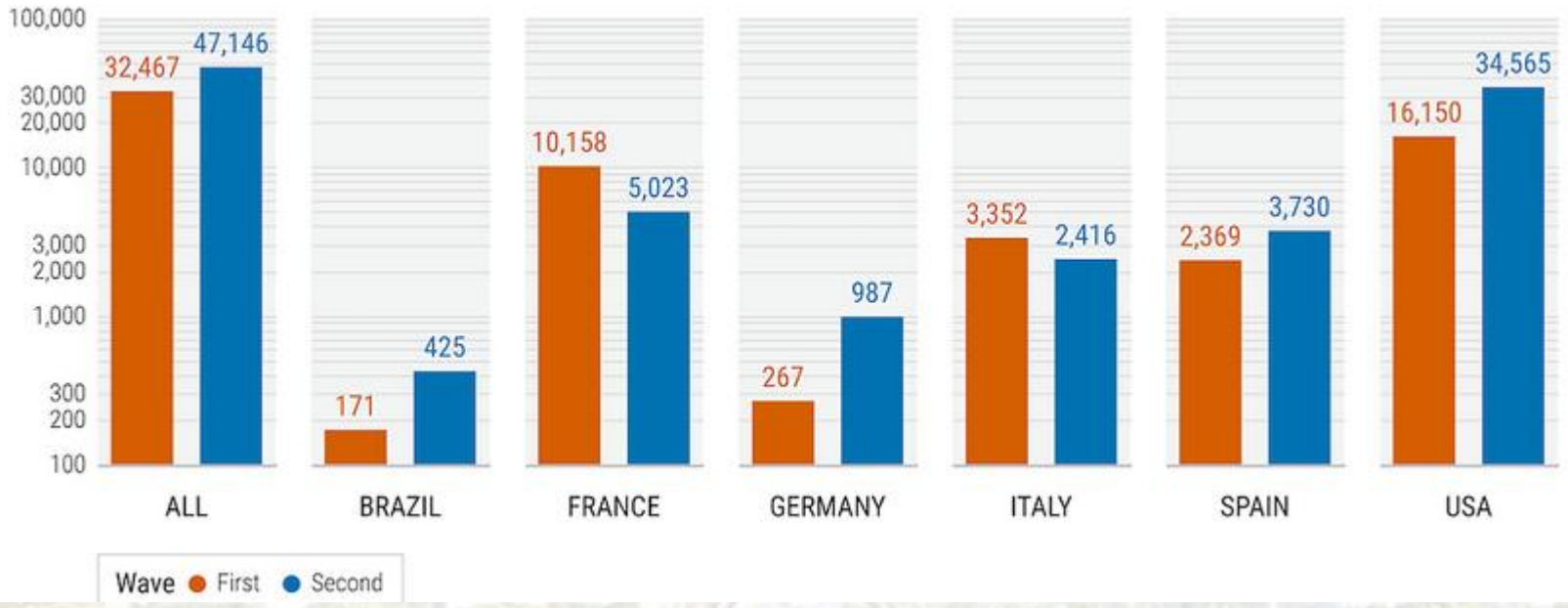
L’initiative 4CE: les entrepôts participant



L'initiative 4CE: les grands principes



International Changes in COVID-19 Clinical Trajectories Across 315 Hospitals and 6 Countries: Retrospective Cohort Study, Weber et al, JMIR



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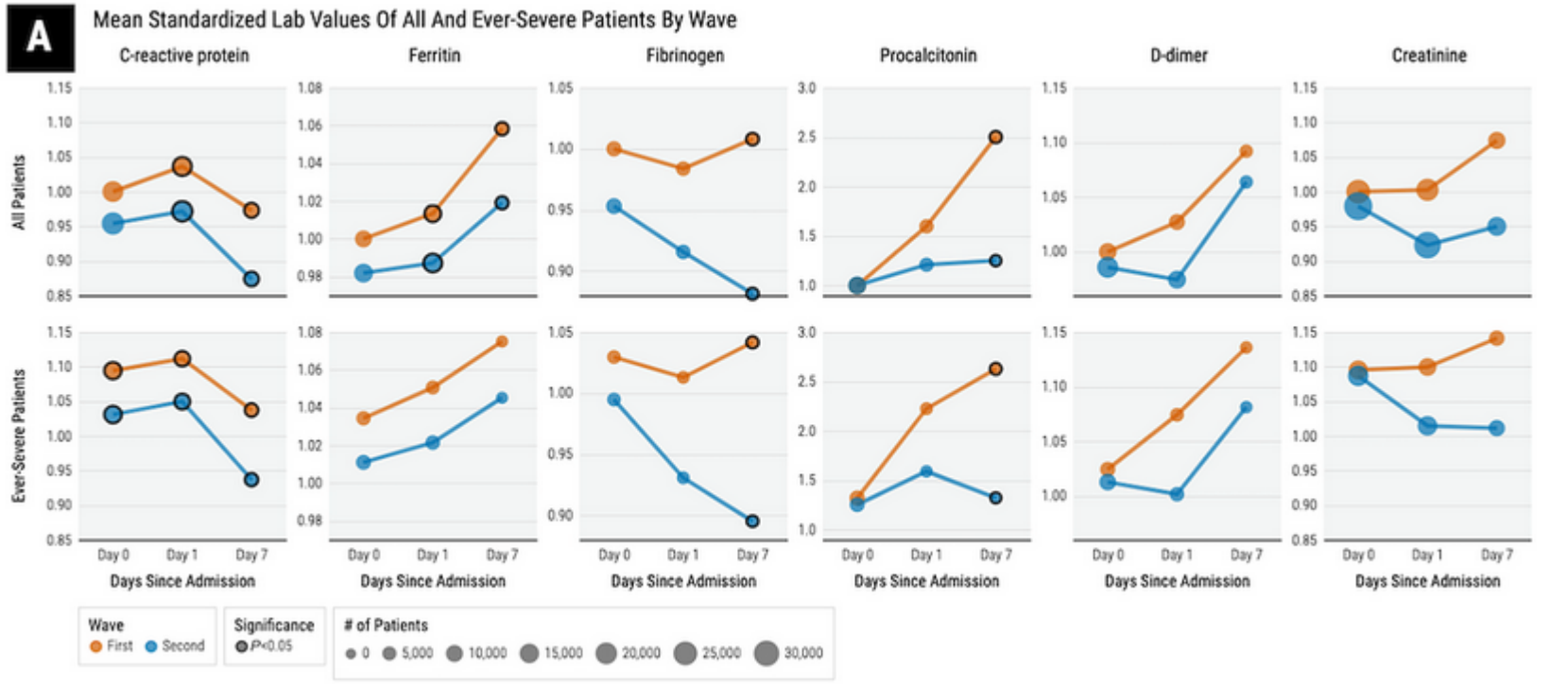
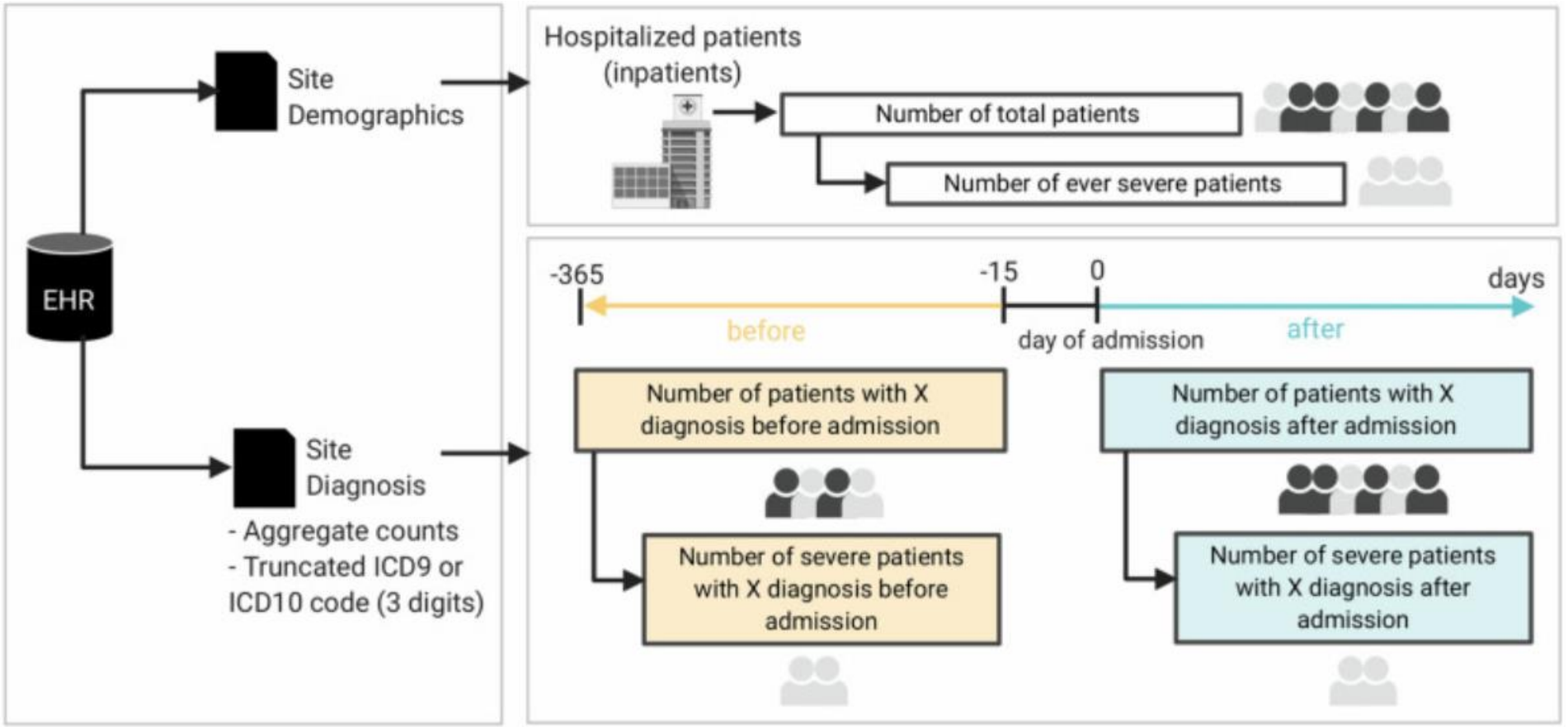


Multinational characterization of neurological phenotypes in patients hospitalized with COVID-19, Trang et al, Sci rep, 2021



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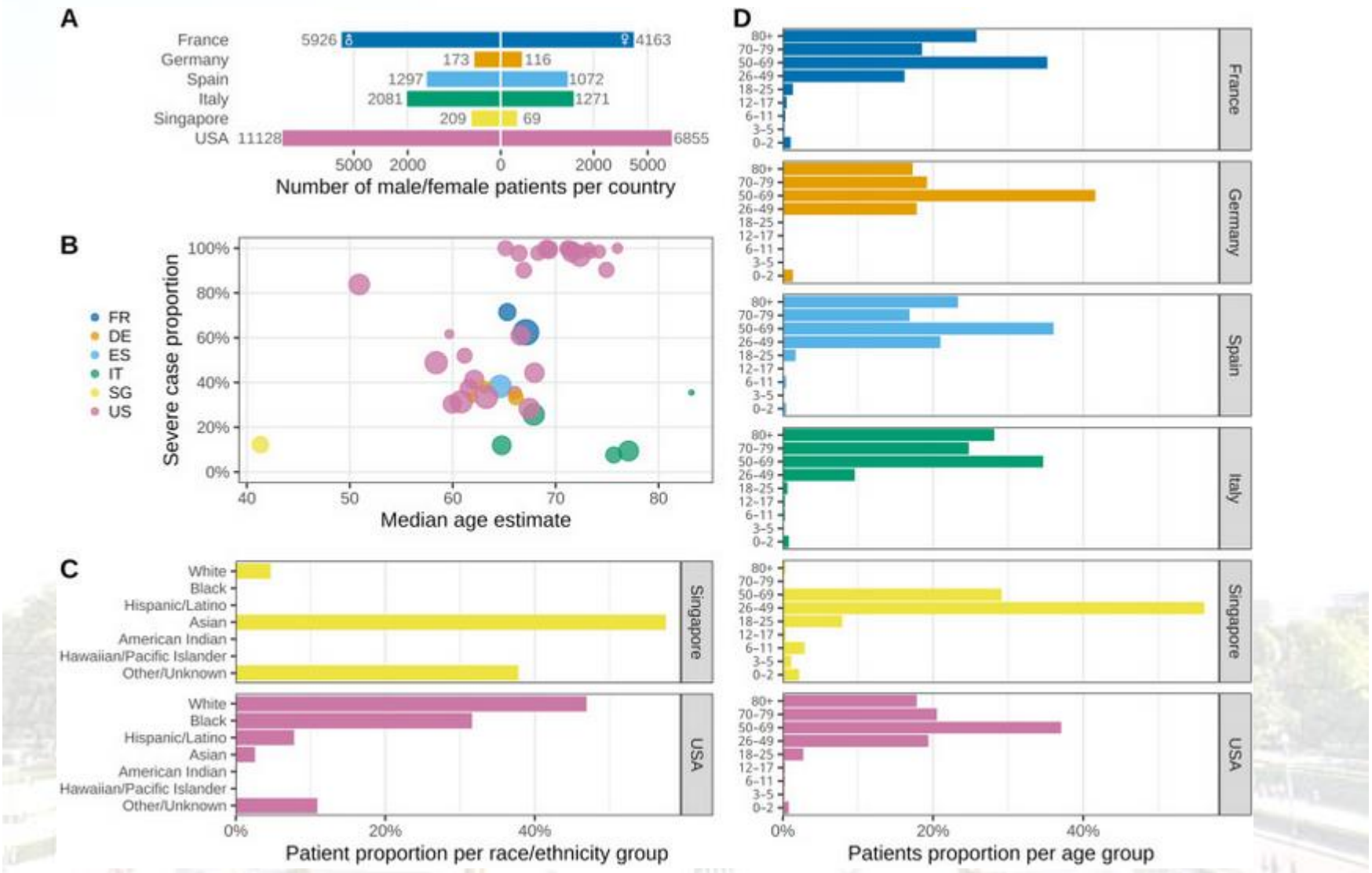

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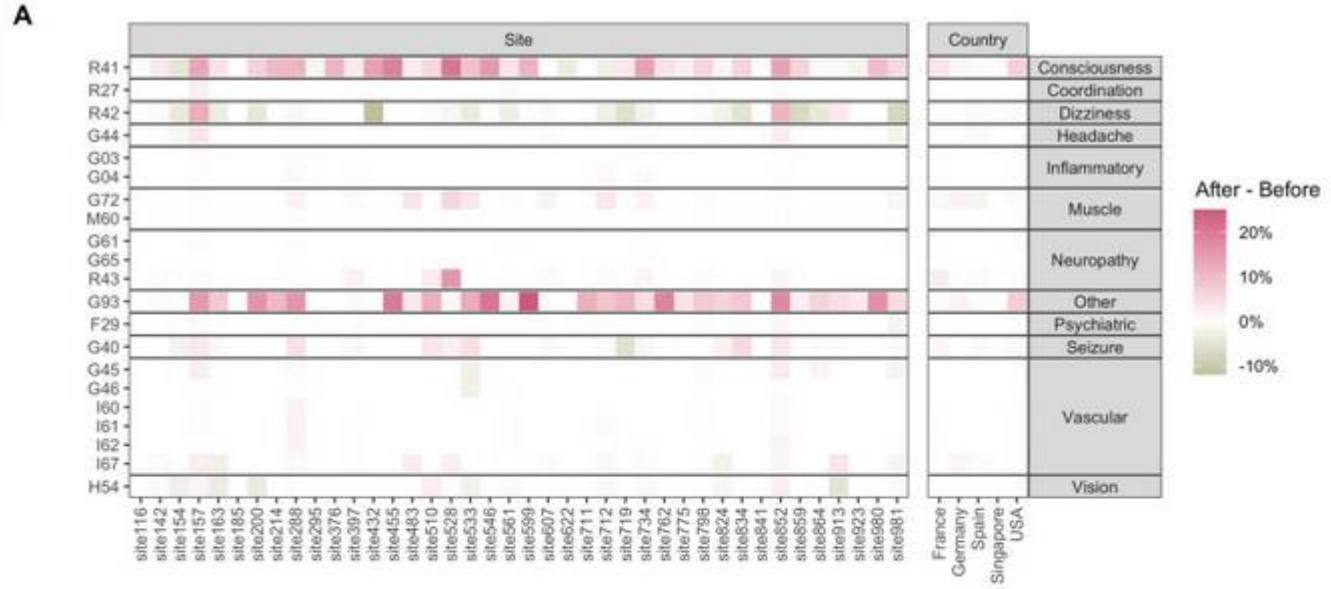


L'initiative OHDSI: les entrepôts participant

OHDSI
OBSERVATIONAL HEALTH DATA SCIENCES AND INFORMATICS

EUROPE (9)		
CPRD (EHR)	3,864	NR
IQVIA DA Germany (EHR)	11,500	NR
HM Hospitales (Hospital Billing)	NR	2,544
Hospital del Mar (EHR)	NR	2,686
Integrated Primary Care Information (EHR)	3,306	60
IQVIA LPD France (EHR)	23,592	NR
IQVIA LPD Italy (EHR)	4,816	NR
Information System for Research in Primary Care (SIDIAP) (EHR)	124,305	18,369
SIDIAP-H (EHR Hospital linkage)	43,441	7,197

USA (13)		
Columbia University Irving Medical Center (EHR)	10,437	3,439
Department of Veterans Affairs (EHR)	57,937	10,951
HealthVerity (Claims with diagnostic testing)	587,683	22,887
IQVIA Open Claims (Claims)	2,875,812	533,997
IQVIA Hospital Charge Data (Hospital Billing)	153,477	57,062
Optum EHR (EHR)	217,772	36,717
Optum SES (EHR with socio-economic data)	7,863	4,336
Oregon Health & Sciences University (EHR)	11,187	627
Premier (Hospital Billing)	417,650	156,187
Stanford University (EHR)	4,788	744
Tufts Medical Center (EHR)	1,250	326
University of Colorado Anschutz Medical Campus-Health Data Compass(EHR)	9,481	1,874
University of Washington School of Medicine (EHR)	3,245	733

ASIA-PACIFIC (3)		
Health Insurance Review & Assessment Service (Claims)	NR	7,599
Daegu Catholic University Medical Center (EHR)	559	46
Nanfang Hospital (EHR)	403	304

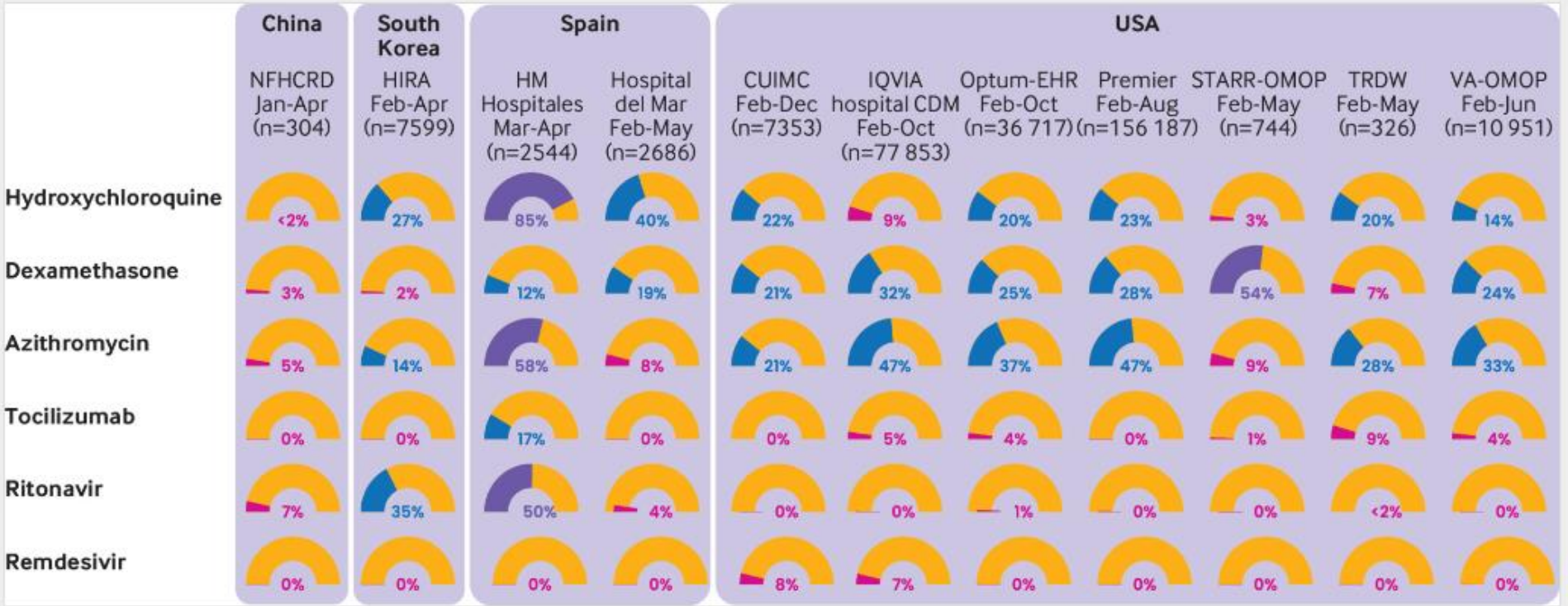
KEY

Persons diagnosed with COVID-19 or lab confirmed tested positive (no prior observation required)

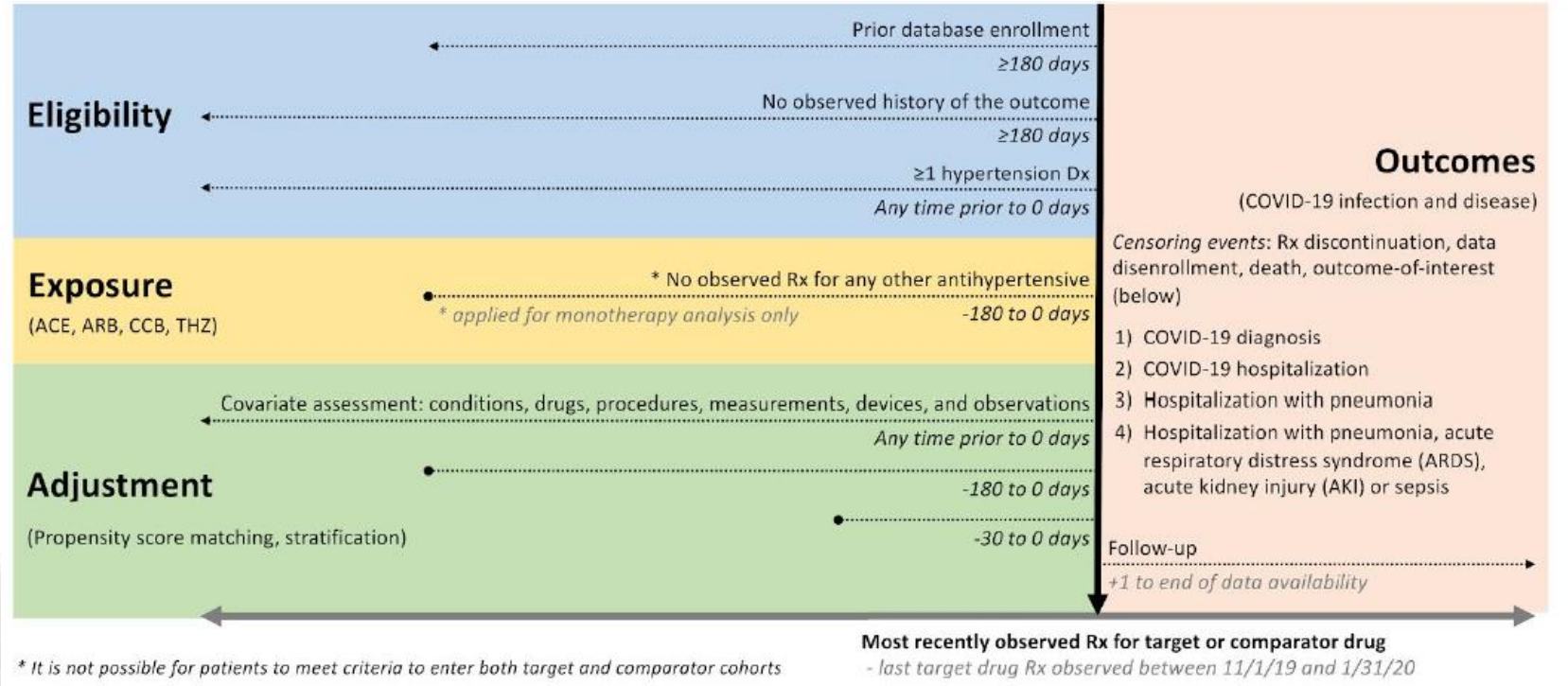
Persons hospitalized with diagnosed with COVID-19 or lab confirmed tested positive (no prior observation required)

NR = Not Reported

Use of repurposed and adjuvant drugs in hospital patients with covid-19: multinational network cohort study, Prats-Uribe, BMJ, 2021



Renin-angiotensin system blockers and susceptibility to COVID-19: an international, open science, cohort analysis. Morales, Lancet Digit Health, 2021



Renin-angiotensin system blockers and susceptibility to COVID-19: an international, open science, cohort analysis. Morales, Lancet Digit Health, 2021

	Patients		Time (years)		Events		
	T	C	T	C	T	C	MDRR
ACE/ARB vs CCB/THZ							
Monotherapy							
SIDIAP	37,796	14,003	10,239	3,780	500	184	1.27
VA-OMOP	320,450	229,063	110,380	76,856	145	183	1.37
CUIMC	5,539	5,849	594	625	28	24	2.18
+ Combination							
SIDIAP	45,239	19,007	12,264	5,175	627	250	1.23
VA-OMOP	656,274	443,061	228,678	150,755	345	335	1.24
CUIMC	10,286	11,008	1,128	1,185	59	58	1.68

MDRR = minimal detectable risk ratio

	PS-stratified			PS-matched		
	HR	95% CI	p	HR	95% CI	p
ACE/ARB vs CCB/THZ						
Monotherapy						
SIDIAP	1.02	(0.86 - 1.21)	0.76	1.16	(0.93 - 1.44)	0.24
VA-OMOP	0.91	(0.71 - 1.17)	0.48	1.06	(0.76 - 1.46)	0.74
CUIMC	1.46	(0.81 - 2.62)	0.21	0.67	(0.20 - 2.20)	0.53
Meta-analysis	0.98	(0.84 - 1.14)	0.76	1.10	(0.92 - 1.32)	0.31
+ Combination						
SIDIAP	1.06	(0.92 - 1.24)	0.47	1.02	(0.85 - 1.23)	0.76
VA-OMOP	0.98	(0.81 - 1.18)	0.80	1.03	(0.83 - 1.29)	0.77
CUIMC	1.28	(0.86 - 1.90)	0.26	2.36	(0.98 - 5.68)	0.06
Meta-analysis	1.01	(0.90 - 1.15)	0.81	1.09	(0.84 - 1.41)	0.54

Characteristics and outcomes of 627 044 COVID-19 patients living with and without obesity in the United States, Spain, and the United Kingdom, Recarlde, Int J Ob, 2021

	CPRD		SIDIAP		STARR-OMOP		CUIMC		IQVIA-OpenClaims		VA-OMOP	
	Obese	Non-obese	Obese	Non-obese	Obese	Non-obese	Obese	Non-obese	Obese	Non-obese	Obese	Non-obese
Diagnosed with COVID-19, n (%)*	976 (41·8)	1360 (58·2)	36 409 (29·8)	85 649 (70·2)	1157 (34·8)	2171 (65·2)	3446 (40·5)	5073 (59·5)	154 325 (33·1)	311 866 (66·9)	11 546 (46·9)	13 066 (53·1)
SARS-CoV-2 positive tests, %	51·5	50·3	39·2	27·2	24·4	28·6	66·7	65·5	100·0	100·0	100·0	100·0
Female sex, %	56·2	57·2	62·5	55·9	52·9	52·8	60·9	56·4	61·0	51·7	13·2	19·0
Age, %												
<18 years	0·0	0·0	1·2	4·7	0·0	0·0	1·2	3·5	1·0	3·9		
18 to 64 years	55·4	52·3	58·9	75·6	66·2	69·6	65·2	65·8	66·7	58·0	53·7	58·4
>65 years	44·7	47·7	40·0	19·6	33·8	30·4	33·6	30·6	32·3	38·2	46·3	41·6

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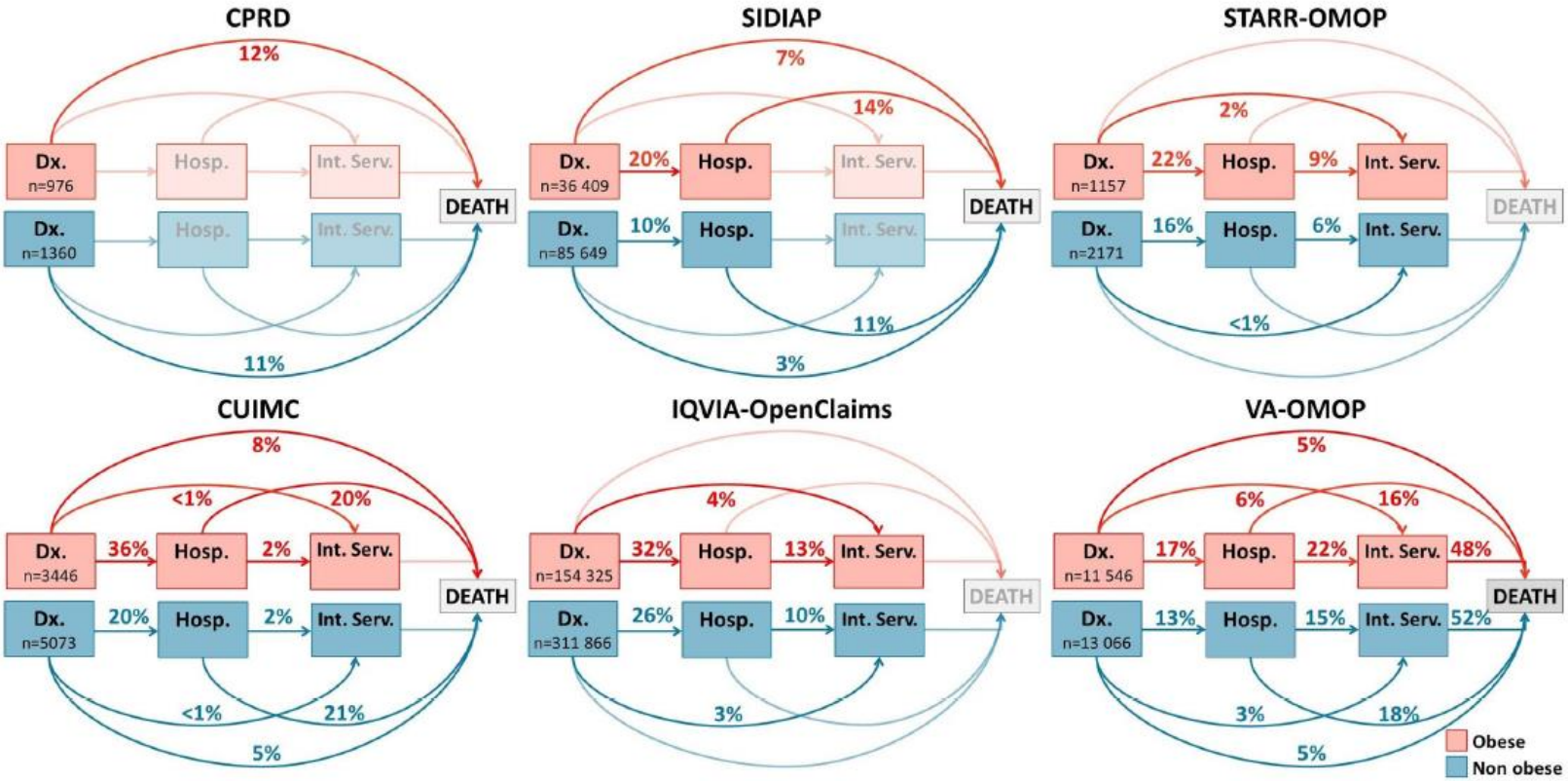
Prevalence of comorbidities for obese (red) and non-obese (blue) patients are depicted in overlapped horizontal bars. Grey colour is the overlap between groups (therefore, it shows the lowest value). For example, in CPRD, 32% of obese and 16% of non-obese patients have hypertension.

Characteristics and outcomes of 627 044 COVID-19 patients living with and without obesity in the United States, Spain, and the United Kingdom, Recarlde, Int J Ob, 2021



Conclusion

- Entrepôts interopérables:
  - Ne garantit pas l'obtention de données comparables entre différents sites: hétérogénéité des variables disponibles, hétérogénéité des définitions
  - Perte d'information possible (↘ granularité des données)
  - Levier pour augmenter la qualité et la comparabilité des données: ↗qualité des soins
- Opportunité de développer des entrepôts interopérables en France et en Europe