



Using Healthcare Big Data in Pandemic Response by Characterizing Disease Natural History and Predicting Patient Outcomes (Project CHARYBDIS)

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IQVIA



Snapshot of the OHDSI COVID-19 Data Network



USA (11)	EUROPE (8)	ASIA-PACIFIC (3)
Columbia University (NY – EHR)	CPRD (UK – EHR)	HIRA (South Korea – Administrative Claims)
Department of Veterans Affairs (National – EHR)	DA Germany (Germany – EHR)	DCMC (South Korea – EHR)
HealthVerity (Claims linked to diagnostic testing)	HM Hospitales (Spain – Hospital Billing)	Nanfang Hospital (China – EMR)
IQVIA Open Claims (National – Administrative Claims)	IPCI (Netherlands – EHR)	<div>Together, OHDSI has studied:</div> <ul style="list-style-type: none">• >7.4m patients tested for SAR-COV-2• >1.6m patients diagnosed or tested positive for COVID-19• >300k patients hospitalized with COVID-19
Optum EHR (National – EHR)	LPD France (France – EHR)	
Optum SES (National – EHR linked to Socio-economic data)	LPD Italy (Italy – EHR)	
Premier (National – Hospital Billing)	SIDIAP (Spain – EHR)	
Stanford University (CA – EHR)	SIDIAP-H (Spain – EHR Hospital linkage)	
Tufts University (MA – EHR)		
University of Colorado Anschutz Medical Campus (CO – EHR)		
University of Washington Medicine COVID Research Dataset (WA – EHR)		



Characterizing Health Associated Risks, and Your Baseline Disease In SARS-COV-2 (CHARYBDIS)

- 1) Describe the baseline demographic, clinical characteristics, treatments, symptoms and outcomes of interest among individuals with COVID-19 overall and stratified by sex, age and specific comorbidities
- 2) Describe characteristics and outcomes of influenza patients between September 2017 and April 2018 compared to the COVID-19 population



Why CHARYBDIS?

- Many published characterization studies
 - Small sample size
 - Few countries
 - Granularity of information
 - Hospital settings

Clinical and virological data of the first cases of COVID-19 in Europe: a case series

Francois-Xavier Lescure*, Lila Bouadma*, Duc Nguyen, Marion Parisey, Paul-Henri Wicky, Sylvie Behillil, Alexandre Gaymard, Maude Bouscambert-Duchamp, Flora Donati, Quentin Le Hingrat, Vincent Enouf, Nadhira Houhou-Fidouh, Martine Valette, Alexandra Mailles, Jean-Christophe Lucet, France Mentre, Xavier Duval, Diane Descamps, Denis Mahvy, Jean-François Timsit, Bruno Lina*, Sylvie van-der-Werf*, Yazdan Yazdanpanah*

Summary
Background On Dec 31, 2019, China reported a cluster of cases of pneumonia in people at Wuhan, Hubei Province. The responsible pathogen is a novel coronavirus, named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). We report the relevant features of the first cases in Europe of confirmed infection, named coronavirus disease 2019 (COVID-19), with the first patient diagnosed with the disease on Jan 24, 2020.

Methods In this case series, we followed five patients admitted to Bichat-Claude Bernard University Hospital (Paris, France) and Pellegrin University Hospital (Bordeaux, France) and diagnosed with COVID-19 by semi-quantitative RT-PCR on nasopharyngeal swabs. We assessed patterns of clinical disease and viral load from different samples (nasopharyngeal and blood, urine, and stool samples), which were obtained once daily for 3 days from hospital admission, and once every 2 or 3 days until patient discharge. All samples were refrigerated and shipped to laboratories in the National Reference Center for Respiratory Viruses (The Institut Pasteur, Paris, and Hospices Civils de Lyon, Lyon, France), where RNA extraction, real-time RT-PCR, and virus isolation and titration procedures were done.

Findings The patients were three men (aged 31 years, 48 years, and 80 years) and two women (aged 30 years and 46 years), all of Chinese origin, who had travelled to France from China around mid-January, 2020. Three different clinical evolutions are described: (1) two paucisymptomatic women diagnosed within a day of exhibiting symptoms, with high nasopharyngeal titres of SARS-CoV-2 within the first 24 h of the illness onset (5·2 and 7·4 log₁₀ copies per 1000 cells, respectively) and viral RNA detection in stools; (2) a two-step disease progression in two young men, with a secondary worsening around 10 days after disease onset despite a decreasing viral load in nasopharyngeal samples; and (3) an 80-year-old man with a rapid evolution towards multiple organ failure and a persistent high viral load in lower and upper respiratory tract with systemic virus dissemination and virus detection in plasma. The 80-year-old patient died on day 14 of illness (Feb 14, 2020); all other patients had recovered and been discharged by Feb 19, 2020.

Interpretation We illustrated three different clinical and biological types of evolution in five patients infected with SARS-CoV-2 with detailed and comprehensive viral sampling strategy. We believe that these findings will contribute to a better understanding of the natural history of the disease and will contribute to advances in the implementation of more efficient infection control strategies.

Clinical features of patients infected with coronavirus in Wuhan, China

Chaolin Huang*, Yeming Wang*, Xingwang Li*, Lili Ren*, Jianping Zhao*, Yi Hu*, Li Zhang, Guohu Zhengshun Cheng, Ting Yu, Jian Xia, Yuan Wei, Wenjuan Wu, Xuefei Xie, Wen Yin, Hui Li, Min Liu, Y Guangfa Wang, Rongmeng Jiang, Zhancheng Gao, Qi Jin, Jianwei Wang†, Bin Cao†

Summary
Background A recent cluster of pneumonia cases in Wuhan, China, was ca 2019 novel coronavirus (2019-nCoV). We report the epidemiological, clinical, lab and treatment and clinical outcomes of these patients.

Methods All patients with suspected 2019-nCoV were admitted to a designated collected and analysed data on patients with laboratory-confirmed 2019-nCoV next-generation sequencing. Data were obtained with standardised data coll International Severe Acute Respiratory and Emerging Infection Consortium Researchers also directly communicated with patients or their families to as to data. Outcomes were also compared between patients who had been admitt those who had not.

Findings By Jan 2, 2020, 41 admitted hospital patients had been identified as h infection. Most of the infected patients were men (30 [73%] of 41); less than h including diabetes (eight [20%]), hypertension (six [15%]), and cardiovascular 49·0 years (IQR 41·0–58·0, 27 [66%] of 41 patients had been exposed to Huar was found. Common symptoms at onset of illness were fever (40 [98%] of 41 pat fatigue (18 [44%]); less common symptoms were sputum production (11 [28] haemoptysis (two [5%] of 39), and diarrhoea (one [3%] of 38). Dyspnoea develop time from illness onset to dyspnoea 8·0 days (IQR 5·0–13·0). 26 (63%) of 41 pa had pneumonia with abnormal findings on chest CT. Complications include (12 [29%]), RNAemia (six [15%]), acute cardiac injury (five [12%]) and secondary were admitted to an ICU and six (15%) died. Compared with non-ICU patients, of IL2, IL7, IL10, GSCF, IP10, MCP1, MIP1A, and TNFα.

Interpretation The 2019-nCoV infection caused clusters of severe respiratory illness similar to severe acute respiratory syndrome coronavirus and was associated with ICU admission and high mortality. Major gaps in our knowledge of the origin, epidemiology, duration of human transmission, and clinical spectrum of disease need fulfilment by future studies.

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ORIGINAL ARTICLE

Covid-19 in Critically Ill Patients in the Seattle Region — Case Series

Pavan K. Bhatraju, M.D., Bijan J. Ghassemieh, M.D., Michelle Nichols, M.D., Richard Kim, M.D., Keith R. Jerome, M.D., Arun K. Nalla, Ph.D., Alexander L. Greninger, M.D., Sudhakar Pipavath, M.D., Mark M. Wurfel, M.D., Ph.D., Laura Evans, M.D., Patricia A. Kritek, M.D., T. Eoin West, M.D., M.P.H., Andrew Luks, M.D., Anthony Gerbino, M.D., Chris R. Dale, M.D., Jason D. Goldman, M.D., Shane O'Mahony, M.D., and Carmen Mikacenic, M.D.

ABSTRACT

BACKGROUND

Community transmission of coronavirus 2019 (Covid-19) was detected in the state of Washington in February 2020.

METHODS

We identified patients from nine Seattle-area hospitals who were admitted to the intensive care unit (ICU) with confirmed infection with severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2). Clinical data were obtained through review of medical records. The data reported here are those available through March 23, 2020. Each patient had at least 14 days of follow-up.

CORRESPONDENCE



Clinical Characteristics of Covid-19 in New York City

TO THE EDITOR: The world is in the midst of the coronavirus disease 2019 (Covid-19) pandemic,^{1,2} and New York City has emerged as an epicenter. Here, we characterize the first 393 consecutive patients with Covid-19 who were admitted to two hospitals in New York City. This retrospective case series includes adults 18 years of age or older with confirmed Covid-19

col and structured abstraction tool (details are provided in the Methods section in the Supplementary Appendix, available with the full text of this letter at NEJM.org).

Among the 393 patients, the median age was 62.2 years, 60.6% were male, and 35.8% had obesity (Table 1). The most common presenting symptoms were cough (79.4%), fever (77.1%),

THE NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Clinical Characteristics of Coronavirus Disease 2019 in China

W. Guan, Z. Ni, Yu Hu, W. B. Du, L. Li, G. Zeng, K. S. Li, Jin-lin Wang, Z. Jian-ming Wang, J. Liu, and N. Zhong. for the C

Clinical characteristics of COVID-19 in 104 people with SARS-CoV-2 infection on the *Diamond Princess* cruise ship: a retrospective analysis

Sakiko Tabata*, Kazuo Imai*, Shuichi Kawana, Mayu Ikeda, Tatsuya Kodama, Kazuyasu Miyoshi, Hirofumi Obinata, Satoshi Mimura, Tsutomu Kodera, Manabu Kitagaki, Michiya Sato, Satoshi Suzuki, Toshimitsu Ito, Yasuhide Uwabe, Kaku Tamura

COVID-19, which is a newly discovered disease, is spreading worldwide. We report the clinical characteristics of COVID-19 in 104 people with SARS-CoV-2 infection on the *Diamond Princess* cruise ship, a retrospective analysis.

Methods Th who were ad data, and ra whichever c and sympto oxygen satu on admission end of obs asymptoma

Findings An 54 (52%) we COVID-10, : as being asy hydrogenas but develop the observat with patient! 73 years [IQ nine [21%] c

Interpretati



Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study

Fei Zhou*, Ting Yu*, Ronghui Du*, Guohui Fan*, Ying Liu*, Zhibo Liu*, Jie Xiang*, Yeming Wang, Bin Song, Xiaoying Gu, Lulu Guan, Yuan Hui Li, Xudong Wu, Jiuyang Xu, Shengjin Yu, Yi Zhang, Hua Chen, Bin Cao

Summary

Background Since December, 2019, Wuhan, China, has experienced an outbreak of coronavirus disease (COVID-19), caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Epidemiologic and clinical characteristics of patients with COVID-19 have been reported but risk factors for mortality and a clinical course of illness, including viral shedding, have not been well described.

Methods In this retrospective, multicentre cohort study, we included all adult inpatients (≥18 years old) with laboratory-confirmed COVID-19 from Jinyintan Hospital and Wuhan Pulmonary Hospital (Wuhan, China) who had been discharged or had died by Jan 31, 2020. Demographic, clinical, treatment, and laboratory data, including samples for viral RNA detection, were extracted from electronic medical records and compared between survivors and non-survivors. We used univariable and multivariable logistic regression methods to explore the risk factors associated with in-hospital death.

Findings 191 patients (135 from Jinyintan Hospital and 56 from Wuhan Pulmonary Hospital) were included in this study, of whom 137 were discharged and 54 died in hospital. 91 (48%) patients had a comorbidity, with hypertension being the most common (58 [30%] patients), followed by diabetes (36 [19%] patients) and coronary heart disease (15 [8%] patients). Multivariable regression showed increasing odds of in-hospital death associated with older age (odds ratio 1·10, 95% CI 1·03–1·17, per year increase; p=0·0043), higher Sequential Organ Failure Assessment (SOFA) score (5·65, 2·61–12·23; p<0·0001), and d-dimer greater than 1 µg/mL (18·42, 2·64–128·55; p=0·0033) on admission. Median duration of viral shedding was 20·0 days (IQR 17·0–24·0) in survivors, but SARS-CoV-2 was detectable in non-survivors. The longest observed duration of viral shedding in survivors was 37 days.

Interpretation The potential risk factors of older age, high SOFA score, and d-dimer greater than 1 µg/mL could be used by clinicians to identify patients with poor prognosis at an early stage. Prolonged viral shedding provides the rationale for a strategy of isolation of infected patients and optimal antiviral interventions in the future.

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Why CHARYBDIS?

- But many unanswered questions:
 - Who gets tested, infected and hospitalized?
 - Age and gender
 - Most frequent comorbidities
 - Treatment history
 - What are their symptoms and outcomes?
 - How different is COVID-19 from influenza?

COVID-19 PATIENT TRAJECTORY

Presentation
of symptoms

Tested for
COVID-19

Tested positive or
diagnosed with
COVID-19

Hospitalization

Hospitalization
requiring intensive
services

Death

Demographics
Conditions
Drugs
Health service utilization



CHARYBDIS – Target cohorts

Persons tested for SARS-CoV-2

Persons tested positive for SARS-CoV-2

Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test

Persons hospitalized with a COVID-19 diagnosis record or a SARS-CoV-2 positive test

Persons hospitalized and requiring intensive services with a COVID-19 diagnosis record or a SARS-CoV-2 positive test

Persons with influenza diagnosis or positive test 2017-2018

Persons hospitalized with influenza diagnosis or positive test 2017-2018

Persons hospitalized with influenza diagnosis or positive test and requiring intensive services 2017-2018

COHORT DEFINITIONS AVAILABLE AT:
<https://atlas.ohdsi.org/>



CHARYBDIS – Stratification factors

COVID-19 and...

- Asthma
- Cancer
- Cardiac Outcomes
- Chronic Kidney Disease
- COPD
- Elderly
- End-Stage Renal Disease
- Gender Differences
- Heart Disease
- Hepatitis C
- HIV infection
- Hypertension
- Immune Disorders
- Obesity
- Pediatrics
- Pregnant Women
- Tuberculosis
- Type 2 Diabetes
- Dementia
- Gender

... And more!



PHENOTYPE DEFINITIONS AVAILABLE AT:
<https://atlas.ohdsi.org/>



CHARYBDIS – Findings to Date on COVID-19

- COVID-19 diagnosis/tested positive more common in women
- Hospitalization with COVID-19 more common in men

European Data Partners



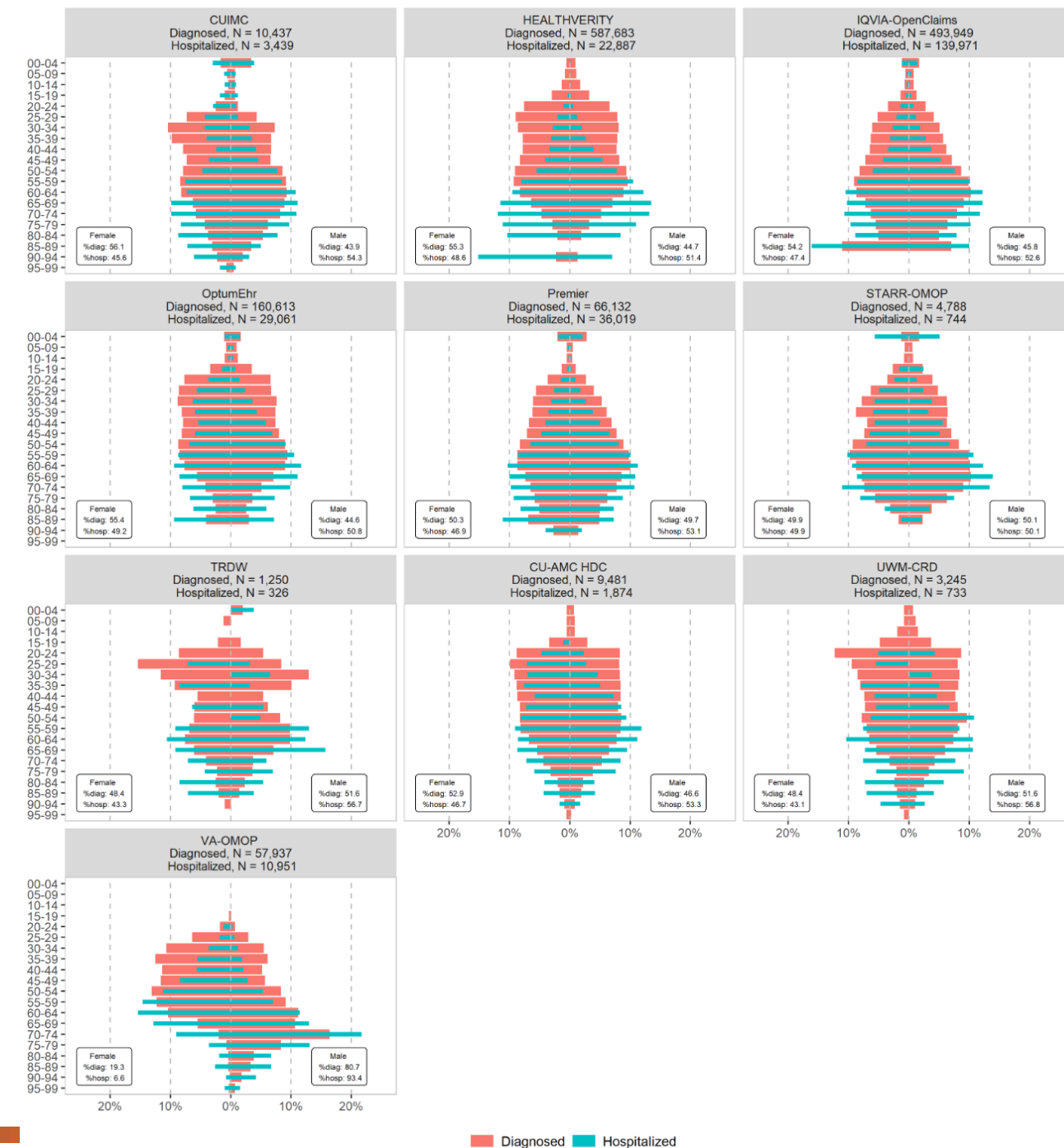
Diagnosed Hospitalized



CHARYBDIS – Findings to Date on COVID-19

USA Data Partners

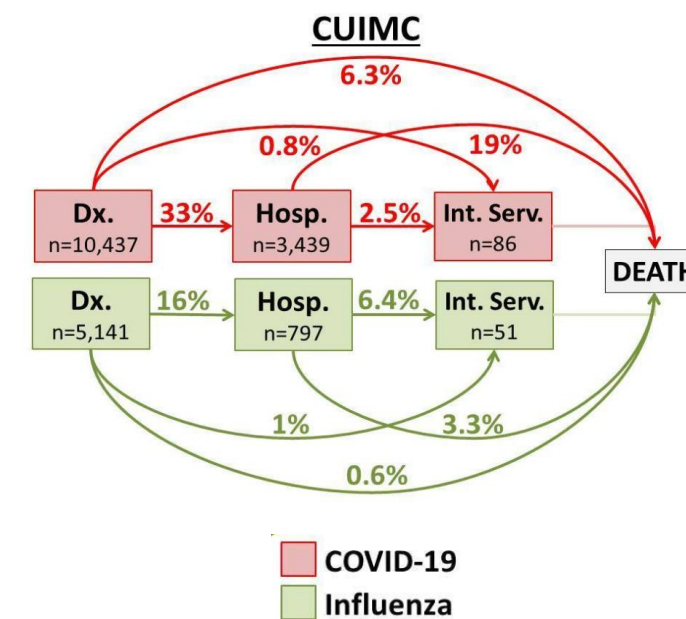
- COVID-19 diagnosis/tested positive more common in women
- Hospitalization with COVID-19 more common more common in men
- Amongst age groups, hospitalized with COVID-19 are older than diagnosed/tested positive





CHARYBDIS – Findings to Date on COVID-19

- COVID is no flu
- COVID patients tend to be healthier
- Less history of drug use
- Worse outcomes





CHARYBDIS – Findings to Date on COVID-19



CHARYBDIS																	
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Show 100 entries																	
Cohort																	
Strata																	
		HealthVerity	CDM_Premier_COVID_v1240	CPRD_COVID	DCMC	HIRA	HM Hospitals	NFHCRC	optum_ehr_covid_v1239	SIDIAP_H	SIDIAP	STARR-OMOP	TRDW	VA-OMOP	IPCI	IQVIA_OpenClaims	
		Subjects	Subjects	Subjects	Subjects	Subjects	Subjects	Subjects	Subjects	Subjects	Subjects	Subjects	Subjects	Subjects	Subjects	Subjects	Subjects
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: All		371,153	66,132	2,679	559	7,603	2,069	403	45,508	43,411	124,221	4,768	1,250	25,538	1,417	493,949	
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: with Full 30-day follow up		22,440	3,902	894	162	7,348	17	276	13,690	26,570	81,896	2,703	641	19,196	1,009	243,316	
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: with < 30-day follow up		348,713	62,230	1,785	397	255	2,072	127	31,818	14,841	42,325	2,065	608	6,340	408	250,633	
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: with Sex = Female		203,731	33,271	1,527	314	4,502	843	197	24,717	24,891	71,680	2,388	1,199	4,374	859	267,537	
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: with Sex = Male		167,422	32,861	1,152	245	3,101	1,246	206	20,791	18,520	52,541	2,380	234	21,163	558	226,333	
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: with Age >= 18		356,610	63,572	2,647	552	7,351	2,078	396	44,480	41,474	119,188	4,603		25,535	1,394	476,331	
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: with Age < 18		14,543	2,560	32	7	251	11	7	1,020	1,937	5,033	165		<5	23	17,618	
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: with Age >= 65		72,735	22,579	1,315	98	1,373	1,257	81	13,332	11,966	31,473	1,380		10,999	483	174,479	
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: with Age < 65		298,418	43,553	1,364	461	6,229	832	322	32,176	31,445	92,748	3,408		14,538	934	319,470	
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: with Black or African American			14,306						10,701				120		8,012		
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: with White			28,556						22,674			2,026		13,246			
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: with Index date: Jan 2020		23	2,380	8		12	<5	<5	6	34	80	51		110	<5	4,083	
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: with Index date: Feb 2020		37	2,560	6	277	1,699	5	261	12	82	241	223		87	<5	3,246	
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: with Index date: Mar 2020		48,024	21,729	404	282	5,263	1,446	139	10,735	23,791	67,452	852		2,124	561	69,665	
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: with Index date: Apr 2020		132,103	32,530	1,884	425	696	<5		20,045	18,294	52,958	1,582		9,881	591	314,366	
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: with Index date: May 2020		190,943	6,061	377		<5			13,746	1,187	3,452	1,434		6,265	170	100,026	
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: with Index date: Jun 2020									960			570		7,024	89		
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: with Prevalent Type 2 Diabetes Mellitus		10,115	10,783	392	108	1,765	271	9	1,091	4,999	9,840	555	179	9,325	248	171,626	
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: without Prevalent Type 2 Diabetes Mellitus		361,038	55,349	2,287	451	5,838	1,818	394	44,417	38,412	114,381	4,233	1,071	16,213	1,169	322,323	
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: with Prevalent hypertension		16,294	19,008	544	154	1,950	712	19	2,068	11,175	20,995	1,319	307	16,474	379	281,426	
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: without Prevalent hypertension		354,859	47,124	2,135	405	5,653	1,377	384	43,440	32,236	103,226	3,469	943	9,064	1,038	212,523	
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: with Prevalent chronic kidney disease		2,511	1,180	122	155	243			319	1,496	505	289	107	4,104	102	64,604	
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: without Prevalent chronic kidney disease		368,642	64,952	2,557	404	7,360			45,189	41,913	123,716	4,499	1,143	21,434	1,315	429,345	
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: with Prevalent end stage renal disease		865		7	155	26			409	134		73	70	1,032		18,232	
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: without Prevalent end stage renal disease		370,288	65,177	2,672	404	7,577			45,099	43,277		4,715	1,180	24,506		475,717	
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: with Prevalent heart disease		9,516	11,533	504	106	1,319		7	1,217	8,142	17,718	977	245	12,310	266	220,766	
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: without Prevalent heart disease		361,637	54,599	2,175	453	6,284	1,758	396	44,291	35,269	106,503	3,811	1,005	13,228	1,149	273,183	
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: with Prevalent malignant neoplasm excluding non-melanoma skin cancer		2,970	3,157	220	32	412	174		460	4,367	8,805	887	106	5,551	152	73,444	
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: without Prevalent malignant neoplasm excluding non-melanoma skin cancer		368,183	62,975	2,459	527	7,191	1,915		45,048	39,104	115,416	3,901	1,144	19,987	1,265	420,505	
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: with Prevalent Human Immunodeficiency virus infection		266	128							82	56	19	14	408		4,653	
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: without Prevalent Human Immunodeficiency virus infection		370,887	66,004						45,329	124,165		4,769	1,236	25,130		469,296	
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: with Prevalent Hepatitis C		374	410			61	8		38	407	647	61	35	1,680		9,905	
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: without Prevalent Hepatitis C		370,779	65,722			7,542	2,061		45,470	43,004	123,574	4,727	1,215	23,858		464,044	
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: with Prevalent obesity		6,658	7,298	1,011	29	16	92		22,350	14,136	36,527	1,246	325	11,586	283	155,436	
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: without Prevalent obesity		364,495	58,834	1,668	530	7,587	1,997		23,156	29,275	87,694	3,542	925	13,952	1,134	338,513	
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: with Prevalent Dementia		2,587	3,697	198	6	438	47		225	2,421	6,007	38	29	2,314	48	57,998	
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: without Prevalent Dementia		366,566	62,435	2,481	553	7,165	2,042		45,283	40,990	118,214	4,750	1,221	23,224	1,369	435,951	
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: with Prevalent tuberculosis				8	24					40	85			27		89	
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: without Prevalent tuberculosis					551	7,579				43,371	124,136			25,511		493,860	
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: with Prevalent Autoimmune condition		3,478	1,678	285	49	815	81		381	3,556	8,255	418	133	5,142	244	105,239	
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: without Prevalent Autoimmune condition		367,675	64,454	2,394	510	6,788	2,008		45,127	39,855	115,966	4,370	1,117	20,396	1,173	368,710	
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: with Prevalent chronic obstructive pulmonary disease (COPD) without asthma		3,949	3,335	212		149	113		5,800	6,764	15,811	231	89	6,667	121	68,554	
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: without Prevalent chronic obstructive pulmonary disease (COPD) without asthma		367,204	62,797	2,467		7,454	1,976		39,708	36,647	108,410	4,557	1,161	18,871	1,296	425,095	
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: with Prevalent Asthma without COPD		4,646	3,972	349	17	1,566	82		2,934	3,134	7,561	521	112	2,970	165	87,164	
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: without Prevalent Asthma without COPD		366,507	62,160	2,330	542	6,037	2,007		42,574	40,277	116,660	4,267	1,136	22,568	1,252	406,785	
Persons with a COVID-19 diagnosis or a SARS-CoV-2 positive test with no required prior observation: with Prevalent pre-existing condition of COVID risk factor		17,304	18,402	955	197	2,694	609	18	2,052	14,044	32,850	1,762	353	16,578	471	296,641	

<https://data.ohdsi.org/Covid19CharacterizationCharybdis/>



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ARTICLE

<https://doi.org/10.1038/s41467-020-18849-z> OPEN

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

Edward Bum et al.[#]

Comorbid conditions appear to be common among individuals hospitalised with coronavirus disease 2019 (COVID-19) but estimates of prevalence vary and little is known about the prior medication use of patients. Here, we describe the characteristics of adults hospitalised with COVID-19 and compare them with influenza patients. We include 34,128 (US: 8362, South Korea: 7341, Spain: 18,425) COVID-19 patients, summarising between 4811 and 11,643 unique aggregate characteristics. COVID-19 patients have been majority male in the US and Spain, but predominantly female in South Korea. Age profiles vary across data sources. Compared to 84,585 individuals hospitalised with influenza in 2014-19, COVID-19 patients have more typically been male, younger, and with fewer comorbidities and lower medication use. While protecting groups vulnerable to influenza is likely a useful starting point in the response to COVID-19, strategies will likely need to be broadened to reflect the particular characteristics of individuals being hospitalised with COVID-19.

HIGHLIGHT: Compared to individuals hospitalized with influenza, patients admitted with COVID-19 were more likely male, younger, and, in the US, had fewer comorbidities and lower medication use.

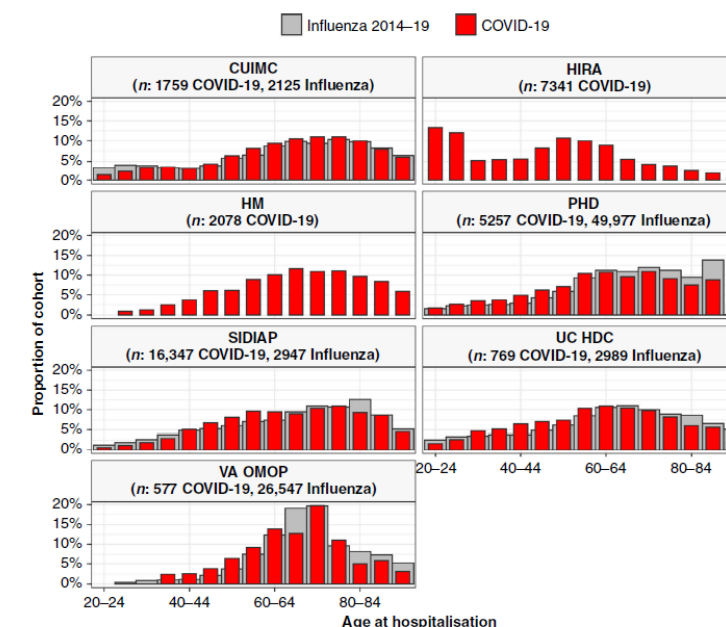


Fig. 1 Age of patients hospitalised with COVID-19 and of patients hospitalised with influenza. Individuals hospitalised with COVID-19 between December 2019 and April 2020 compared with those hospitalised with influenza between September 2014 to April 2019 (where available). Proportion of cohorts by 5-year age groups, with groups with counts of <10 omitted. CUIMC: Columbia University Irving Medical Center; HIRA: Health Insurance Review & Assessment; HM: HM Hospitals; PHD: Premier Healthcare Database; SIDIAP: The Information System for Research in Primary Care; UC HDC: University of Colorado Health Data Compass; VA OMOP: Department of Veterans Affairs. Influenza data for SIDIAP was only available from 2014 to 2017.

Interactive Shiny Application available at: <http://data.ohdsi.org/Covid19CharacterizationCharybdis/>

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Characteristics and outcomes of 627 044 COVID-19 patients with and without obesity in the United States, Spain, and the United Kingdom

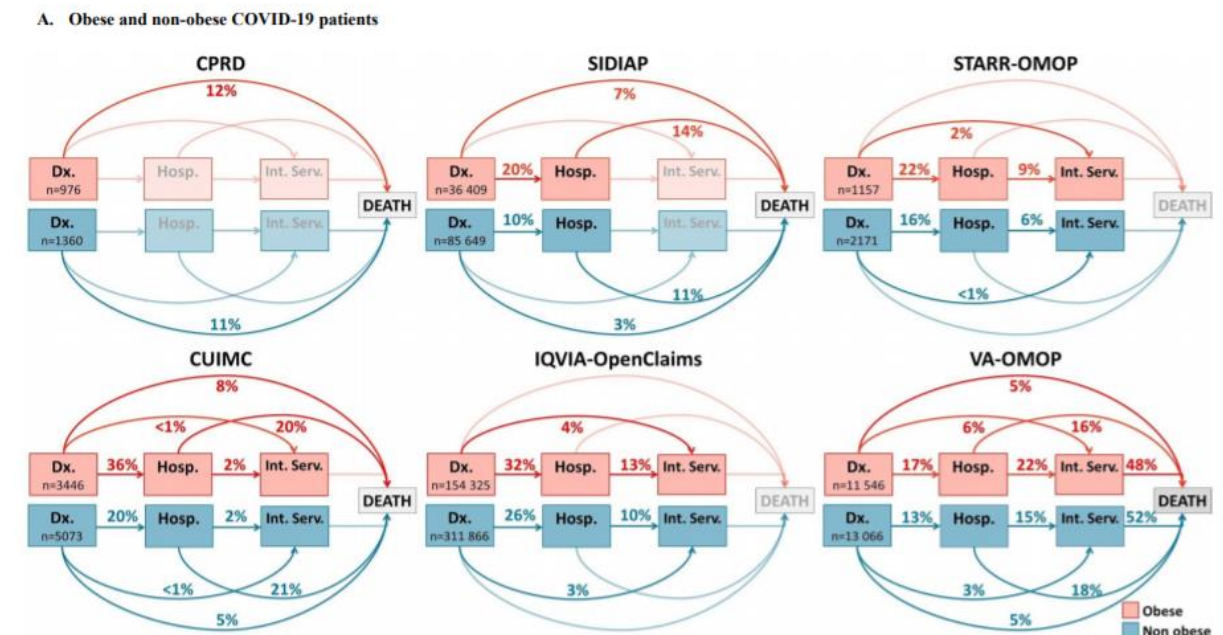
[Martina Recalde](#), [Elena Roel](#), [Andrea Pistillo](#), [Anthony G Sena](#), [Albert Prats-Urbe](#), [Waheed Ul-Rahman Ahmed](#), [Heba Alghoul](#), [Thamir M Alshammari](#), [Osaid Alser](#), [Carlos Areia](#), [Edward Burn](#), [Paula Casajust](#), [Dalia Dawoud](#), [Scott L DuVall](#), [Thomas Falconer](#), [Sergio Fernandez-Bertolin](#), [Asieh Golozar](#), [Mengchun Gong](#), [Lana Yin Hui Lai](#), [Jennifer C.E Lane](#), [Kristine E Lynch](#), [Michael E Matheny](#), [Paras P Mehta](#), [Daniel R Morales](#), [Karthik Natarjan](#), [Fredrik Nyberg](#), [Jose D Posada](#), [Christian G Reich](#), [Lisa M Schilling](#), [Karishma Shah](#), [Nigham H Shah](#), [Vignesh Subbian](#), [Lin Zhang](#), [Hong Zhu](#), [Patrick Ryan](#), [Daniel Prieto-Alhambra](#), [Kristin Kostka](#), [Talita Duarte-Salles](#)

doi: <https://doi.org/10.1101/2020.09.02.20185173>

This article is a preprint and has not been peer-reviewed [what does this mean?]. It reports new medical research that has yet to be evaluated and so should not be used to guide clinical practice.

HIGHLIGHT: We show that obesity is more common amongst COVID-19 than influenza patients, and that obese patients present with more severe forms of COVID-19 with higher hospitalization, intensive services, and fatality than non-obese patients. These data are instrumental for guiding preventive strategies of COVID-19 infection and complications.

Figure 2: Main outcomes: a comparison between obese and non-obese patients with COVID-19 and obese influenza patients.



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Clinical characteristics, symptoms, management and health outcomes in 8,598 pregnant women diagnosed with COVID-19 compared to 27,510 with seasonal influenza in France, Spain and the US: a network cohort analysis

[Lana Yin Hui Lai](#), [Asieh Golozar](#), [Anthony G Sena](#), [Andrea V Margulis](#), [Nuria Haro](#), [Paula Casajust](#), [Neus Valveny](#), [Albert Prats-Urbe](#), [Evan P Minty](#), [Waheed -UI-Rahman Ahmed](#), [Thamir M Alshammari](#), [Daniel R Morales](#), [Heba Alghoul](#), [Osaid Alser](#), [Dalia Dawoud](#), [Lin Zhang](#), [Jose D Posada](#), [Nigam Shah](#), [Clair Blacketer](#), [Carlos Areia](#), [Vignesh Subbian](#), [Fredrik Nyberg](#), [Jennifer C.E Lane](#), [Marc A Suchard](#), [Mengchun Gong](#), [Martina Recalde](#), [Jitendra Jonnagaddala](#), [Karishma Shah](#), [Elena Roel](#), [David Vizcaya](#), [Stephen Fortin](#), [Ru-fong Joanne Cheng](#), [Christian Reich](#), [George Hripcsak](#), [Peter Rijnbeek](#), [Patrick B Ryan](#), [Kristin Kostka](#), [Talita Duarte-Salles](#), [DANIEL PRIETO-ALHAMBRA](#)

doi: <https://doi.org/10.1101/2020.10.13.20211821>

This article is a preprint and has not been certified by peer review [what does this mean?]. It reports new medical research that has yet to be evaluated and so should not be used to guide clinical practice.

HIGHLIGHT: Comorbidities that were more prevalent with COVID-19 hospitalization (compared to COVID-19 diagnosed) in pregnancy included renal impairment and anemia. Multiple medications were used to treat pregnant women hospitalized with COVID-19, some with little evidence of benefit. Anosmia and dyspnea were indicative symptoms of COVID-19 in pregnancy compared to influenza, and may aid differential diagnosis. Despite low fatality, pregnancy and maternal outcomes were worse in COVID-19 than influenza.

Figure 2a. Scatter plot of prevalence of socio-demographics, medication use, comorbidities, symptoms and pregnancy outcomes in women diagnosed (X axis) versus hospitalized (Y axis) with COVID-19

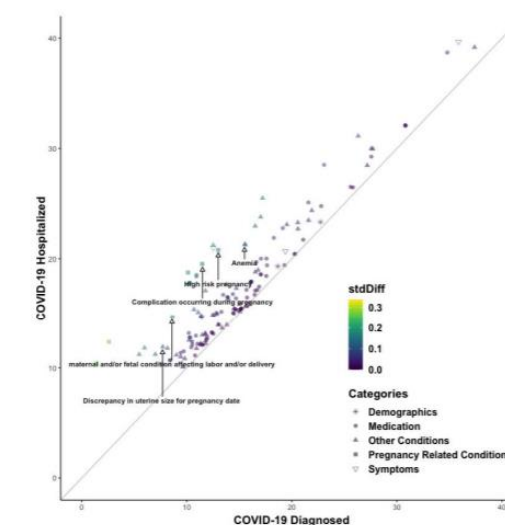
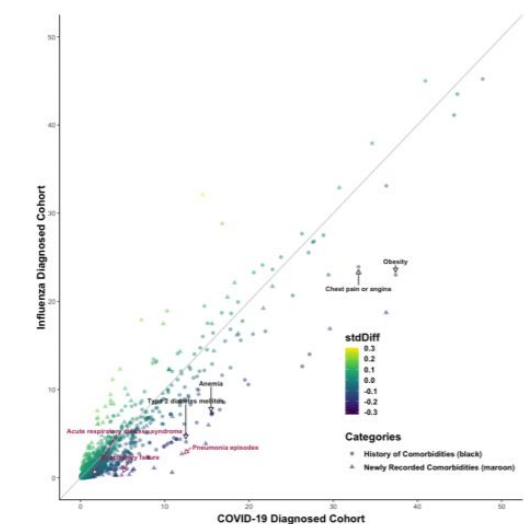


Figure 2b. Scatter plot of prevalence of previous comorbidities and newly recorded comorbidities in pregnant women diagnosed with COVID-19 (X axis) versus diagnosed with influenza (Y axis)



Interactive Shiny Application available at: <http://data.ohdsi.org/Covid19CharacterizationCharybdis/>



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“Clinical characteristics, symptoms, management and health outcomes in 8,598 pregnant women diagnosed with COVID-19 compared to 27,510 with seasonal influenza in France, Spain and the US: a network cohort analysis”

[Lana Yin Hui Lai](#), [Asieh Golozar](#), [Anthony Sena](#), [Andrea V. Margulis](#), [Nuria Haro](#), [Paula Casajust](#), [Neus Valveny](#), [Albert Prats-Urbe](#), [Evan P. Minty](#), [Waheed-UI-Rahman Ahmed](#), [Thamir M Alshammari](#), [Daniel R. Morales](#), [Heba Alghoul](#), [Osaid Alser](#), [Dalia Dawoud](#), [Lin Zhang](#), [Jose D. Posada](#), [Nigam H. Shah](#), [Clair Blacketer](#), [Carlos Areia](#), [Vignesh Subbian](#), [Fredrik Nyberg](#), [Jennifer C E Lane](#), [Marc A Suchard](#), [Mengchun Gong](#), [Martina Recalde](#), [Jitendra Jonnagaddala](#), [Karishma Shah](#), [Elena Roel](#), [David Vizcaya](#), [Stephen Fortin](#), [Ru-fong Joanne Cheng](#), [Christian Reich](#), [George Hripcsak](#), [Peter Rijnbeek](#), [Patrick Ryan](#), [Kristin Kostka](#), [Talita Duarte-Salles](#), [Daniel Prieto-Alhambra](#)

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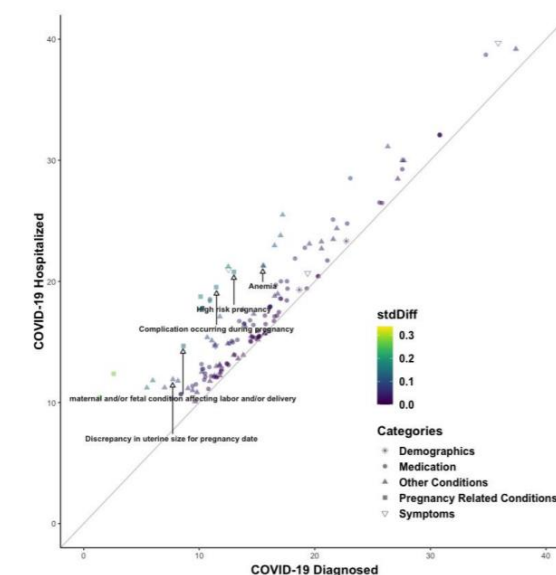


Figure 3a. COVID-19 symptoms at index date amongst pregnant women diagnosed versus hospitalized with COVID-19

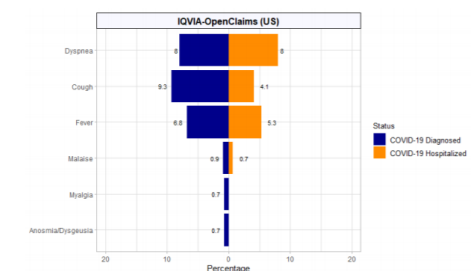
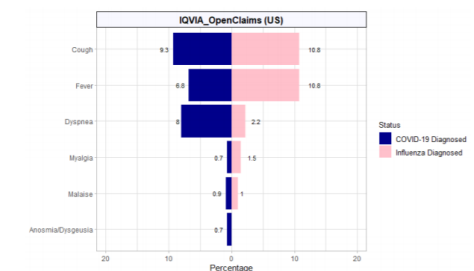


Figure 3b. COVID-19 symptoms at index date amongst pregnant women diagnosed with COVID-19 versus diagnosed with influenza



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Baseline phenotype and 30-day outcomes of people tested for COVID-19: an international network cohort including >3.32 million people tested with real-time PCR and >219,000 tested positive for SARS-CoV-2 in South Korea, Spain and the United States

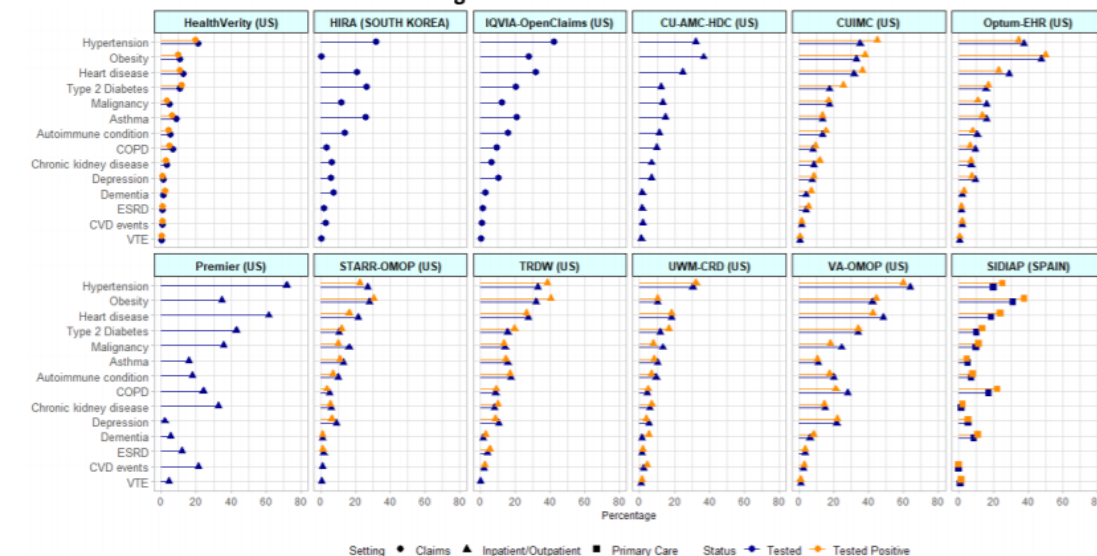
[Asieh Golozar](#), [Lana YH Lai](#), [Anthony G. Sena](#), [David Vizcaya](#), [Lisa M. Schilling](#), [Vojtech Huser](#), [Fredrik Nyberg](#), [Scott L. Duvall](#), [Daniel R. Morales](#), [Thamir M Alshammari](#), [Hamed Abedtash](#), [Waheed-UI-Rahman Ahmed](#), [Osaid Alser](#), [Heba Alghoul](#), [Ying Zhang](#), [Mengchun Gong](#), [Yin Guan](#), [Carlos Areia](#), [Jitendra Jonnagaddala](#), [Karishma Shah](#), [Jennifer C.E. Lane](#), [Albert Prats-Urbe](#), [Jose D. Posada](#), [Nigam H. Shah](#), [Vignesh Subbian](#), [Lin Zhang](#), [Maria Tereza Fernandes Abrahão](#), [Peter R. Rijnbeek](#), [Seng Chan You](#), [Paula Casajust](#), [Elena Roel](#), [Martina Recalde](#), [Sergio Fernández-Bertolin](#), [Alan Andryc](#), [Jason A. Thomas](#), [Adam B. Wilcox](#), [Stephen Fortin](#), [Clair Blacketer](#), [Frank DeFalco](#), [Karthik Natarajan](#), [Thomas Falconer](#), [Matthew Spotnitz](#), [Anna Ostropelets](#), [George Hripcsak](#), [Marc Suchard](#), [Kristine E. Lynch](#), [Michael E. Matheny](#), [Andrew Williams](#), [Christian Reich](#), [Talita Duarte-Salles](#), [Kristin Kostka](#), [Patrick B. Ryan](#), [Daniel Prieto-Alhambra](#)

doi: <https://doi.org/10.1101/2020.10.25.20218875>

This article is a preprint and has not been peer-reviewed [what does this mean?]. It reports new medical research that has yet to be evaluated and so should not be used to guide clinical practice.

HIGHLIGHT: Observed disparity in testing practices led to variable baseline characteristics and outcomes, both nationally (US) and internationally. Our findings highlight the importance of large scale characterization of COVID-19 international cohorts to inform planning and resource allocation including testing as countries face a second wave.

Figure 1: Baseline comorbidities 30-days prior to index date among SARS-CoV-2 tested and tested+ cohorts across databases of various setting



COPD = Chronic obstructive pulmonary disease; ESRD = End stage renal disease; CVD = Cardiovascular disease; VTE = Venous thromboembolism events; US = United States

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

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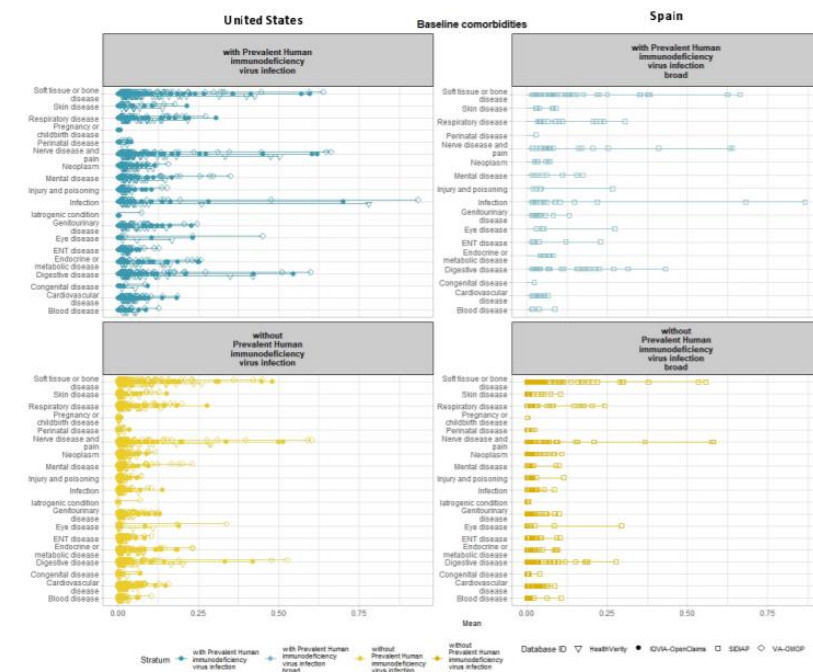
Using Real World Data to Understand HIV and COVID-19 in the U.S.A. and Spain: Characterizing Co-Infected Patients Across the Care Cascade

Julianna Kohler,  Kristin Kostka, Rupa Makadia, Roger Paredes,  Talita Duarte-Salles,  Scott Duvall, Alison Cheng,  Asieh Golozar,  Jennifer C. E. Lane,  Anthony G. Sena, Peter R. Rijnbeek, Daniel R. Morales,  Patrick B. Ryan,  Christian Reich,  Michael E. Matheny, Kristine E. Lynch,  George K. Siberry,  Daniel Prieto-Alhambra

doi: <https://doi.org/10.1101/2020.11.10.20229401>

This article is a preprint and has not been peer-reviewed [what does this mean?]. It reports new medical research that has yet to be evaluated and so should *not* be used to guide clinical practice.

HIGHLIGHT: We found that HIV and COVID-19 coinfecting patients have higher prevalence of underlying comorbidities such as cardiovascular and respiratory disease as compared to HIV-negative COVID-19 infected patients. We also found that, across the care cascade, co-infected patients who received intensive services were more likely to have more serious underlying disease or a history of more serious events as compared to PLHIV who were diagnosed with COVID-19.



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Baseline characteristics, management, and outcomes of 55,270 children and adolescents diagnosed with COVID-19 and 1,952,693 with influenza in France, Germany, Spain, South Korea and the United States: an international network cohort study

Talita Duarte-Salles, David Vizcaya, Andrea Pistillo, Paula Casajust, Anthony G. Sena, Lana Yin Hui Lai, Albert Prats-Urbe, Waheed-Ul-Rahman Ahmed, Thamir M Alshammari, Heba Alghoul, Osaid Alser, Edward Burn, Seng Chan You, Carlos Areia, Clair Blacketer, Scott DuVall, Thomas Falconer, Sergio Fernandez-Bertolin, Stephen Fortin, Asieh Golozar, Mengchun Gong, Eng Hooi Tan, Vojtech Huser, Pablo Iveli, Daniel R. Morales, Fredrik Nyberg, Jose D. Posada, Martina Recalde, Elena Roel, Lisa M. Schilling, Nigam H. Shah, Karishma Shah, Marc A. Suchard, Lin Zhang, Ying Zhang, Andrew E. Williams, Christian G. Reich, George Hripcsak, Peter Rijnbeek, Patrick Ryan, Kristin Kostka, Daniel Prieto-Alhambra

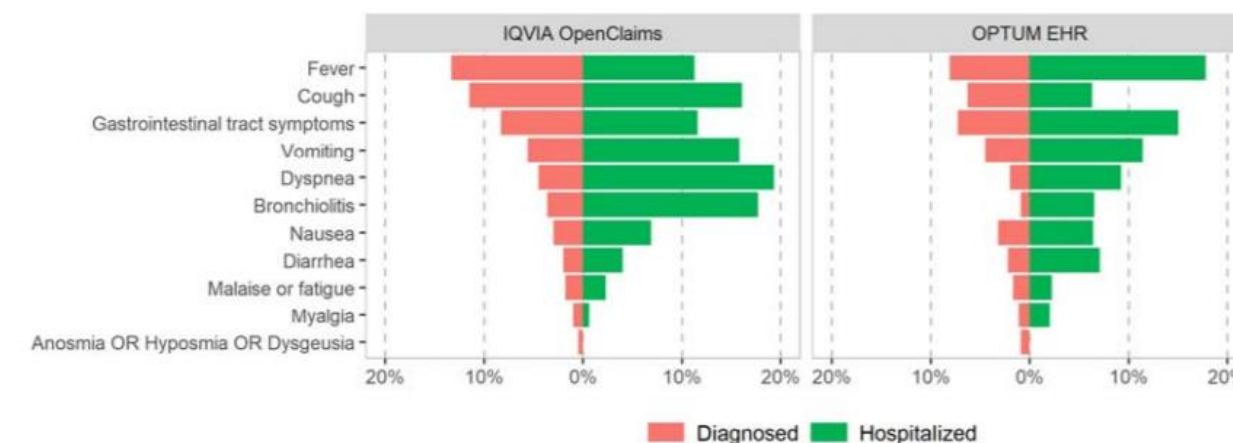
doi: <https://doi.org/10.1101/2020.10.29.20222083>

This article is a preprint and has not been peer-reviewed [what does this mean?]. It reports new medical research that has yet to be evaluated and so should not be used to guide clinical practice.

HIGHLIGHT: Despite negligible fatality, complications including pneumonia, ARDS and MIS-C were more frequent in children/adolescents with COVID-19 than with influenza. Dyspnea, anosmia and gastrointestinal symptoms could help differential diagnosis. A wide range of medications were used for the inpatient management of pediatric COVID-19.

Figure 3. Symptoms recorded at index date among children/adolescents (<18 years of age)

A. Diagnosed compared to hospitalized with COVID-19



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Use of dialysis, tracheostomy, and extracorporeal membrane oxygenation among 240,392 patients hospitalized with COVID-19 in the United States

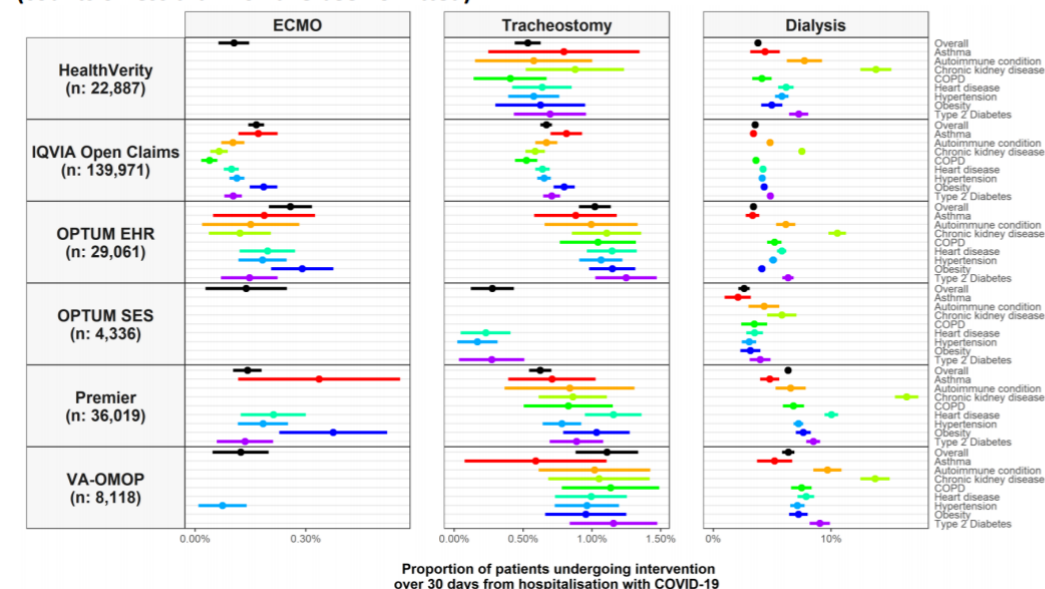
Edward Burn, Anthony G. Sena, Albert Prats-Urbe, Matthew Spotnitz, Scott DuVall, Kristine E. Lynch, Michael E. Matheny, Fredrik Nyberg, Waheed-UI-Rahman Ahmed, Osaid Alser, Heba Alghoul, Thamer Alshammari, Lin Zhang, Paula Casajust, Carlos Areia, Karishma Shah, Christian Reich, Clair Blacketer, Alan Andryc, Stephen Fortin, Karthik Natarajan, Mengchun Gong, Asieh Golozar, Daniel Morales, Peter Rijnbeek, Vignesh Subbian, Elena Roel, Martina Recalde, Jennifer C.E. Lane, David Vizcaya, Jose D. Posada, Nigam H. Shah, Jitendra Jonnagaddala, Lana Yin Hui Lai, Francesc Xavier Avilés-Jurado, George Hripcsak, Marc A. Suchard, Otavio T. Ranzani, Patrick Ryan, Daniel Prieto-Alhambra, Kristin Kostka, Talita Duarte-Salles

doi: <https://doi.org/10.1101/2020.11.25.20229088>

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HIGHLIGHT: Use of dialysis among those hospitalized with COVID-19 is high at around 4%. Although less than one percent of patients undergo tracheostomy and ECMO, the absolute numbers of patients who have undergone these interventions is substantial and can be expected to continue grow given the continuing spread of the COVID-19.

Figure 2. Proportion of patients hospitalized with COVID-19 who underwent ECMO, tracheostomy, or dialysis, overall and stratified by comorbidities of interest. Point estimates with 95% confidence intervals (counts of less than 10 have been omitted).



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Characteristics, outcomes, and mortality amongst 133,589 patients with prevalent autoimmune diseases diagnosed with, and 48,418 hospitalised for COVID-19: a multinational distributed network cohort analysis

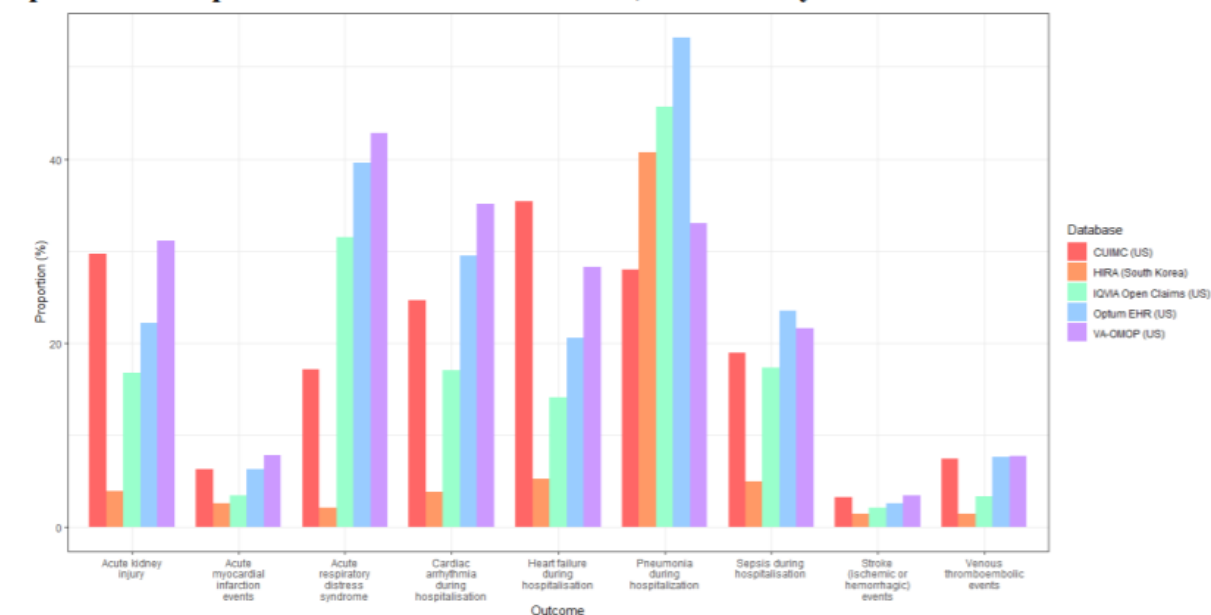
Eng Hooi Tan, Anthony G. Sena, Albert Prats-Urbe, Seng Chan You, Waheed-UI-Rahman Ahmed, Kristin Kostka, Christian Reich, Scott L. Duvall, Kristine E. Lynch, Michael E. Matheny,  Talita Duarte-Salles, Sergio Fernandez Bertolin, George Hripcsak, Karthik Natarajan, Thomas Falconer, Matthew Spotnitz, Anna Ostropolets, Clair Blacketer, Thamir M Alshammari, Heba Alghoul, Osaid Alser, Jennifer C.E. Lane, Dalia M Dawoud, Karishma Shah, Yue Yang, Lin Zhang, Carlos Areia, Asieh Golozar, Martina Relcade, Paula Casajust, Jitendra Jonnagaddala, Vignesh Subbian, David Vizcaya, Lana YH Lai, Fredrik Nyberg, Daniel R Morales, Jose D. Posada, Nigam H. Shah, Mengchun Gong, Arani Vivekanantham, Aaron Abend, Evan P Minty, Marc Suchard, Peter Rijnbeek, Patrick B Ryan,  Daniel Prieto-Alhambra

doi: <https://doi.org/10.1101/2020.11.24.20236802>

This article is a preprint and has not been peer-reviewed [what does this mean?]. It reports new medical research that has yet to be evaluated and so should not be used to guide clinical practice.

HIGHLIGHT: Patients with autoimmune diseases had high rates of respiratory complications and 30-day mortality following a hospitalization with COVID-19. Compared to influenza, COVID-19 is a more severe disease, leading to more complications and higher mortality. Future studies should investigate predictors of poor outcomes in COVID-19 patients with autoimmune diseases.

Figure 3a. Severe outcomes in 30 days post hospital admission with COVID-19 in patients with prevalent autoimmune diseases, stratified by database



Interactive Shiny Application available at: <http://data.ohdsi.org/Covid19CharacterizationCharybdis/>



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Thank you!





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