

TRINETX

COVID-19

2019-nCoV (COVID-19) Real-World Data Report
USA

Issue 8

Run on November 19, 2020



TriNetX



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OVERVIEW

TriNetX is the global health research network that connects the world of drug discovery and development from pharmaceutical company to study site, and investigator to patient by sharing real-world data to make clinical and observational research easier and more efficient. This report summarizes critical information about the characteristics, treatments, and outcomes of COVID-19 patients identified in our network and will be updated on an ongoing basis.

NETWORK CHARACTERISTICS

This report includes data from the TriNetX Dataworks – USA network, representing electronic medical record (EMR) data from 40 healthcare organizations (HCOs) across the United States, representing over 59 million patients. The Dataworks – USA network provides the ability to download datasets.

COHORT SUMMARY

Potential COVID-19 patients were identified using on a combination of ICD-10 diagnostic terms and confirmatory laboratory results occurring on or after January 1, 2020 (See Appendix A). TriNetX identified **255,183 potential COVID-19 patients** as of November 19, 2020. From this cohort of all potential COVID-19 patients, we identified a sub-cohort of 37,170 severe patients who were hospitalized within one month on or after the first instance of COVID-19 in their EMR.

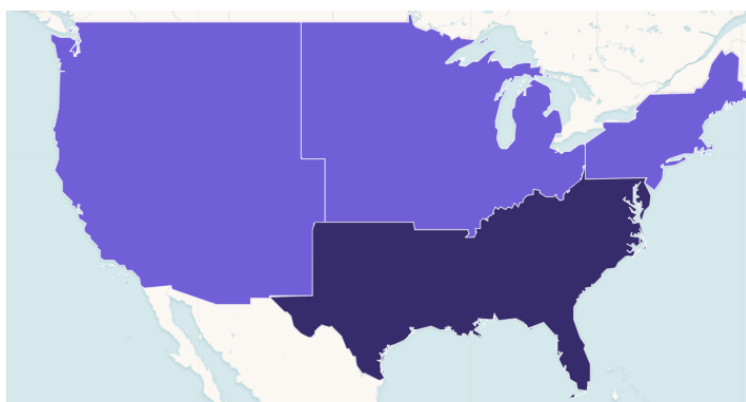
CLINICAL FINDINGS

COVID-19 Patient Density Map

US Regions	Patients	Percent
Northeast	35,411	14%
Midwest	40,981	16%
South	118,671	47%
West	50,935	20%

Other Regions	Patients	Percent
Unknown	9,185	4%

Patient location is determined by location of HCO headquarters



PATIENT CHARACTERISTICS

Demographics and Prior/Coexisting Conditions of COVID-19 Patients

Demographics	All COVID-19 Patients		Severe COVID-19 Patients	
	n=255,183		n=37,170	
Age, years (mean ± SD)	45 ± 20		58 ± 19	
10 - 19 (n, %)	20,700	8.1	911	2.5
20 – 29 (n, %)	45,457	17.8	2,513	6.8
30 – 39 (n, %)	43,184	16.9	3,575	9.6
40 – 49 (n, %)	39,559	15.5	4,458	12.0
50 – 59 (n, %)	40,957	16.1	6,610	17.8
60 – 69 (n, %)	32,473	12.7	7,666	20.6
70 – 79 (n, %)	19,741	7.7	6,500	17.5
≥80 (n, %)	13,112	5.1	4,937	13.3
Male Sex (n, %)	114,111	44.7	18,334	49.3
Female Sex (n, %)	139,930	54.8	18,800	50.6
Unknown Sex (n, %)	1,142	0.4	36	0.1
Prior or Coexisting Condition ¹	n	%	n	%
Respiratory diseases	96,455	37.8	17,006	45.8
Asthma	19,886	7.8	3,209	8.6
Seasonal allergies	10,009	3.9	1,057	2.8
COPD	8,163	3.2	3,315	8.9
Cardiovascular diseases	75,136	29.4	18,780	50.5
Hypertension	56,506	22.1	14,702	39.6
Congestive heart failure	10,349	4.1	4,708	12.7
Myocardial infarction	4,070	1.6	1,974	5.3
Angina pectoris	3,369	1.3	1,219	3.3
Diabetes	28,096	11.0	8,756	23.6
Cancer	15,096	5.9	4,352	11.7
Kidney disease	12,173	4.8	5,291	14.2
HIV	1,147	0.4	254	0.7

¹ Data as of November 19, 2020. Diagnoses captured any time to one day before first instance of COVID-19 in EMR.

Clinical Characteristics During COVID-19 Episode

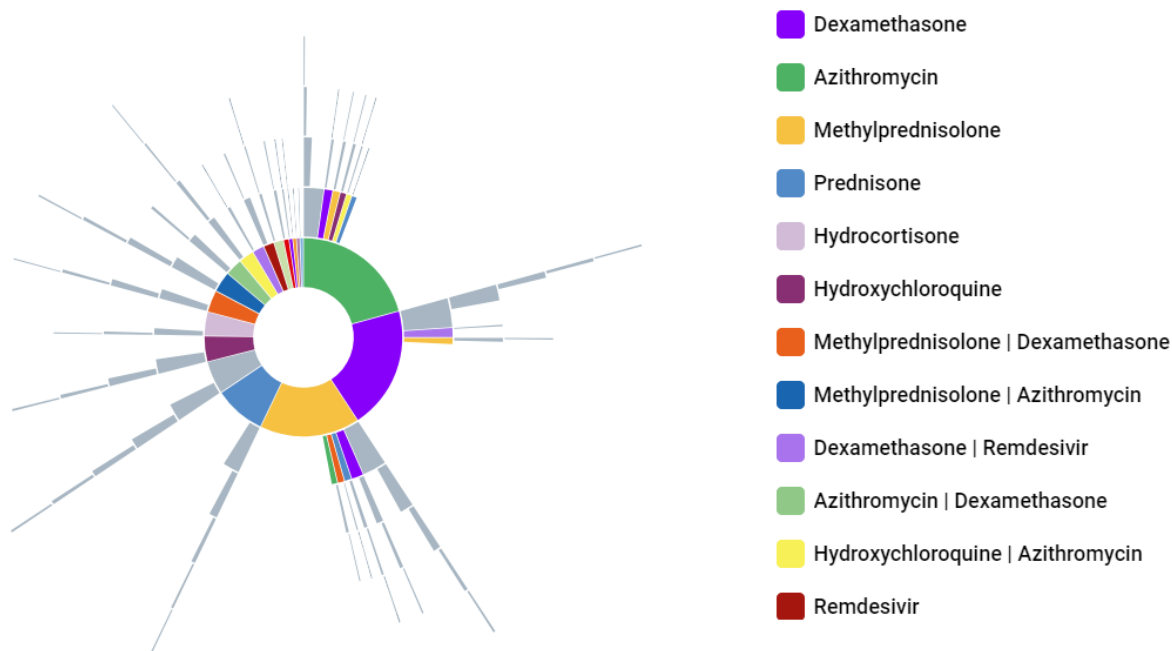
	All COVID-19 Patients		Severe COVID-19 Patients	
	n=255,183		n=37,170	
Diagnosis ²	n	%	n	%
Cough	43,627	17.1	6,153	16.6
Shortness of breath	28,758	11.3	10,703	28.8
Pneumonia	28,698	11.2	18,593	50.0
Fever	28,590	11.2	7,346	19.8
Pain in throat and chest	13,917	5.5	4,570	12.3
Renal failure	9,899	3.9	7,718	20.8
Diarrhea	8,480	3.3	2,864	7.7
Hypotension	7,159	2.8	5,712	15.4
Acute lower respiratory infections	4,821	1.9	1,568	4.2
Acute respiratory distress syndrome (ARDS)	3,784	1.5	3,156	8.5
Loss of taste or smell	3,585	1.4	184	0.5
Bronchitis	2,634	1.0	643	1.7
Hepatic failure	741	0.3	589	1.6
Clinical Setting ²	n	%	n	%
Emergency	63,148	24.7	21,550	58.0
Inpatient	39,586	15.5	37,170	100.0
Medication ³	n	%	n	%
Antibiotics	54,276	21.3	24,928	67.1
Glucocorticoids	38,834	15.2	20,356	54.8
Antivirals	10,398	4.1	6,594	17.7
Antimalarials	6,541	2.6	4,518	12.2
Interleukin Inhibitors	1,234	0.5	813	2.2

² Diagnoses and clinical setting captured in EMR one week before to one month after first instance of COVID-19 in EMR.

³ Medications captured in EMR one day before to one month after first instance of COVID-19 in EMR.

Treatment Pathway of COVID-19 Patients

The sunburst diagram shows the top ten individual or combination therapies used to treat potential COVID-19 patients. Here a line of therapy is defined as any treatments taken within 1 day. Treatment pathways were analyzed from the first instance of COVID-19 in EMR until November 19, 2020.



200,180 patients or 78% of the cohort don't have a pathway

MAJOR OUTCOMES

	All COVID-19 Patients	Severe COVID-19 Patients
	n=255,183	n=37,170
Laboratory Data ⁴	Mean ± SD	Mean ± SD
Complete Blood Count		
Hemoglobin, g/dL	12.3 ± 2.3	11.5 ± 2.3
Hematocrit, %	34.6 ± 11.9	34.5 ± 8.8
RBC, 10 ⁶ cells/μL	4.2 ± 0.8	4.0 ± 0.8
Platelet Count, 10 ³ cells/μL	259.1 ± 112.7	268.8 ± 128.1
WBC, 10 ³ cells/μL	8.2 ± 20.5	9.2 ± 8.8
Eosinophils, %	1.5 ± 2.2	1.6 ± 2.4
Metabolic		
Creatinine, mg/dL	1.2 ± 1.7	1.3 ± 1.6
Hepatic		

ALT, U/L	53.2 ± 210.7		65.8 ± 277.8	
AST, U/L	64.1 ± 520.5		84.4 ± 684.9	
Alk Phos, U/L	92.3 ± 71.3		99.1 ± 84.4	
Total bilirubin, mg/dL	0.6 ± 1.2		0.7 ± 1.5	
Inflammatory				
C Reactive Protein, mg/L	54.3 ± 72.8		59.7 ± 76.6	
IL-6, pg/mL	180.8 ± 861.6		157.6 ± 597.0	
Cardiac				
Ejection Fraction, %	56.0 ± 13.4		55.4 ± 13.9	
QTc prolongation, ms	435.1 ± 70.3		439.4 ± 71.2	
Renal				
Creatinine clearance, mL/min	85.3 ± 62.1		94.0 ± 62.4	
Care and Management⁴				
Hospitalization (n, %)	75,558	29.6	36,962	99.4
Mean time to discharge, days	13.1		10.8	
Chest radiology (e.g., x-ray, CT, MRI) (n, %)	36,844	14.4	14,922	40.1
Abnormal finding on imaging of lung ⁵	8,016	21.8	5,243	35.1
Mechanical ventilation (including ECMO) (n, %)	5,280	2.1	4,518	12.2
Follow-up time at least 14 days (n, %)	103,754	40.7	21,022	56.6
Follow-up time at least 21 days (n, %)	92,716	36.3	18,424	49.6
Follow-up time at least 28 days (n, %)	84,913	33.3	16,521	44.4
Mortality⁶				
	n	%	n	%
All-cause mortality	5,125	2.0	3,831	10.3

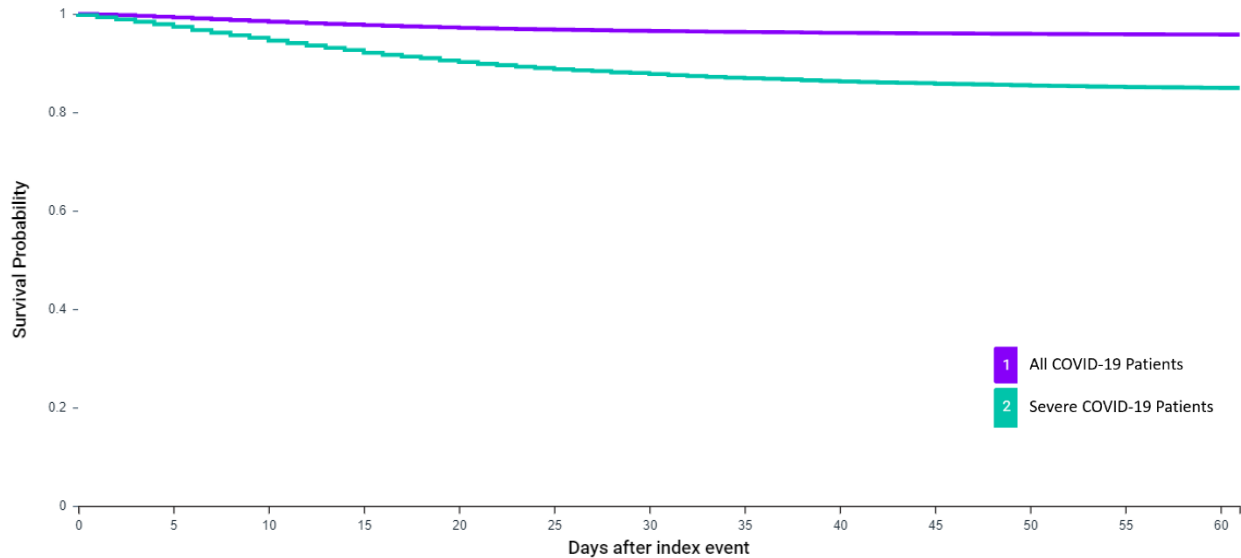
⁴ Laboratory and care and management variables captured in EMR on same day to one month after first instance of COVID-19 in EMR. Laboratory data are of patients' most recent laboratory results in this time window. Not all patients have laboratory data.

⁵ Abnormal finding on imaging of lung is an ICD-10 term (R91). Percentages are calculated among patients with chest radiology performed.

⁶ All-cause mortality captured in EMR on same day to two months after first instance of COVID-19 in EMR.

Kaplan-Meier Survival Curve for All-Cause Mortality

The Kaplan-Meier curve shows the survival probability among all COVID-19 patients and severe COVID-19 patients. All-cause mortality was analyzed from the first instance of COVID-19 up to 2 months after, through November 19, 2020.

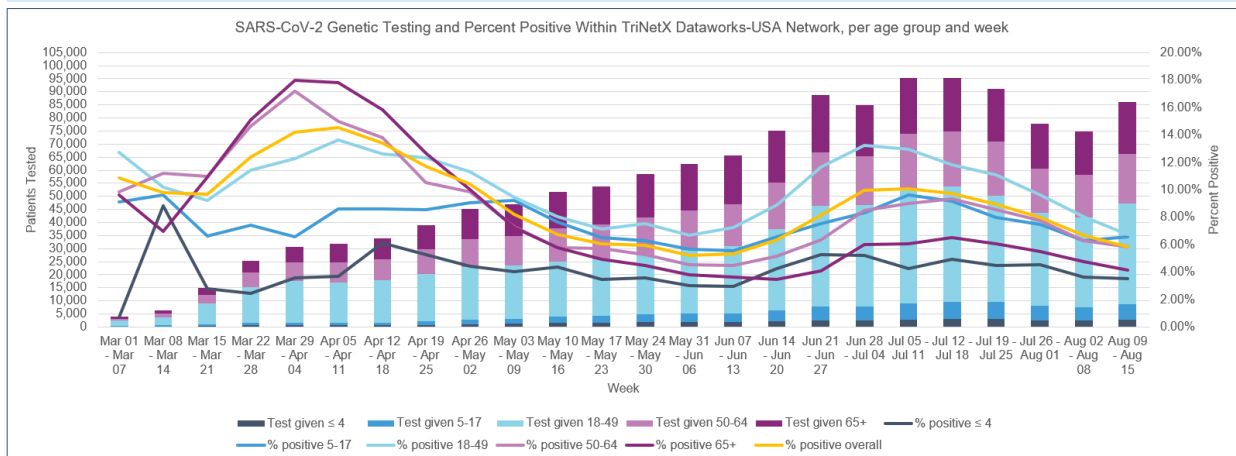


CLINICAL SPOTLIGHT

Each issue of the 2019-nCoV (COVID-19) Real-World Data Report spotlights real-world insights generated in the TriNetX platform or datasets.

Since community transmission of COVID-19 was recognized in the US, public health governing bodies have tracked specimen tests and results over time. TriNetX's real-world data was used to replicate the CDC's SARS-CoV-2 genetic testing trends and results over time. The Dataworks-USA network was used to find the number of patients with discernable results from genetic SARS-CoV-2 testing, as well as the weekly percentage of patients with positive results.

Overall, the number of patients tested has increased over time. For each age group, the percentage of patients with positive results increases from March through April, decreases through June, and increases slightly again from June to July. Trends in testing activity and positive results appear to follow results presented by CDC's COVIDView public health laboratory surveillance, although the June-July increase in percent positivity is more exaggerated in this replication. The high percentage of patients with positive SARS-CoV-2 results towards the beginning of the analysis period likely indicates the targeted reservation of testing for those with probable COVID-19 infection based on symptomatic presentation, while the smaller increase in percent positivity from June-July represents an increase in positivity under greater testing coverage.



APPENDIX

Appendix A: COVID-19 query in TriNetX

Network Datanworks - UISA

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Population ≥ 10 years, Any sex

MUST Have

Search Term... 🔍 📄

CANNOT Have

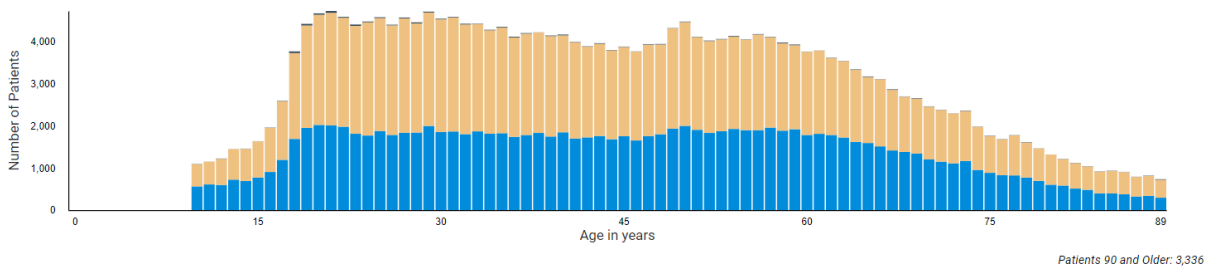
Search Term... 🔍 📄

Event 1A: The terms in this event occurred on or after Jan 01, 2020 ✎
+ Add Related Event ✕

<div style="border-bottom: 1px solid #ccc; padding: 2px 5px;"> OR 24,923 </div> <div style="border-bottom: 1px solid #ccc; padding: 2px 5px;"> OR 37,645 </div> <div style="border-bottom: 1px solid #ccc; padding: 2px 5px;"> OR 424 </div> <div style="border-bottom: 1px solid #ccc; padding: 2px 5px;"> OR 10,414 </div> <div style="border-bottom: 1px solid #ccc; padding: 2px 5px;"> OR 8,384 </div> <div style="border-bottom: 1px solid #ccc; padding: 2px 5px;"> > Positive, Ever </div> <div style="border-bottom: 1px solid #ccc; padding: 2px 5px;"> OR 54,421 </div> <div style="border-bottom: 1px solid #ccc; padding: 2px 5px;"> > Positive, Ever </div> <div style="border-bottom: 1px solid #ccc; padding: 2px 5px;"> OR 4,596 </div> <div style="border-bottom: 1px solid #ccc; padding: 2px 5px;"> > Positive, Ever </div> <div style="border-bottom: 1px solid #ccc; padding: 2px 5px;"> OR 1,233 </div> <div style="border-bottom: 1px solid #ccc; padding: 2px 5px;"> > Positive, Ever </div> <div style="border-bottom: 1px solid #ccc; padding: 2px 5px;"> OR 209 </div> <div style="border-bottom: 1px solid #ccc; padding: 2px 5px;"> > Positive, Ever </div> <div style="border-bottom: 1px solid #ccc; padding: 2px 5px;"> OR 10 </div> <div style="border-bottom: 1px solid #ccc; padding: 2px 5px;"> > Positive, Ever </div> <div style="border-bottom: 1px solid #ccc; padding: 2px 5px;"> OR 34 </div> <div style="border-bottom: 1px solid #ccc; padding: 2px 5px;"> > ≥ 0.1 units, ever </div> <div style="padding: 2px 5px;"> OR 17 </div> <div style="padding: 2px 5px;"> > ≥ 0.1 units, ever </div>
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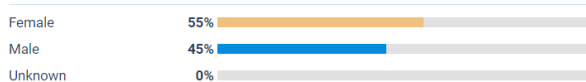
079.89
18,393

Appendix B: Distribution of age and sex



Total Patients	Minimum Age	Maximum Age	Mean Age	Standard Deviation
255,183	10	90	45	20

Sex



APPENDIX C: COVID-19 Publications Using TriNetX Data

- “Cardiovascular Outcomes of Diabetic Covid-19 Patients: A Multi-center Research Network Study” Ali Yousaf, Mark Studney, Mehیار EL-HAMDANI, Eva Patton-Tackett. Abstract published in American Heart Association Circulation 12 Nov 2020. https://www.ahajournals.org/doi/abs/10.1161/circ.142.suppl_3.14671
- “Health Outcomes in Pulmonary Arterial Hypertension Patients With COVID-19: A Real-world Analysis.” Jeremy Feldman, Melisa Wilson, Alexander Kantorovich, Alexander DeRuiter, Kevin Schreur, Peter Classi, Andrew Nelsen. Abstract published in American Heart Association Circulation 12 Nov 2020. https://www.ahajournals.org/doi/abs/10.1161/circ.142.suppl_3.15745
- Ranabothu S, Kanduri SR, Nalleballe K, Cheungpasitporn W, Onteddu S, Kovvuru K. Outcomes of COVID-19 in Solid Organ Transplants. Cureus. 2020;12(11):e11344. Published 2020 Nov 5. doi:10.7759/cureus.11344
- The Impact of Substance Use Disorder on COVID-19 Outcomes. Jacques Baillargeon, Efstathia Polychronopoulou, Yong-Fang Kuo, and Mukaila A. Raji. Psychiatric Services. November 2020. <https://doi.org/10.1176/appi.ps.202000534>
- Muacevic A, Adler J, Nalleballe K, et al. Coronavirus Disease 2019 in Patients With Prior Ischemic Stroke Cureus. ;12(9). doi: 10.7759/cureus.10231
- Maxime Taquet, Sierra Luciano, John R Geddes, Paul J Harrison. Bidirectional associations between COVID-19 and psychiatric disorder: retrospective cohort study studies of 62,354 COVID-19 cases in the USA. The Lancet Psychiatry, November 2020. [https://doi.org/10.1016/S2215-0366\(20\)30462-4](https://doi.org/10.1016/S2215-0366(20)30462-4)
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- Nalleballe, K., Siddamreddy, S., Kovvuru, S., Veerapaneni, P., Roy, B., & Onteddu, S. (2020). Risk of COVID-19 from hospital admission during the pandemic. *Infection Control & Hospital Epidemiology*, 1-7. doi:10.1017/ice.2020.1249
- Annapureddy, N., Nalleballe, K., Onteddu, S.R. et al. Biologics in systemic autoimmune diseases during COVID-19 pandemic. *Clin Rheumatol* (2020). <https://doi.org/10.1007/s10067-020-05439-z>
- Abstract S10-03: "Increased risk of COVID-19-related death among cancer survivors." Jie Shen and Hua Zhao. *Clin Cancer Res* September 15 2020 (26) (18 Supplement) S10-03; DOI: 10.1158/1557-3265.COVID-19-S10-03
- Nalleballe K, Siddamreddy S, Sheng S, et al. (September 03, 2020) Coronavirus Disease 2019 in Patients With Prior Ischemic Stroke. *Cureus* 12(9): e10231. doi:10.7759/cureus.10231
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