

THE IMPACT OF COVID-19 DIAGNOSIS ON HEALTHCARE COSTS

Cynthia Morrow, MA, PhD

Ryan M McKenna, PhD

Liisa Palmer, PhD

—

IBM Watson Health



The following work was paid for by IBM Watson Health.

IBM's statements regarding its plans, directions and intent are subject to change or withdrawal without notice at IBM's sole discretion

Information regarding potential future products is intended to outline our general product direction and it should not be relied on in making a purchasing decision.

The information mentioned regarding potential future products is not a commitment, promise, or legal obligation to deliver any material, code or functionality. Information about potential future products may not be incorporated into any contract. The development, release, and timing of any future features or functionality described for our products remains at our sole discretion.

Background & Objectives

- As of April 2022, over 80 million cases and 980,000 deaths due to COVID-19 have been reported in the U.S.¹
- The COVID-19 pandemic has disrupted the healthcare system and created high burden of disease.
- Currently, there is limited data regarding direct healthcare costs among COVID-19 diagnosed patients.
- This research aims to measure the healthcare costs of commercially insured and Medicare patients with Covid-19 before and after diagnosis.

1. JHU: COVID-19 dashboard by the Center for Systems Science and Engineering at Johns Hopkins University [Internet]. Baltimore (MD): John Hopkins University of Medicine; 2022. [cited 2022 April 11]. Available from: <https://coronavirus.jhu.edu/map.html>.

Methods

Study Design

Source Population

- All patients with a Covid-19 diagnosis between March 2020 and January 2021 were identified in the IBM® MarketScan® Commercial and Medicare Research Databases.
- The MarketScan databases include administrative claims data for patients in the US who are commercially insured or are insured as part of the national Medicare program.
- The databases provide detailed cost, use, and outcomes data for healthcare services performed in both inpatient and outpatient settings.

Study Design

Patient Criteria and Cohorts

- Eligible patients had 6 months of continuous enrollment in medical and pharmacy benefits prior to and after the COVID-19 diagnosis date
- Patients with were stratified into the following cohorts:
 - Commercially insured
 - Adults
 - Pediatrics
 - Medicare

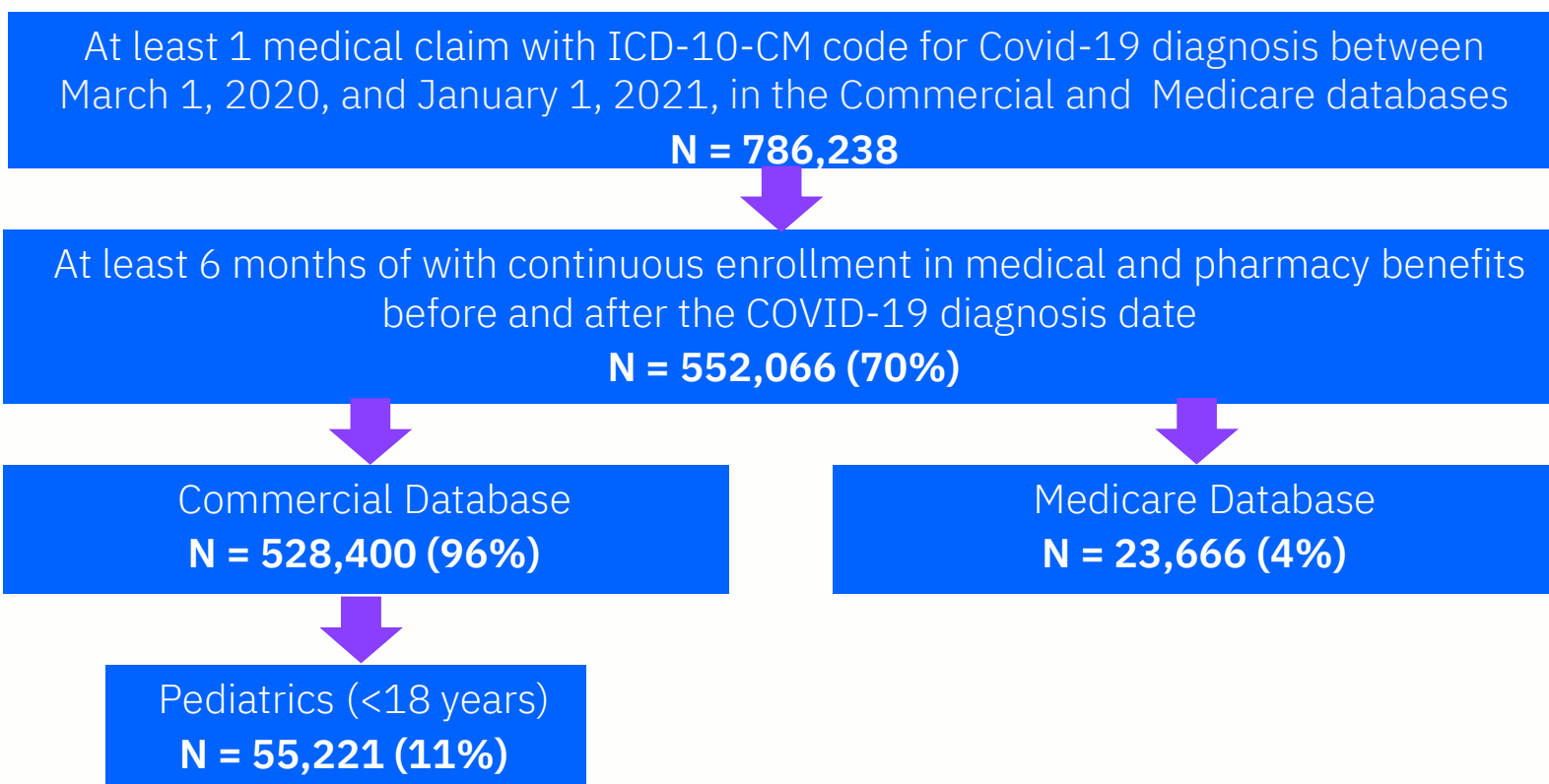
Study Design

Patient Characteristics and Outcomes

- Demographics were measured on the date of diagnosis
- Comorbid Conditions (common risk factors for severe COVID-19 as identified by ICD-10 diagnosis codes) were measured in the 6 months prior to COVID-19 diagnosis
- Healthcare costs were measured during each of the 6-month baseline and follow-up (post-COVID-19 diagnosis) periods
- Total healthcare costs (inclusive of all medical and pharmacy costs) were assessed

Results – Patient Attrition

[Add text if needed, otherwise delete this text and just keep the blank bar]



Demographic Characteristics at COVID-19 diagnosis

[Text of Objective #1]

- Among all eligible 552,066 patients, 46% were male, with a mean age of 40.1.
- 85% resided in urban (vs. rural) areas, and over half (54%) resided in the southern U.S.
- 71% had managed care insurance plans (e.g., PPO, HMO) and 24% had high-deductible plans
- Among the 55,221 pediatric patients, mean age was 11.5, 86% resided in urban areas, 54% in the southern U.S.
- Among the 23,661 Medicare patients, mean age was 75.4, 81% resided in urban areas, and 26% in the southern U.S.

Demographics at COVID-19 diagnosis

All Patients

N=552,066	N/Mean	SD/%
Mean Age	40.1	17.2
Age by Category		
0-17	55,221	10.0%
18-34	157,327	28.5%
35-44	97,468	17.7%
45-54	116,702	21.1%
55-64	102,051	18.5%
65-74	11,863	2.1%
75+	11,434	2.1%
Gender		
Male	253,991	46.0%
Female	298,075	54.0%

N=552,066	N/Mean	%
Insurance		
CDHP/HDHP	130,978	23.7%
Comprehensive	15,207	2.8%
EPO/PPO	274,595	49.7%
HMO	69,671	12.6%
POS	46,140	8.4%
Unknown/Missing	15,475	2.8%
Region		
Northeast	66,472	12.0%
Midwest	119,728	21.7%
South	298,894	54.1%
West	66,397	12.0%
Unknown/Missing	575	0.1%
Urbanicity		
Non-rural	469,002	85.0%
Rural	82,465	14.9%
Unknown/Missing	599	0.1%

EPO: Exclusive provider organization; HMO: Health maintenance organization; POS: Point of service; PPO: Preferred provider organization; CDHP: Consumer-driven health plan; HDHP: High deductible health plan

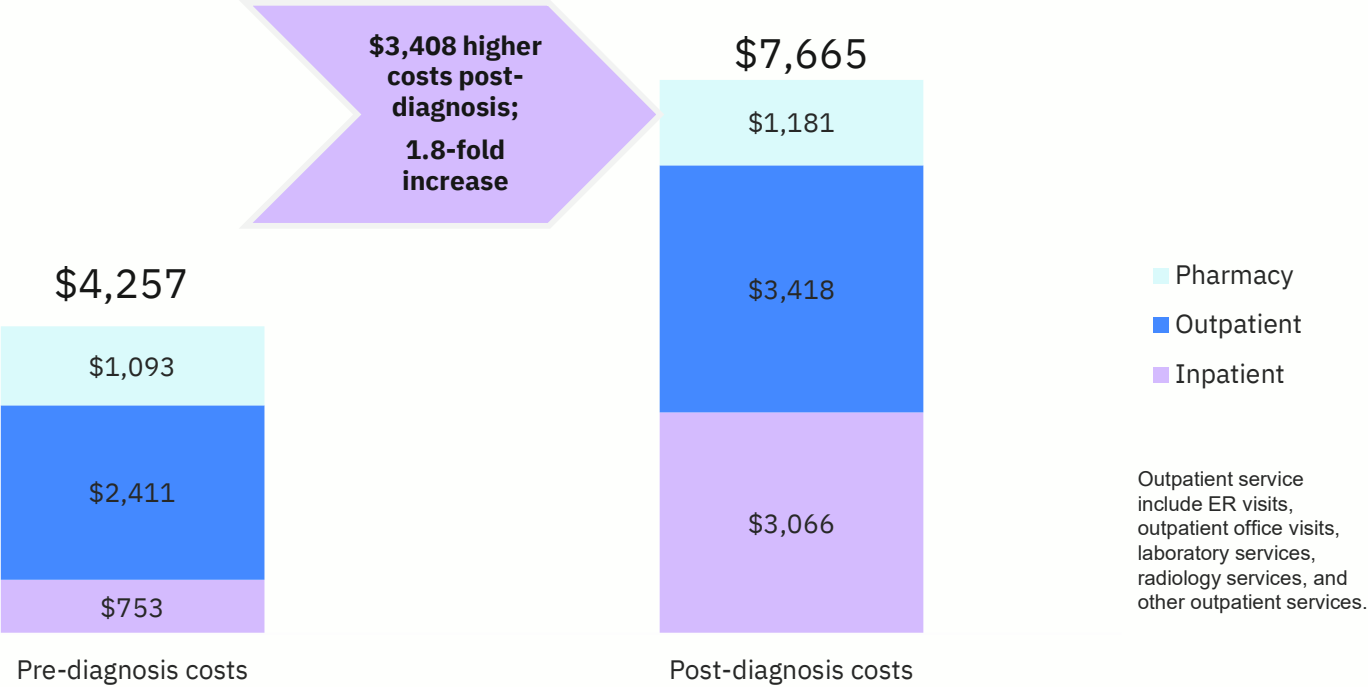
Comorbid Conditions- Prior to and after COVID-19 diagnosis

Clinical Characteristics, N=552,066	6 months prior to diagnosis	
	N/Mean	%/SD
Charlson Comorbidity Index (Mean, SD)	0.32	0.98
Median	0	
Comorbid Conditions (N, %)		
Congestive heart failure	5,087	0.9%
Myocardial Infarction	2,501	0.5%
Liver disease	1,105	0.2%
Kidney disease	7,489	1.4%
Diabetes	45,204	8.2%
Chronic pulmonary disease	32,379	5.9%
Immunocompromised*	35,572	6.4%

*Includes HIV/AIDS, primary solid and hematologic malignancies, transplant recipients, rheumatologic/inflammatory conditions, and other intrinsic immune conditions and immunodeficiencies

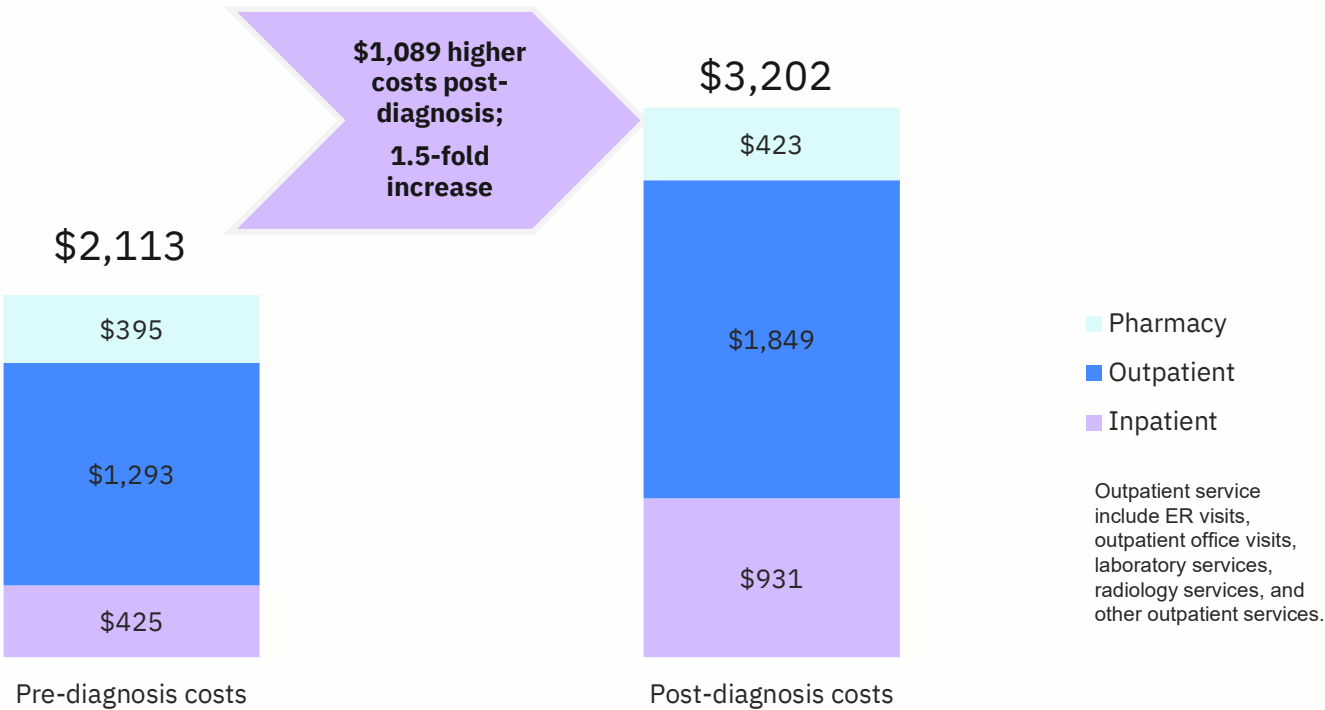
Outcomes – Healthcare Costs, pre- and post- diagnosis

Commercial Database, N=528,400



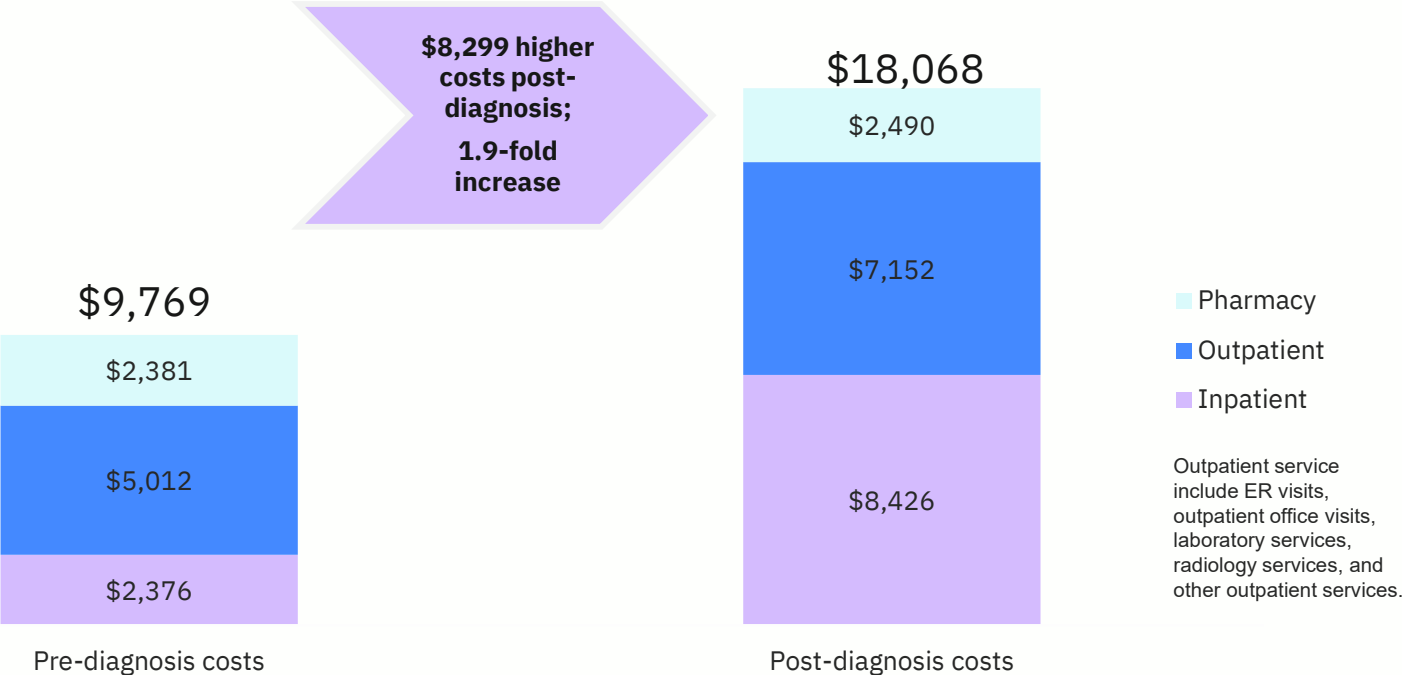
Outcomes – Healthcare Costs, pre- and post- diagnosis

Pediatrics, N=55,221



Outcomes – Healthcare Costs, pre- and post- diagnosis

Medicare, N=23,661



Limitations

- Healthcare costs include all costs incurred for care, and the extent of costs incurred directly due to COVID-19 are unknown.
- Patients in the MarketScan databases are a convenience sample comprised of socioeconomically diverse health plans, thus these findings may not be generalizable to the uninsured populations.
- Data collected for administrative purposes may not be collected and validated with the same rigor as data collected for research; miscoding, under-coding, and coding limitations may have introduced bias or measurement error.

Conclusions

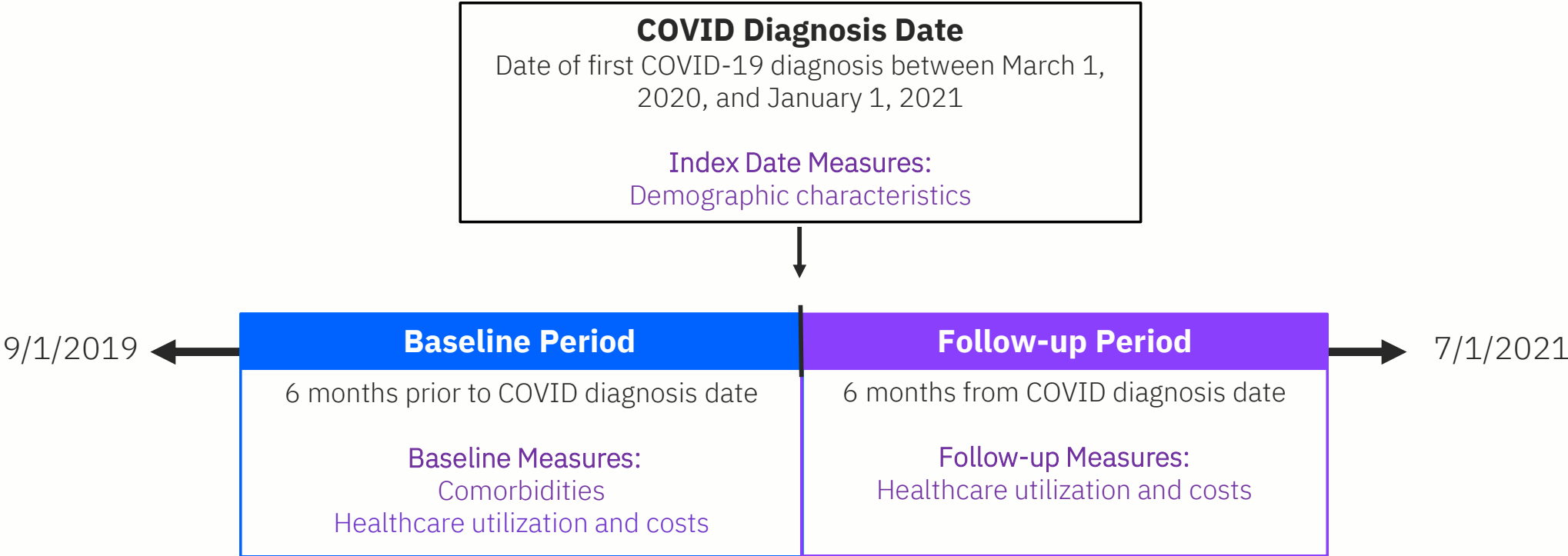
- Patients diagnosed with COVID-10 have significantly higher economic healthcare burden after diagnosis, as evidenced by cost data from a highly representative claims database.
- Further research in longitudinal claims data will illuminate burden of long Covid-19, including but not limited to identifying cohorts of patients most susceptible to high healthcare burden and identifying specific services and treatments incurring the highest costs.
- Further research is needed to investigate disparities and the burdens of out-of-pocket spending and absenteeism/job loss.

Appendix

Appendix: Data Sources

- The MarketScan Commercial Database contains the healthcare experience of privately insured individuals. Coverage is provided under a variety of fee-for-service, fully capitated, and partially capitated health plans, including preferred provider organizations, point of service plans, indemnity plans, and health maintenance organizations
- The MarketScan Medicare Supplemental Database contains the healthcare experience of individuals with Medicare supplemental insurance paid for by employers. Both the Medicare-covered portion of payment (represented as Coordination of Benefits Amount, or COB) and the employer-paid portion are included in this database

Study Time Periods



Demographics at COVID-19 diagnosis

Commercial Database

	N=528,400	N/Mean	SD/%
Mean Age		38.5	15.8
Age by Category			
0-17	55,221		10.5%
18-34	157,326		29.8%
35-44	97,461		18.4%
45-54	116,657		22.1%
55-64	101,734		19.3%
65+	1		0.0%
Gender			
Male	242,896		46.0%
Female	285,504		54.0%

EPO: Exclusive provider organization; HMO: Health maintenance organization; POS: Point of service; PPO: Preferred provider organization; CDHP: Consumer-driven health plan; HDHP: High deductible health plan

	N=528,400	N/Mean	%
Insurance			
CDHP/HDHP	130,737		24.7%
Comprehensive	13,756		2.6%
EPO/PPO	257,648		48.8%
HMO	64,692		12.2%
POS	46,101		8.7%
Unknown/Missing	15,466		2.9%
Region			
Northeast	65,254		12.3%
Midwest	105,414		20.0%
South	292,623		55.4%
West	64,537		12.2%
Unknown/Missing	572		0.1%
Urbanicity			
Non-rural	449,876		85.1%
Rural	78,192		14.8%
Unknown/Missing	332		0.1%

Demographics at COVID-19 diagnosis

Pediatrics

	N=55,221	N/Mean	SD/%
Mean Age		11.5	4.9
Age by Category			
0-5		8,785	15.9%
6-10		11,158	20.2%
11-14		15,128	27.4%
15-17		20,150	36.5%
Gender			
Male		27,693	50.1%
Female		27,528	49.9%

EPO: Exclusive provider organization; HMO: Health maintenance organization; POS: Point of service; PPO: Preferred provider organization; CDHP: Consumer-driven health plan; HDHP: High deductible health plan

	N=55,221	N/Mean	%
Insurance			
CDHP/HDHP		15,197	27.5%
Comprehensive		1,042	1.9%
EPO/PPO		26,076	47.2%
HMO		6,504	11.8%
POS		4,765	8.6%
Unknown/Missing		1,637	3.0%
Region			
Northeast		6,917	12.5%
Midwest		11,443	20.7%
South		30,004	54.3%
West		6,799	12.3%
Unknown/Missing		58	0.1%
Urbanicity			
Non-rural		47,660	86.3%
Rural		7,530	13.6%
Unknown/Missing		31	0.1%

Demographics at COVID-19 diagnosis

Medicare Database

N=23,666	N/Mean	SD/%
Mean Age	75.4	7.7
Age by Category		
0-17	0	0.0%
18-34	1	0.0%
35-44	7	0.0%
45-54	45	0.2%
55-64	317	1.3%
65-74	11,862	50.1%
75+	11,434	48.3%
Gender		
Male	11,095	46.9%
Female	12,571	53.1%

EPO: Exclusive provider organization; HMO: Health maintenance organization; POS: Point of service; PPO: Preferred provider organization; CDHP: Consumer-driven health plan; HDHP: High deductible health plan

N=23,666	N/Mean	%
Insurance		
CDHP/HDHP	241	1.0%
Comprehensive	1,451	6.1%
EPO/PPO	16,947	71.6%
HMO	4,979	21.0%
POS	39	0.2%
Unknown/Missing	9	0.0%
Region		
Northeast	1,218	5.1%
Midwest	14,314	60.5%
South	6,271	26.5%
West	1,860	7.9%
Unknown/Missing	3	0.0%
Urbanicity		
Non-rural	19,126	80.8%
Rural	4,273	18.1%
Unknown/Missing	267	1.1%

