

COVID-19 diagnoses, treatments, outcomes, and costs in the Washington All-Payer Claims Database, March 2020 – November 2021

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Background

Community transmission of COVID-19 was first reported in Washington on Feb. 28, 2020. Confirmed cases began to rise in March, and by June 30, there were 33,435 confirmed cases, 4,922 hospitalizations, and 1,305 deaths in Washington. The following two years saw COVID-19 cases rise and fall in 6 distinct waves. At the time of writing (June 2022) we are currently in the midst of a seventh. By June 1, 2022, there have been 1,596,985 confirmed cases, 62,882 hospitalizations, and 12,985 deaths¹. In this report, we examine COVID-19 related diagnoses, treatments, outcomes, and costs in the Washington State All-Payer Claims Database (WA-APCD) for 2021 and 2022.

Changes from previous report

We made some changes in methodology between the previous report and this current update which caused changes in some of our previous estimates. First, we include total insurance paid and out-of-pocket costs, where the previous report included only insurance paid

amount. Second, the previous report provided quarterly estimates. In this update, we chose to use time intervals that corresponded more closely to the sequence of COVID-19 surges in the state: March 2020-May 2020, June 2020-August 2020, September 2020-February 2021, March 2021-June 2021, and July 2021-November 2021 (delta variant). The time intervals presented are of different lengths, but we feel they are more comparable, since each reported interval now represents one complete cycle. Data are not yet available for the sixth, omicron variant surge, December 2021-March 2022. Finally, with the advent of many new therapeutics in 2021, the topic of therapeutics is now beyond the scope of this present report, and has been removed.

Summary

Most cases of COVID-19 result in only mild symptoms. However, more severe cases can result in extremely long and expensive hospital visits. For patients diagnosed with COVID-19 during the initial surge between March and May 2020, the average 30-day was \$9,888. For

¹ : Washington State Department of Health, COVID-19 dashboard.

<https://www.doh.wa.gov/Emergencies/COVID19/DataDashboard> accessed June 2021.

comparison, per-member-per-month cost in 2019 for members who were subsequently treated for COVID-19 was \$772 per month. Patients hospitalized with COVID-19 during the initial surge had a median length of stay of six days for commercial insurance plans and Medicaid and seven days for Medicare. The average cost of a 30-day episode of care for a COVID-19 hospitalization was \$27,070. For patients who required 96 or more hours of mechanical respiration, the median length of stay was 12, 17, and 16 days for commercial, Medicaid, and Medicare patients respectively, for an average 30-day cost of \$97,703. Of those hospitalized, 15% required invasive mechanical respiration, and 17% died in the hospital.

Outcomes and costs improved slightly in subsequent surges. The average 30-day cost was about half what it had been in the initial surge (Figure 1), though costs for inpatient cases remained high (Figure 2). The fraction of inpatient cases requiring respiration dropped to 7-10%, and the fraction who died in hospital dropped to 8-13% (Figure 3). These patterns may reflect actual changes in outcomes due to improved treatment, or they may reflect increased testing with a greater number of less severe cases being diagnosed, thereby drawing down the average.

The pandemic changed character in 2021, with the availability of effective vaccines on the one hand, and the advent of new variants of the virus on the other. The surge from March 2021 – June 2021 occurred as a growing fraction of the population was being vaccinated. This surge had the lowest inpatient death rate of the pandemic at 8%. Inpatient death rate rose again to 13% during the surge from July 2021 – November 2021 which was dominated by the delta variant. The delta variant was more infectious and virulent than the original strain. Available

vaccines were less effective than against the original strain, but still provided substantial protection against severe illness.

The cost of treating COVID-19 has been considerable. Total cost paid by insurance and by members out-of-pocket in Washington for COVID-19 patients diagnosed between March 2020 and November 2021 - including all medical claims for 30-day episodes of care following diagnosis – was \$1.36 billion. Based on an average 30-day cost of \$772 for this same population in 2019, this represents \$1.15 billion in excess costs attributable to COVID-19.

Study population

The study population includes people with medical insurance in Washington, any time between March 2020 and November 2021. The Washington All-Payer Claims Database (WA-APCD) includes medical, dental, and pharmacy claims from publicly funded payers. This includes Medicaid, Medicare Advantage, Public Employees Benefit Board, and Labor and Industries, and commercial plans including group and individual markets. WA-APCD does not include claims from the Veterans Administration or self-funded commercial plans. Medicare fee-for-service data is only available through 2017 at the time of analysis.

Based on representation in the 2017 WA-APCD (which includes Medicare FFS) compared to the 2017 insured population, we adjusted Medicare Advantage member counts and costs by a factor of 3.17 to compensate for missing Medicare fee-for-service claims. We adjusted commercial counts and paid amounts by a factor of 1.20 to compensate for other missing payers. Medicaid is fully represented in the database, so we didn't need to make an adjustment.

We need to note that the Medicare Advantage population is not the same as Medicare fee-for-service. In 2017, Medicare advantage members were slightly older (average age 70.8 years for Medicare Advantage, 69.6 for Medicare fee-for-service) and had a higher prevalence of COVID-19 risk factors (60.6% for Medicare Advantage, 51.1% for Medicare fee-for-service). Using Medicare advantage as a proxy for Medicare fee-for-service may inflate the values to some extent. Still, this seemed preferable to the gross underestimation that would have come from disregarding the Medicare fee-for-service population entirely. Similarly, the commercial population represented in the database may not be the same as the commercial population not represented, though we don't have the data to assess this.

Table 1 presents the study population by payer, age, sex, and race. Race and ethnicity data are largely missing in WA-APCD for Medicare Advantage and commercial payers and are only presented for Medicaid.

There were 5.2 million covered lives in the WA-APCD for 2020-21, representing, after adjustment, 6.1 million covered lives in Washington. The uninsured population is not represented. Average monthly total medical cost in 2020-2021 was \$364 per-member-per-month. Medical cost increased with age, from \$106 per-member-per-month for age < 35 up to \$454 for members age 75 and older. Among Medicaid-only members, average monthly medical cost was highest for American Indian / Alaska Natives at \$296, followed by Whites (\$230), Blacks (\$199), Native Hawaiian / Pacific Islanders

(\$160), Hispanics (\$154), and Asians (\$139). It should be noted that differences in cost may reflect disparities in access and coverage and should not be interpreted as indicative of population health.

Seventeen percent of the study population (1.2 million members) had preexisting risk conditions for severe COVID-19 before March 2020 with an average monthly cost of \$390 per month in 2020-2021. Eight percent (521,454) of the study population had an inpatient admission, COVID-19 or otherwise, during 2020-2021. The average cost for a 30-day episode of care following inpatient admission was \$1,004.

COVID-19 medical claims

The Mathematica COVID-19 Primer² provides definitions and code lists for COVID-19 related diagnoses and procedures. Using this document, we identified claims with COVID diagnosis and service date between March 1, 2020 and November 30, 2021. We identified members with claims for respiratory diagnoses (viral pneumonia, bronchitis, lower respiratory infection, acute respiratory distress syndrome) that were indicative of more severe cases. We identified members with preexisting risk factors (chronic kidney disease, chronic lung disease, diabetes, HIV, immunocompromised, liver disease, moderate/severe asthma, serious heart conditions, severe obesity) diagnosed between March 1, 2019 and March 1, 2020. And we examined outcomes for inpatient cases (length of stay, ICU admission, mechanical respiration, respiration 96-plus hours, died in hospital). For COVID-19 patients, we compiled the total amount paid by medical insurance and out-of-

² Mathematica - A COVID-19 Primer: Analyzing Health Care Claims, Administrative Data, and Public Use Files. <https://mathematica.org/publications/a-covid-19-primer-analyzing-health-care-claims->

[administrative-data-and-public-use-files](#) accessed January, 2021.

pocket for each member for 30 days following the first COVID-19 diagnosis. For members without COVID-19 diagnosis, we calculated the average monthly medical cost.

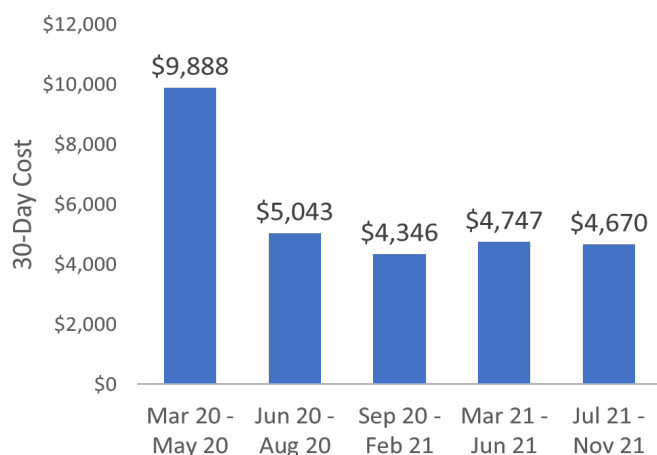
Results

COVID-19 diagnoses

There were 274,525 members (adjusted count) with a COVID-19 diagnosis between March 1 2020 and November 30, 2021 (Table 2). Note that these adjusted counts are considerably less than the number of confirmed COVID-19 cases in the state. Cases only enter the WA-APCD if they generate a medical claim. Asymptomatic or mild cases that do not require treatment would not be represented.

Average cost for a 30-day episode of care following COVID-19 diagnosis was \$9,888 during the initial surge from March-May, 2020. Average costs declined through subsequent surges over the next two years ranging from \$4,346 to \$5,043. (Figure 1). It is unclear to what extent the reduction in average cost reflects improvement in treatments and outcomes, and to what extent it reflects increased testing, with more milder cases being diagnosed. This further

Figure 1. Average 30-day cost for COVID-19 patients, March 2020 – November 2021



illustrates the caveat that the WA-APCD only captures cases that generate claims.

Among members with COVID-19 diagnosis, 28,829 (11%) had severe respiratory diagnoses between March 2020 and November 2021. The proportion of cases with severe diagnosis declined from 40% in the initial surge (Mar - May 2020) to 18% in the second (June – August 2020), possibly reflecting increased testing.

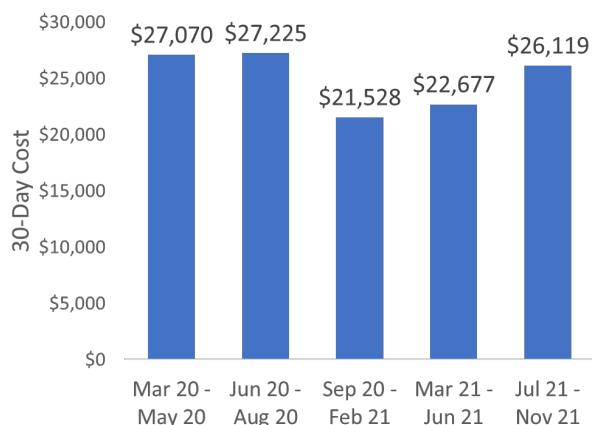
Vaccines capable of preventing more severe illness became available for vulnerable groups in December 2020, and for the general population in April 2021. The percentage of severe cases continued to decline through 2021, to 13 % in September 2020 – February 2021 and 8% in March – June 2021. By the delta variant surge, July – November 2021, only 5% of diagnosed cases with medical claims included severe symptoms.

Hospital outcomes and costs

There were 49,387 (adjusted count) COVID-19 diagnosed members with inpatient claims between March 1, 2020, and November 30, 2021, for \$25,007 average 30-day cost. Though overall per-member cost declined (figure 1) the 30-day cost of a COVID-19 inpatient episode remained high through two years of the pandemic (Figure 2). In the initial surge, March – May, 2020, a 30-day inpatient episode cost \$27,070. By the delta surge, July-November 2021, a 30-day inpatient episode cost \$26,119. For comparison, an average 30-day episode of care following an inpatient admission in 2019 cost \$1795. Note that our adjusted inpatient counts are not far from the state totals. Most inpatient admissions would generate medical claims, and so our estimates for inpatient

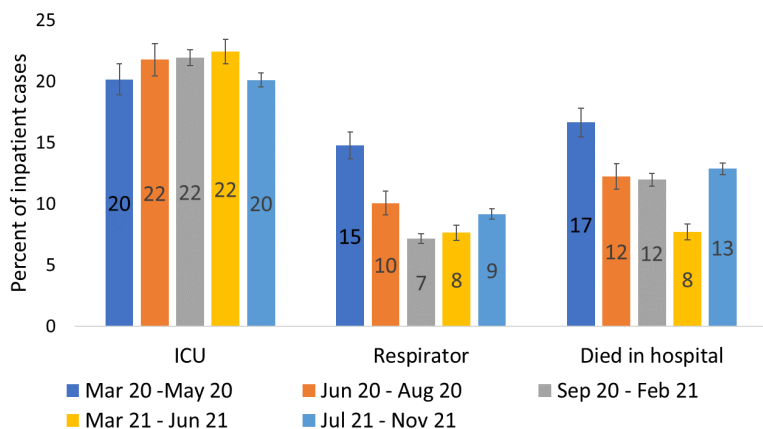
outcomes and costs are more representative than our counts for diagnosed cases.

Figure 2. Average 30-day cost for COVID-19 inpatients, March 2020 – November 2021



Among COVID-19 inpatient cases from March, 2020, - November, 2021, 10,579 (21%) were treated in the ICU for an average 30-day cost of \$37,185; 4,452 (9%) required respiration for \$84,563 average 30-day cost; 2,962 (6%) required 96+ hours respiration for \$104,808 average 30-day cost. 40,972 inpatient cases (12%) died in hospital with average cost of \$40,972.

Figure 3. Hospital outcomes for COVID-19 patients, March 2020 – November 2021



While the fraction of COVID-19 hospitalizations in the ICU remained constant at 20-22%, other hospital outcomes improved somewhat over the course of the pandemic (Figure 3, Table 2). Respirator use declined from 15% in the initial March – May 2020 surge, to 7-10% in subsequent surges. Inpatient cases who died in hospital declined from 17% in the initial March – May 2020 surge, to 8-13% in subsequent surges. The surge from March 2021 – June 2021 occurred as a growing fraction of the population was being vaccinated. This surge had the lowest inpatient death rate of the pandemic at 8%. Inpatient death rate rose to 13% and respirator use to 9% during the surge from July 2021 – November 2021 which was dominated by the delta variant.

The median total length of stay for a COVID-19 inpatient stay in 2020-2021 including transfers and 30-day readmissions was 5 days for commercial and Medicaid members, and 6 days for Medicare. Median is more reflective of a “typical” length of stay, than the average value which can be influenced by occasional very lengthy visits. Patients admitted to ICU had slightly longer median length of stay at 6 days for commercial and Medicaid, and 7 days for Medicare. Patients requiring respiration had very long inpatient stays, with median of 14 days for Medicaid and 15 days for commercial and Medicare. Inpatient length of stay decreased only slightly over two years (Table 4). For comparison, the median length-of-stay for an inpatient admission in 2019 was 2 days for commercial members, 3 days for Medicaid and 4 days for Medicare. The median length of stay in 2019 for an ICU admission was 3 days for commercial and 4 days for Medicaid and Medicare.

Hospital outcomes and length of stay for commercial, Medicaid, and Medicare patients are given in Tables 3 and 4.

Preexisting risk factors

From March 2020 – November 2021 there were 1,189,057 members (adjusted count) with diagnoses for one or more preexisting risk condition diagnosed before March 2020, representing 17% of the total study population (Table 5). Members with preexisting risk conditions account for 112,135 (41%) of COVID-19 diagnoses, 30,095 (61%) of inpatient cases, 2,780 (63%) of respirator cases, and 4,445 (74%) of cases who died in hospital.

Members with preexisting risk factors were more likely to have adverse outcomes. While the overall rate of adverse outcomes declined over time, the relative risk related to preexisting conditions remained high.

Demographic patterns

COVID-19 outcomes varied by payer (Table 3) and by age, sex and race/ethnicity (Table 6). To provide sufficient sample for small demographic groups, we combined data for March 2020 – November 2021.

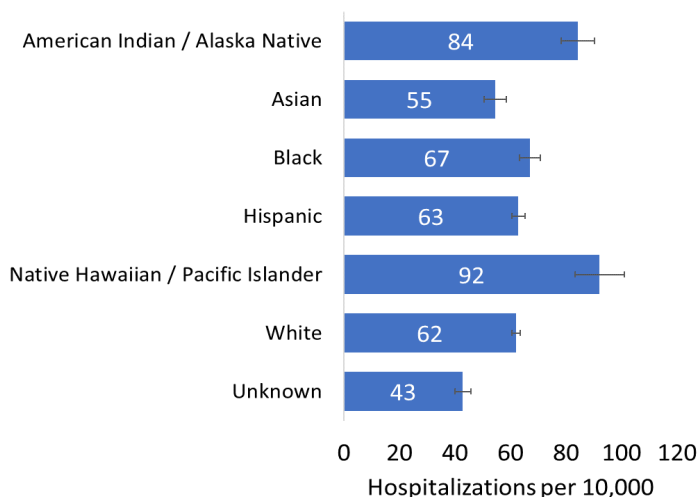
The percentage of men and women with inpatient admission (49% men, 51% women) was close to the underlying proportion in the study population (47% men, 53% women). However, a larger fraction of men required a respirator (57% men, 43% women) or died in hospital (54% men, 46% women).

Advanced age is strongly related to adverse outcomes for COVID-19. Members age 65 or older accounted for 29% of the study population, but 54% of inpatient cases, 53% of cases requiring respiration, and 78% of those who died in hospital. The inpatient mortality

rate was 14% for members aged 65-74, and 21% for members aged 75 and older.

Member race and ethnicity was not available for commercial and Medicare advantage payers. Race or ethnicity was available for 91% of members with Medicaid coverage only. Among Medicaid members, race and ethnicity data may not be missing at random. Members of unknown race had disproportionately fewer inpatient cases compared to members with known race. Results by race and ethnicity should be interpreted with caution.

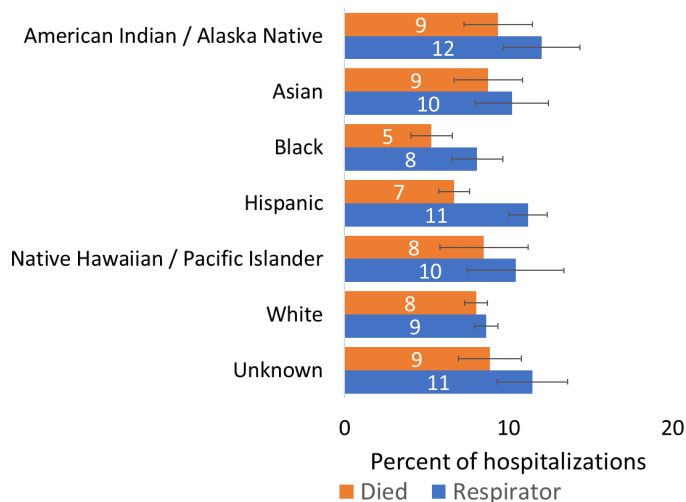
Figure 4. COVID-19 Hospitalizations per 10,000 Medicaid covered lives by race and ethnicity, March 2020 – November 2021.



Native Hawaiian / Pacific Islander Medicaid members had the highest hospitalization rate at 92 COVID-19 hospitalizations per 10,000 covered lives, followed by American Indian / Alaska Natives (84 per 10,000), Black (67 per 10,000), Hispanic (63 per 10,000), White (62 per 10,000), Asian (55 per 10,000), and unknown (43 per 10,000) (Figure 4).

Small numbers and wide margins of error make it difficult to assess hospital outcomes by race and ethnicity. (Figure 5).

Figure 5. Hospital outcomes among Medicaid COVID-19 inpatient cases by race and ethnicity. March 2020 – November 2021.



Comparison with 2019

To provide a baseline for comparison with COVID-19 costs, we calculated average per-member-per-month medical cost in 2019 for members of the study population who had continuous medical coverage throughout 2019 (Table 8). The continuously enrolled subpopulation was sicker on average than the full study population with 48% having pre-existing risk conditions, compared to 11% in the full study population. For members with pre-existing risk conditions, the average monthly medical cost was \$957 in 2019. The average total cost for a 30-day episode of care following hospital admission was \$1,795 (compare with \$25,007 for an average COVID-19 inpatient episode). Following an ICU admission, the 30-day cost was \$2586. Median inpatient length of

stay was 2 days for commercial, 3 days for Medicaid, and 4 days for Medicare.

Average monthly cost for members who were subsequently diagnosed with COVID-19 was \$772. There were 274,525 COVID-19 diagnosed members in the study population, with a total medical cost of \$1.36 billion between March 2020 and November 2021. The expected cost based on 2019 monthly cost would have been \$212 million. COVID-19 therefore accounts for \$1.15 billion in excess medical costs in 2020 and 2021.

Strengths and limitations

One of the strengths of the WA-APCD is its comprehensive nature. We can follow a patient through a complete episode of care across multiple settings, from initial diagnosis (perhaps in a primary care setting) to emergency department, inpatient admission, and through to possible rehabilitation in a skilled nursing facility or outpatient follow-up care.

Another strength is the ability to assess actual costs paid by insurance and by members out of pocket. These are generally, substantially less than the amount that the provider charges. Since prices negotiated by insurance companies are proprietary, claims data are perhaps the only source for detailed assessment of medical costs.

This study has two chief limitations: First is the lack of Medicare fee-for-service data for 2020 and 2021. We adjusted for this lack by weighting Medicare Advantage data to ensure that Medicare had the correct proportional representation in the overall totals. However, this method assumes that the Medicare fee-for-service population resembles Medicare Advantage in health, treatment and outcomes, which is not the case. Medicare advantage members in 2017 were slightly older and had

higher prevalence of COVID-19 risk factors. Because of this, our adjusted values may be somewhat elevated.

Second, medical claims data do not capture all COVID-19 cases, only those that generate claims. By June 1, 2020, for example, there were 33,435 confirmed cases in Washington, but only 17,689 diagnosed cases after adjustment. The remaining cases could be uninsured, or could be

asymptomatic or mild cases that required no treatment. Those cases wouldn't generate a claim. Claims data greatly underestimates population disease prevalence. However, since most inpatient cases would generate claims, our estimates of inpatient outcome rates are probably more reliable.

Table 1: Study population: WA-APCD covered lives, 2020-2021

	Member count	Total cost (\$1,000s)	Adjusted count	Adjusted total cost (\$1,000s)	Adjusted percent	Adjusted 30-day cost (\$)
Covered lives, 2020 – 2021	5,177,872	28,530,710	6,857,713	47,409,094	100	364
Commercial	2,627,209	13,024,518	3,156,960	15,650,785	46	261
Medicaid	2,020,404	8,013,012	2,020,404	8,013,012	30	209
Medicare	530,259	7,493,180	1,680,349	23,745,297	24	744
Female	2,686,280	15,617,163	3,599,262	25,793,321	53	247
Male	2,467,789	12,168,191	3,231,738	20,364,180	47	217
Unknown	563	2,779	683	3,510	0	177
Age<35	2,503,214	7,569,338	2,731,544	8,419,975	40	106
Age35-64	1,789,025	12,164,119	2,151,618	15,963,469	31	256
Age65-74	514,062	4,329,803	1,139,417	11,140,788	17	337
Age75+	347,563	3,724,871	808,191	10,636,776	12	454
Unknown	768	2,568	914	2,651	0	100
American Indian / Alaska Native*	88,670	498,471	88,670	498,471	4	296
Asian*	127,457	337,540	127,457	337,540	6	139
Black*	176,931	669,672	176,931	669,672	9	199
Hispanic*	437,532	1,279,654	437,532	1,279,654	22	154
Native Hawaiian / Pacific Islander*	44,705	136,280	44,705	136,280	2	160
White*	941,858	4,113,253	941,858	4,113,253	47	230
Unknown*	197,488	712,816	197,488	712,816	10	190
Preexisting risk conditions	708,179	4,739,601	1,189,057	9,279,616	17.3	390
Inpatient**	346,137	5,701,176	521,454	9,423,821	8	1,004
*Medicaid only						
**Total cost for 30-day episode of care following admission						

Table 2: COVID-19 outcomes and cost

(a) March 2020 - May 2020	Member count	Total cost (\$1,000s)	Adjusted count	Adjusted total cost (\$1,000s)	Adjusted percent	Adjusted 30-day cost (\$)
Covered lives	4,224,780	3,138,806	5,616,034	5,176,916		307
COVID-19 diagnosis	8,182	64,677	12,030	118,953		9,888
Severe symptoms	3,098	52,644	4,836	95,044		19,653
Inpatient	2,391	59,235	3,952	106,976	100	27,070
ICU	480	18,102	797	32,242	20	40,472
Respirator	356	28,350	583	48,983	15	83,995
Respirator 96+ hours	263	25,091	433	42,318	11	97,703
Died in hospital	315	9,329,911	657	19,842,156	17	30,190

(b) June 2020 - August 2020	Member count	Total cost (\$1,000s)	Adjusted count	Adjusted total cost (\$1,000s)	Adjusted percent	Adjusted 30-day cost (\$)
Covered lives	4,259,101	1,352,645	5,655,384	2,251,933		133
COVID-19 diagnosis	16,488	69,232	22,166	111,772		5,043
Severe symptoms	2,830	49,724	4,050	79,714		19,682
Inpatient	2,498	63,302	3,751	102,110	100	27,225
ICU	534	21,418	816	34,624	22	42,423
Respirator	258	23,283	377	34,597	10	91,811
Respirator 96+ hours	190	18,892	286	28,614	8	100,141
Died in hospital	234	11,044	459	20,187	12	43,993

(c) September 2020 - February 2021	Member count	Total cost (\$1,000s)	Adjusted count	Adjusted total cost (\$1,000s)	Adjusted percent	Adjusted 30-day cost (\$)
Covered lives	4,553,137	2,327,879	6,070,980	3,902,254		107
COVID-19 diagnosis	61,831	208,243	85,303	370,703		4,346
Severe symptoms	6,803	111,547	11,386	206,954		18,176
Inpatient	8,943	183,456	15,432	332,215	100	21,528
ICU	1,927	61,968	3,384	110,369	22	32,612
Respirator	664	49,312	1,105	83,205	7	75,296
Respirator 96+ hours	416	39,926	700	67,889	5	96,989
Died in hospital	862	29,163	195,614	29,359	12	34,059

(d) March 2021 - June 2021	Member count	Total cost (\$1,000s)	Adjusted count	Adjusted total cost (\$1,000s)	Adjusted percent	Adjusted 30-day cost (\$)
Covered lives	4,364,535	1,662,819	5,844,142	2,773,201		119
COVID-19 diagnosis	28,043	107,666	35,639	169,185		4,747
Severe symptoms	1,428	33,198	2,033	51,444		25,300
Inpatient	4,304	96,323	6,765	153,412	100	22,677
ICU	932	33,158	1,517	52,125	22	34,365
Respirator	328	26,653	516	40,315	8	78,162
Respirator 96+ hours	208	21,735	310	32,153	5	103,740
Died in hospital	262	13,944	521	25,669	8	49,264

(e) July 2021 - Nov 2021	Member count	Total cost (\$1,000s)	Adjusted count	Adjusted total cost (\$1,000s)	Adjusted percent	Adjusted 30-day cost (\$)
Covered lives	4,515,228	7,334,777	6,026,230	12,215,943		676
COVID-19 diagnosis	90,074	338,834	116,691	544,909		4,670
Severe symptoms	4,311	113,096	6,173	173,240		28,065
Inpatient	11,732	304,342	19,015	496,668	100	26,119
ICU	2,321	89,021	3,823	145,392	20	38,029
Respirator	1,101	98,954	1,742	148,320	9	85,138
Respirator 96+ hours	724	80,275	1,149	121,769	6	106,012
Died in hospital	1,218	61,634	2,444	113,337	13	46,372

Table 3: COVID-19 outcomes and by payer, March 2020 – November 2021

	Member count	Total cost (\$1,000s)	Adjusted count	Adjusted total cost (\$1,000s)	Adjusted percent	Adjusted 30-day cost (\$)
COVID-19 Diagnosis						
Commercial	79,098	259,552	95,047	311,889	35	3,281
Medicaid	102,362	324,592	102,362	324,592	37	3,171
Medicare	24,335	228,512	77,116	724,137	28	9,390
COVID-19 Inpatient						
Commercial	6,641	219,047	7,980	263,215	16	32,984
Medicaid	15,007	298,620	15,007	298,620	30	19,899
Medicare	8,331	212,435	26,400	673,191	53	25,499
COVID-19 ICU						
Commercial	1,319	71,318	1,585	85,698	15	54,069
Medicaid	3,100	94,063	3,100	94,063	29	30,343
Medicare	1,860	67,414	5,894	213,628	56	36,244
COVID-19 Respirator						
Commercial	510	69,579	613	83,609	14	136,430
Medicaid	1,535	112,413	1,535	112,413	34	73,233
Medicare	727	56,934	2,304	180,420	52	78,314
COVID-19 Respirator 96+ hours						
Commercial	346	57,680	416	69,311	14	166,705
Medicaid	1,025	92,183	1,025	92,183	35	89,934
Medicare	480	46,998	1,521	148,933	51	97,912
COVID-19 Died in hospital						
Commercial	365	32,301	439	38,815	7	88,497
Medicaid	1,168	44,274	1,168	44,274	19	37,905
Medicare	1,399	51,873	4,433	164,381	73	37,079

Table 4: Inpatient median length of stay, including transfers and readmissions, for COVID-19 patients by payer.

(a) March 2020 - May 2020	Commercial	Medicaid	Medicare
COVID-19 inpatient	6	6	7
ICU	7	7	8
Respirator	12	17	16
Respirator 96+ hours	15	18	18
Died in hospital	8	7	7

(b) June 2020 - August 2020	Commercial	Medicaid	Medicare
COVID-19 inpatient	5	5	7
ICU	7	6	8
Respirator	18	17	17
Respirator 96+ hours	21	23	20
Died in hospital	17	10	9

(c) September 2020 - February 2021	Commercial	Medicaid	Medicare
COVID-19 inpatient	4	5	6
ICU	5	6	7
Respirator	13	15	16
Respirator 96+ hours	19	20	17
Died in hospital	11	10	8

(d) March 2021 - June 2021	Commercial	Medicaid	Medicare
COVID-19 inpatient	4	5	6
ICU	5	6	6
Respirator	13	14	12
Respirator 96+ hours	18	17	19
Died in hospital	15	10	9

(e) July 2021 – November 2021	Commercial	Medicaid	Medicare
COVID-19 inpatient	5	5	7
ICU	6	6	8
Respirator	15	13	14
Respirator 96+ hours	18	17	16
Died in hospital	14	10	10

Table 5: COVID-19 outcomes and cost among members with preexisting risk factors

(a) March 2020 - May 2020	Member count	Total cost (\$1,000s)	Adjusted count	Adjusted total cost (\$1,000s)	Adjusted percent	Adjusted 30-day cost (\$)
COVID-19 diagnosis	4,099	39,137	6,894	84,400	57	12,242
Severe symptoms	1,723	30,923	3,057	66,339	63	21,699
Inpatient	1,455	35,408	2,697	75,160	68	27,864
ICU	272	9,606	511	21,385	64	41,852
Respirator	212	16,441	397	34,679	68	87,418
Respirator 96+ hours	148	14,214	292	29,855	67	102,295
Died in hospital	238	6,699	517	15,345	79	29,708

(b) June 2020 - August 2020	Member count	Total cost (\$1,000s)	Adjusted count	Adjusted total cost (\$1,000s)	Adjusted percent	Adjusted 30-day cost (\$)
COVID-19 diagnosis	6,566	36,149	10,339	69,555	46	6,728
Severe symptoms	1,457	26,889	2,366	50,752	58	21,452
Inpatient	1,375	33,375	2,344	63,982	63	27,295
ICU	315	11,390	535	21,813	66	40,782
Respirator	137	10,683	227	19,355	60	85,271
Respirator 96+ hours	104	9,282	180	17,115	63	94,891
Died in hospital	161	6,454	339	14,095	74	41,540

(c) September 2020 – February 2021	Member count	Total cost (\$1,000s)	Adjusted count	Adjusted total cost (\$1,000s)	Adjusted percent	Adjusted 30-day cost (\$)
COVID-19 diagnosis	23,242	115,422	37,388	236,866	44	6,335
Severe symptoms	3,859	66,553	7,168	140,214	63	19,562
Inpatient	5,206	104,136	9,969	216,730	65	21,741
ICU	1,255	36,955	2,414	75,906	71	31,447
Respirator	418	27,162	760	54,134	69	71,184
Respirator 96+ hours	267	22,181	500	44,852	72	89,671
Died in hospital	615	18,221	1,366	42,536	74	31,142

(d) March 2021 –June 2021	Member count	Total cost (\$1,000s)	Adjusted count	Adjusted total cost (\$1,000s)	Adjusted percent	Adjusted 30-day cost (\$)
COVID-19 diagnosis	8,655	47,561	12,548	86,283	35	6,876
Severe symptoms	580	14,474	939	26,593	46	28,316
Inpatient	2,090	43,648	3,667	80,322	54	21,902
ICU	479	14,622	852	26,893	56	31,561
Respirator	161	10,849	293	19,967	57	68,148
Respirator 96+ hours	97	8,219	169	15,058	55	88,872
Died in hospital	169	7,151	366	16,131	70	44,017

(e) July 2021 – November 2021	Member count	Total cost (\$1,000s)	Adjusted count	Adjusted total cost (\$1,000s)	Adjusted percent	Adjusted 30-day cost (\$)
COVID-19 diagnosis	27,629	145,821	41,887	276,383	36	6,598
Severe symptoms	1,772	48,728	2,909	84,326	47	28,991
Inpatient	5,700	134,005	10,522	256,815	55	24,409
ICU	1,206	37,783	2,221	72,270	58	32,539
Respirator	543	40,448	983	69,604	56	70,802
Respirator 96+ hours	339	31,600	623	55,179	54	88,516
Died in hospital	763	29,481	1,686	63,522	69	37,673

Table 6: COVID-19 outcomes and by age, sex and race, March 2020 – November 2021.

(a) COVID-19 diagnosis	Member count	Total cost (\$1,000s)	Adjusted count	Adjusted total cost (\$1,000s)	Adjusted percent	Adjusted 30-day cost (\$)
Female	113,895	369,640	151,903	636,549	56	4,190
Male	89,684	431,214	119,509	707,097	44	5,917
Age<35	90,724	133,353	97,213	145,644	36	1,498
Age35-64	82,198	430,828	98,788	540,982	36	5,476
Age65-74	16,355	124,711	38,919	327,980	14	8,427
Age75+	14,302	111,962	36,493	329,039	13	9,017
American Indian / Alaska Native*	5,912	19,299	5,912	19,299	6	3,264
Asian*	4,303	11,511	4,303	11,511	5	2,675
Black*	8,105	24,838	8,105	24,838	9	3,065
Hispanic*	26,072	65,824	26,072	65,824	27	2,525
Native Hawaiian / Pacific Islander*	1,923	11,090	1,923	11,090	2	5,767
White*	42,598	117,070	42,598	117,070	45	2,748
Unknown*	5,919	19,210	5,919	19,210	6	3,245
*Medicaid only						

(b) Inpatient	Member count	Total cost (\$1,000s)	Adjusted count	Adjusted total cost (\$1,000s)	Adjusted percent	Adjusted 30-day cost (\$)
Female	15,079	323,111	24,958	564,961	51	22,636
Male	14,521	396,027	23,849	654,440	49	27,441
Age<35	5,159	107,685	5,490	117,192	11	21,347
Age35-64	13,541	393,480	16,892	493,855	35	29,236
Age65-74	5,230	117,844	12,234	310,488	25	25,378
Age75+	5,670	100,129	14,190	297,867	29	20,991
American Indian / Alaska Native*	748	17,007	748	17,007	6	22,736
Asian*	696	10,220	696	10,220	6	14,683
Black*	1,187	22,624	1,187	22,624	10	19,060
Hispanic*	2,752	60,616	2,752	60,616	22	22,026
Native Hawaiian / Pacific Islander*	412	10,672	412	10,672	3	25,902
White*	5,844	105,267	5,844	105,267	47	18,013
Unknown*	847	17,617	847	17,617	7	20,800
*Medicaid only						

(c) Respirator	Member count	Total cost (\$1,000s)	Adjusted count	Adjusted total cost (\$1,000s)	Adjusted percent	Adjusted 30-day cost (\$)
Female	1,139	90,539	1,893	150,577,941	43	79,534
Male	1,593	143,787	2,517	221,093,737	57	87,841
Age<35	250	26,577	268	29,548	6	110,440
Age35-64	1,464	146,441	1,822	178,065	41	97,710
Age65-74	624	41,598	1,406	107,370	32	76,373
Age75+	394	19,711	914	56,689	21	61,993
American Indian / Alaska Native*	90	6,521	90	6,521	7	72,460
Asian*	71	2,628	71	2,628	6	37,018
Black*	96	7,110	96	7,110	8	74,060
Hispanic*	308	26,433	308	26,433	25	85,821
Native Hawaiian / Pacific Islander*	43	4,911	43	4,911	4	114,203
White*	505	33,407	505	33,407	42	66,153
Unknown*	97	7,123	97	7,123	8	73,435
*Medicaid only						

(d) Died in hospital	Member count	Total cost (\$1,000s)	Adjusted count	Adjusted total cost (\$1,000s)	Adjusted percent	Adjusted 30-day cost (\$)
Female	1,289	45,100	2,730	94,178	46	34,499
Male	1,610	80,844	3,265	150,214	54	46,008
Age<35	44	4,473	49	4,993	1	101,185
Age35-64	931	67,089	1,231	85,211	21	69,202
Age65-74	740	27,744	1,755	75,898	29	43,239
Age75+	1,184	26,638	2,959	78,290	49	26,459
American Indian / Alaska Native*	70	3,745	70	3,745	7	53,502
Asian*	61	792	61	792	6	12,987
Black*	63	2,667	63	2,667	7	42,339
Hispanic*	184	8,775	184	8,775	19	47,688
Native Hawaiian / Pacific Islander*	35	1,614	35	1,614	4	46,102
White*	469	14,221	469	14,221	49	30,322
Unknown*	75	2,783	75	2,783	8	37,103
*Medicaid only						

Table 7: Cost and utilization among members of the study population who were continuously enrolled in 2019.

January 2019 – December 2019	Member count	Total cost (\$1,000s)	Adjusted count	Adjusted total cost (\$1,000s)	Adjusted 30-day cost (\$)
All members	1,367,714	7,475,559	1,900,038	12,725,034	558
With risk conditions	556,036	5,805,210	916,537	10,520,394	957
Inpatient 30-day episodes	78,494	1,593,522	134,656	2,899,997	1,795
ICU 30-day episode	11,642	383,706	24,075	746,957	2,586
Later diagnosed with COVID-19	98,263	704,263	132,399	1,225,988	772

Table 8: Inpatient length of stay among members of the study population who were continuously enrolled in 2019.

January 2019 – December 2019	Number of discharges	Adjusted number of discharges	Median length of stay
	Acute inpatient		
Commercial	20,762	24,948	2
Medicaid	38,831	38,831	3
Medicare	27,102	85,884	4
	ICU		
Commercial	1,987	2,388	3
Medicaid	5,154	5,154	4
Medicare	6,517	20,652	4