Analyzing Long COVID Using Commercial Claims Data

Michael Cohen, PhD
202.568.0633 • michael.cohen@wakely.com

Chia Yi Chin, ASA, MAAA
832.247.6858 • chiayi.chin@wakely.com

Darren Johnson, FSA, MAAA
515.708.2098 • darren.johnson@wakely.com

Long term impact of COVID-19: Findings from Commercial Claims Data[1]

The long term impact of COVID-19 is of critical importance but something that has remained hard to quantify. "Long COVID", as it is commonly known, is a condition characterized by chronic symptoms persisting long after the initial COVID-19 infection. Given the millions of people infected by COVID-19, understanding the long term implications of the disease is crucial for treating individuals with Long COVID symptoms as well as understanding the implications for the health care system as whole. The National Institute of Health has allocated $1.5 billion over four years to study Long COVID; dozens of articles have been written studying the potential effects of Long COVID. Despite these extensive research efforts, there is a need for more conclusive answers as much remains unknown about Long COVID and its potential long term implications.

Most Long COVID studies have focused on either survey data or medical records, with very few studies having used insurer claims data to date. Even fewer studies have focused on the commercially insured population. This study does both by using a unique dataset of commercial claims which allows us to analyze the effects of a COVID-19 diagnosis on future claims cost and conditions.

We were able to find that on average, individuals with initial COVID-19 diagnoses were costlier in the months following the initial diagnosis, even after several months had passed. Additionally, individuals with a COVID-19 diagnosis were more likely to have additional medical conditions in future months than a control population. The findings, contained herein, reinforce previous research that COVID-19 diagnoses and related costs are not isolated to the initial diagnosis. This analysis further shows that these findings are not isolated only to those with prior comorbidities or for only individuals that older. However, we did find that the impact of Long COVID may vary significantly by individual's age and prior comorbidities.

This paper will discuss the previous literature, the methods and data used to study Long COVID, key findings, and implications.

Background

The novel coronavirus disease 2019 (COVID-19) has rapidly spread throughout the world, including the United States. At least 80 million Americans[2] have been infected by COVID-19 since March 2020, with

[1] This research was funded by a grant from Robert Woods Johnson Foundation. All errors are the authors.
[2] https://www.worldometers.info/coronavirus/country/us/ Accessed March 20, 2022

actual estimates far in excess of this figure. Beyond the initial acute symptoms, there has been growing evidence that some patients have long-term chronic effects from COVID-19. While the term "Long COVID" does not yet have a clinical definition, it has generally been used to describe a variety of persistent symptoms who have had a COVID-19 diagnosis at least 30 days in the past. These symptoms include fatigue, cognitive and neurological problems, decreased lung capacity, mental health issues, heart problems, and more. One meta-analysis identified more than 50 different potential long-term effects of COVID-19.[3] More recent research has identified a pattern of autoimmune response to COVID-19 and circulation problems due to tiny blood clots. [4] Research also has identified comorbidities such as diabetes or cardiovascular illness that make Long COVID more likely. In other words, the literature points to COVID-19 both causing symptoms and exacerbating underlying conditions.

Prior literature has identified Post-COVID-19 symptoms that can last months and potentially result in new chronic conditions. This has an impact both to the quality of the individual's life and in long-term health care considerations such access to appropriate providers and costs to the system as whole (e.g., premiums).

Methods

Wakely, funded by a grant by the Robert Woods Johnson Foundation, collected data from issuers in the commercial markets in order to better understand the cost, utilization, and morbidity impact of the COVID-19 pandemic.

Over the course of nearly 18 months, Wakely has conducted five separate data collections, with the most recent one consisting of medical and pharmacy claims and enrollment information from January 2019 through July 2021 (with claims both paid and incurred through that date). That phase included data comprising over 10 million distinct 2021 Commercial (primarily large group, ACA individual and ACA small group) lives, including:

- Over 660k COVID-19-diagnosed lives
- Over 15,000 COVID-19 inpatient admits
- Over 9 million COVID-19 tests

This dataset gives us the ability to compare member's costs and health status before and after COVID-19 diagnoses, and thus gain a better understanding of the impact of COVID-19 on their morbidity.

Because the data is sourced from commercial insurers, there are limitations to what is covered in it. Most importantly, data on vaccinations are populated at a rate far below the actual population prevalence due to many individuals getting vaccines without submitting their insurance information. The same limitation may also apply to COVID-19 testing.

[3] https://www.nature.com/articles/s41598-021-95565-8

[4] https://www.sciencedaily.com/releases/2021/10/211004104134.htm

In order to summarize condition categories, we relied on the Department of Human and Health Services (HHS) Hierarchical Condition Category (HCC) risk adjustment model that CMS used for risk adjusting individual and small group ACA populations.

We flagged individuals as having a COVID-19 diagnosis if they had ICD10 code U071 or B9729 (with B9729 being used almost exclusively in the first few months of 2020). We summarized member cost data by using Wakely's proprietary Data Cutter to group claims into high level cost categories. In the subsections below, we summarized our findings by two separate sets of results: a basic correlation analysis as well as a more controlled set of analyses.

The correlation analyses we conducted looked at the change in diagnosed conditions and claim costs before and after a COVID-19 diagnosis to give a high-level look at how those factors were changing with COVID-19. The more controlled analyses used several proxies to help control for the fact that someone diagnosed with COVID-19 on a medical claim was guaranteed to have visited the doctor and thus more likely to have chronic conditions (both in incidence and in likelihood of coding). The most promising control being restricting our analysis to individuals who had a diabetes diagnosis pre-COVID-19.

Correlation Findings

The first step taken was to analyze the raw impact in terms of severe diagnoses and claim costs after a COVID-19 diagnosis. Since there may be conditions coded for the first time in a year when an individual is first diagnosed with COVID-19 (either due to that being their first interaction with the medical system that year or due to deferred care such as cancer screenings), we examined individual's HCC codes seven days after the initial date of diagnosis and compared them to their HCC codes 30 days after the date of the diagnosis. This allowed us to study the impact of potential chronic conditions stemming from COVID-19 instead of just capturing acute conditions arising during the infection period of COVID-19.

The change in conditions being coded between these two time periods provides a high level correlation of change in individuals' underlying health status that may be due to long term impacts of COVID-19.

This resulted in tables such as the following:

Table 1: HCC Prevalence Changes

	Percentage Point Change (7 days Post-Diagnosis to 30 Days Post-Diagnosis)			
HCC Condition Group	**All**	**Severe**	**Non Severe**	**No Admits**
Diabetes	0.35%	6.53%	2.18%	0.31%
Respiratory Arrest	0.64%	11.77%	11.12%	0.43%
Asthma/COPD	0.43%	3.57%	1.70%	0.40%
Infection	0.26%	13.52%	5.21%	0.16%
Heart Disease	0.38%	15.58%	3.38%	0.31%
Lung Disease	0.24%	10.16%	2.52%	0.18%
Immune Disorders	0.10%	0.63%	0.41%	0.09%
Kidney Disease	0.02%	1.51%	0.19%	0.02%
Mental Health and Substance Abuse	0.14%	1.54%	0.35%	0.13%

HCC Condition Group	Percentage Point Change (7 days Post-Diagnosis to 30 Days Post-Diagnosis) All	Severe	Non Severe	No Admits
Cancer	0.08%	0.42%	0.20%	0.08%
Liver Disease	0.03%	1.56%	0.24%	0.03%

This table separates out the following categories:

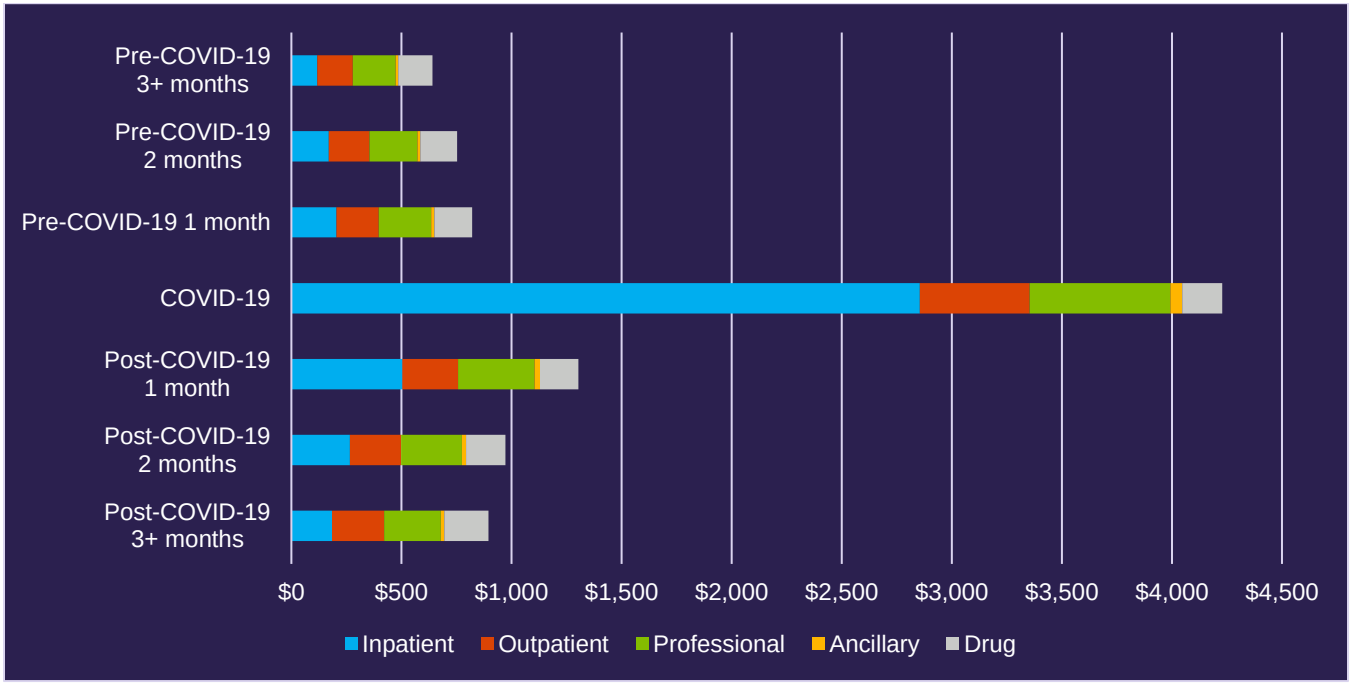
- All: All individuals with a COVID-19 diagnosis
- Severe: All individuals with a severe COVID-19 inpatient admission
- Non-Severe: All individuals with a non-severe COVID-19 inpatient admission
- No Admits: Individuals with a COVID-19 diagnosis who either did not have an inpatient admission or had one that did not include a matching DRG.

The first column of disease conditions is based on HHS-HCC markers. For example, individuals diagnosed with COVID-19 had relatively higher prevalence of diabetes, as defined by the HHS-HHC model. Overall, individuals had a prevalence of diabetes 0.35 percentage points higher at 30 days' post COVID-19 diagnosis than they did in the snapshot taken 7 days after COVID-19 diagnosis. However, for individuals with severe COVID-19 diagnoses, diabetes prevalence increased 6.53 percentage points (from 38.2% of individuals with severe COVID-19 admits to 44.8%). See the before and after tables in Appendix 1 for more detail.

In addition, we also summarized the change in claims cost for individuals diagnosed with COVID-19. For this exercise, we divided individuals into the same four categories as above.

The full tables are in Appendix 2a-2d. We can see the results for all individuals with a COVID-19 diagnosis below:

Chart 1: Completed Allowed PMPM of All Individuals with COVID-19 Diagnoses



Here, individuals' claims are broken out by service category[5] and period of time – month of COVID-19 diagnosis and 1, 2, or 3+ months in either direction. These individuals have a Pre-COVID-19 PMPM of around $650 PMPM. This PMPM is slightly elevated compared to the general population reflecting the increased morbidity due to many of these individuals already having chronic conditions before contracting COVID. Their costs spike heavily during the month of diagnosis before quickly falling back to earth, but even 3+ months post diagnosis, we see significant increases in Outpatient, Professional and Pharmacy spend with the average PMPM around $900.

These patterns persist in non-admitted individuals with less severe COVID-19 courses. Note that the inpatient costs are still spiking during the month of diagnosis due to stays **with** COVID-19, not **from** COVID-19. For example, any individuals who give birth while having a COVID-19 diagnosis would fall into this population bucket:

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Service categories include medical claims in the following categories:

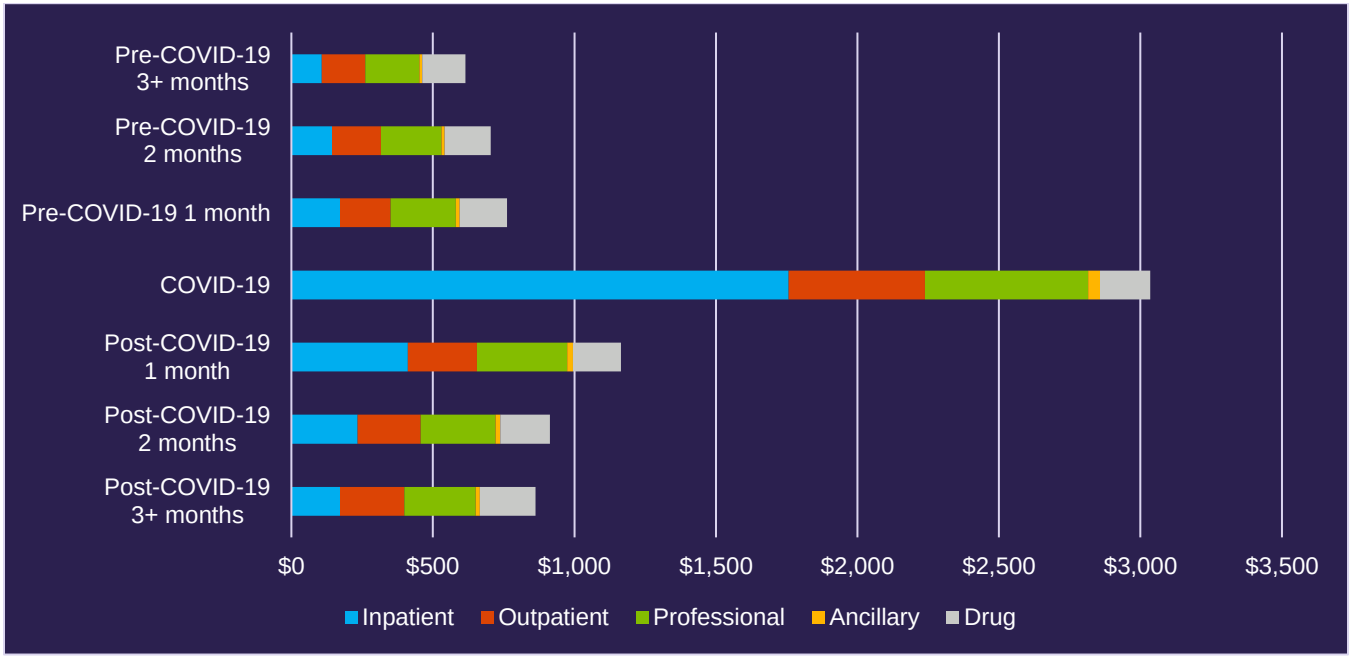
Inpatient: Surgical, Maternity, Mental Health/Substance Abuse, Skilled Nursing Facility

Outpatient: Observations, Emergency Room, Surgery, Radiology, Laboratory, Cardiovascular, Therapy, Pharmacy, Dialysis, Mental Health/Substance Abuse, Preventive, Miscellaneous

Professional: IP Surgery, IP Maternity, OP Surgery, IP Visits, ER Visits, Urgent Care, Office Visits, Cardiovascular, Physical Medicine, Therapeutic Injections, Allergy Testing, Allergy Immunotherapy, Radiology, Pathology, Mental Health/Substance Abuse, Chiropractic, Vision, Hearing, Speech, Preventive, Miscellaneous

Ancillary: Home Health, Durable Medical Equipment, Prosthetics, Ambulance, Vision Hardware, Hearing Aids/Devices, Dental

Chart 2: Completed Allowed PMPM of All Non-Admitted Individuals with COVID-19 Diagnoses



Here we see costs increase by $250 PMPM even 3+ months post COVID-19.

Similar trends existed among the individuals with both severe and non-severe Inpatient Admits for COVID-19, as seen in Appendix 2a and 2b.

Overall, we saw a clear trend of significantly higher costs during the month of a COVID-19 diagnosis. More importantly, we saw elevated costs even 3+ months post COVID-19 diagnosis across all diagnosed individuals, with trends being even clearer for those with more severe cases.

Controlled Findings

A major limitation of our observations in the prior section is the lack of proper controls. Individuals with pre-existing conditions are more likely to experience symptomatic COVID-19 infection. Consequently, even excluding a COVID-19 diagnosis, we assumed individuals predisposed to having a COVID-19 diagnosis to be more likely to have future encounters with the medical system. Secondly, we also expected individuals who had at least one encounter with a doctor (to get coded with a COVID-19 diagnosis) to be on average coded for more conditions than a population containing both individuals who did and did not have at least one encounter with the medical system. Similarly, costs increasing after a doctor visit could be due to a number of non-COVID factors, with it being likely that stratifying any set of individuals before and after a medical encounter would result in higher costs after due to follow-up testing or as a consequence of the underlying conditions that prompted the initial visit.

It is difficult to fully control for all the differences noted above, but we executed several analyses to help provide more clarity on the impact that was due to COVID-19. The primary method we used was to investigate individuals who had eligibility in all 3 years (2019 through 2021) and had been coded with

diabetes in 2019. Due to these individual's chronic condition (diabetes), they were much more likely to have encounters in subsequent years allowing for a more direct comparison between diabetics who had and did not have COVID-19. For example, 93.5% of diabetic individuals with a COVID-19 diagnosis were subsequently coded for diabetes in 2020-2021, and 91.5% of diabetic individuals without a COVID-19 diagnosis were still coded for diabetes in 2020-2021. While this analysis does not perfectly control for the concerns listed previously, it demonstrates that a significant proportion of these individuals were seen by a doctor in 2020 and 2021 helping reduce the concern that we are simply capturing the impacts of interactions with the medical system in our analysis.

In addition, we also evaluated individuals who were not coded for any conditions under the HHS HCC model in 2019 for their experience from 2019 through 2021. The individuals who were not coded for any conditions in 2019 represent the healthiest cohort within our studied population. The comparison of individuals within this cohort that had COVID-19 diagnoses to individuals without any COVID-19 diagnosis allow us to remove the potential complexity of disease that is not captured when only studying the impact of Long COVID through individuals with diabetes.

The absolute % change in HCC prevalence for both of these cohorts from 2019 to 2020/2021 combined is seen in the table below:

Table 3: Diabetes and No-HCC Cohorts – COVID-19 vs No COVID-19 % Change

	% Change COVID-19 (2019 to 2020/2021)		% Change Non-COVID-19 (2019 to 2020/2021)		Difference (COVID-19 – Non-COVID-19)	
HCC Condition Group	Diabetes	No HCC	Diabetes	No HCC	Diabetes	No HCC
Diabetes	N/A	3.3%	N/A	1.7%	N/A	1.7%
Respiratory Arrest	10.6%	2.7%	0.4%	0.2%	10.1%	2.6%
Asthma/COPD	4.6%	5.3%	1.4%	3.0%	3.2%	2.3%
Infection	4.3%	1.2%	0.3%	0.2%	4.0%	1.0%
Heart Disease	3.2%	0.8%	1.2%	0.4%	2.0%	0.5%
Lung Disease	1.6%	0.6%	0.3%	0.2%	1.3%	0.4%
Immune Disorders	0.7%	0.2%	0.3%	0.1%	0.4%	0.1%
Kidney Disease	0.6%	0.1%	0.4%	0.0%	0.2%	0.0%
Mental Health and Substance Abuse	0.5%	0.4%	0.3%	0.3%	0.2%	0.1%
Cancer	0.3%	0.2%	0.3%	0.1%	0.1%	0.0%
Liver Disease	0.2%	0.1%	0.2%	0.0%	0.1%	0.0%

This shows that, for example, diabetics who had COVID-19 had a 3.2 percentage point increase in Heart Disease prevalence over the base period, compared to 1.2 percentage points among diabetics who did not have COVID-19. Similarly, individuals without an HCC in the base period who had COVID-19 saw a 0.6 percentage point increase in lung disease prevalence, compared to 0.2 percentage point among those who did not have COVID-19. Overall, we note that there's a significant increase in prevalence rates for both diabetic and healthy cohorts when they are diagnosed with COVID-19.

Another way to look at this is by average HCC count, or how many conditions the average member is coded for in 2019 and in 2020-2021.

Table 4: Individuals – COVID-19 vs No COVID-19 Demographic Summary: HCC Counts by Gender

Diabetes Age Band	Average HCC Count (COVID-19 - 2019)	Average HCC Count (COVID-19 - 2020/2021)	Average HCC Count (No COVID-19 - 2019)	Average HCC Count (No COVID-19 - 2020/2021)	Change COVID-19 (2019 to 2020/2021)	Change Non-COVID-19 (2019 to 2020/2021)	Difference (Non-COVID-19 vs COVID-19)
00-18	1.26	1.29	1.30	1.28	0.03	(0.02)	0.05
19-29	1.54	0.66	0.44	0.36	0.12	(0.08)	0.20
30-39	1.55	0.76	0.46	1.41	0.21	(0.05)	0.26
40-49	1.55	0.90	0.46	1.47	0.36	0.01	0.35
50-59	1.61	0.01	0.53	1.59	0.40	0.06	0.34
60-64	1.68	0.27	0.61	1.72	0.58	0.11	0.48
65+	1.89	0.46	0.68	1.78	0.57	0.10	0.48

Here we see individuals under the age of 39 who did not have COVID-19 actually had their average HCC count decrease (likely due to difficulty getting younger individuals in to the doctor and coded for diagnoses), while individuals in those age bands who had COVID-19 saw small increases in HCC count. In the 40-59 age-band, individuals who had COVID-19 had over 0.3 additional HCCs on average versus those who did not have COVID-19 and individuals over 60 had almost 0.5 additional HCCs.

Additional tables displaying overall baseline prevalence rates across those HCC groups and Table 5 broken down by gender instead of age are available in Appendix 3a-3c.

Table 6: Change in HCC Counts for Individuals with No HCCs by Age Band

No HCC Age Band	Average HCC Count (COVID-19 - 2019)	Average HCC Count (COVID-19 - 2020/2021)	Average HCC Count (No COVID-19 - 2019)	Average HCC Count (No COVID-19 - 2020/2021)	*HCC Count* Change COVID-19 (2019 to 2020/2021)	*HCC Count* Change Non-COVID-19 (2019 to 2020/2021)	Difference (Non-COVID-19 vs COVID-19)
00-18	-	0.10	-	0.06	0.10	0.06	0.04
19-29	-	0.20	-	0.13	0.20	0.13	0.07
30-39	-	0.26	-	0.16	0.26	0.16	0.10
40-49	-	0.29	-	0.14	0.29	0.14	0.15
50-59	-	0.39	-	0.19	0.39	0.19	0.21
60-64	-	0.51	-	0.24	0.51	0.24	0.28
65+	-	0.60	-	0.24	0.60	0.24	0.36

Similar results were visible among the cohort of individuals who did not have HCCs in 2019 – with those who had COVID-19 seeing increased HCC counts in 2020-2021 to those who did not across the board.

Given the results from both individuals without HCCs in 2019 and individuals with diabetes in 2019, we observed that individuals who had COVID-19 diagnosis tend to have higher number of conditions coded than individuals who did not have COVID-19, regardless of their initial health status in 2019.

An additional table is available in Appendix 4a showing the breakouts by gender for individuals with no HCC.

Conclusion

Given the size and scope of the COVID-19 pandemic and the number of infections it has caused, understanding the long term implications of COVID-19 infections is highly important. This analysis provides a window into the long term effects of COVID-19 on the commercially insured population in the United States. In particular, it shows that individuals with a COVID-19 diagnosis are more likely to have future diagnoses and are costlier in the months following a diagnosis. This is true even when controlling for the presence or absence of previous diagnoses as well as when looking at individuals with less severe COVID-19 disease progressions. In particular, even for those individuals who are younger and without a prior condition, they tended to be diagnosed with a greater number of conditions relative to the same population without COVID-19. There remains a number of unknown factors that merits further exploration such as the extent to which vaccination changes the findings or if newer variants such Omicron resulted in similar outcomes. Nonetheless, the findings do highlight that the impact of the COVID-19 pandemic may not be limited to the initial infection but long term considerations for COVID-19 should be accounted for and better understood.

Please contact our authors of this paper with questions or follow up on concepts presented here.

OUR STORY

Five decades. Wakely began in 1969 and eventually evolved into several successful divisions. In 1999, the actuarial arm became the current-day Wakely Consulting Group, LLC, which specializes in providing actuarial expertise in the healthcare industry. Today, there are few healthcare topics our actuaries cannot tackle.

Wakely is now a subsidiary of Health Management Associates. HMA is an independent, national research and consulting firm specializing in publicly funded healthcare and human services policy, programs, financing, and evaluation. We serve government, public and private providers, health systems, health plans, community-based organizations, institutional investors, foundations, and associations. Every client matters. Every client gets our best. With more than 20 offices and over 400 multidisciplinary consultants coast to coast, our expertise, our services, and our team are always within client reach.

Broad healthcare knowledge. Wakely is experienced in all facets of the healthcare industry, from carriers to providers to governmental agencies. Our employees excel at providing solutions to parties across the spectrum.

Your advocate. Our actuarial experts and policy analysts continually monitor and analyze potential changes to inform our clients' strategies – and propel their success.

Our Vision: To partner with clients to drive business growth, accelerate success, and propel the health care industry forward.

Our Mission: We empower our unique team to serve as trusted advisors with a foundation of robust data, advanced analytics, and a comprehensive understanding of the health care industry.

Learn more about Wakely Consulting Group at www.wakely.com

Appendix

Appendix 1: Prevalence Rates

HCC Condition Group	Prevalence: 7 Days Pre				Prevalence: 7 Days Post				Prevalence: 30 Days Post			
	All	Severe	Non Severe	No Admits	All	Severe	Non Severe	No Admits	All	Severe	Non Severe	No Admits
Diabetes	9.2%	29.5%	23.8%	8.9%	10.1%	38.3%	29.8%	9.7%	10.5%	44.8%	32.0%	10.1%
Respiratory Arrest	0.5%	5.7%	2.5%	0.5%	3.5%	80.0%	52.2%	2.5%	4.1%	91.8%	63.3%	2.9%
Asthma/COPD	6.7%	13.6%	11.2%	6.6%	7.8%	19.2%	15.7%	7.7%	8.3%	22.8%	17.4%	8.1%
Infection	0.8%	4.2%	3.2%	0.7%	1.8%	50.0%	28.9%	1.3%	2.1%	63.5%	34.1%	1.4%
Heart Disease	3.8%	16.3%	10.7%	3.7%	4.6%	35.0%	17.7%	4.3%	5.0%	50.5%	21.1%	4.7%
Lung Disease	0.8%	4.4%	2.3%	0.8%	1.2%	9.8%	5.1%	1.1%	1.4%	20.0%	7.6%	1.3%
Immune Disorders	2.4%	6.3%	4.9%	2.3%	2.6%	7.1%	5.8%	2.5%	2.7%	7.7%	6.2%	2.6%
Kidney Disease	0.3%	4.0%	1.8%	0.2%	0.3%	5.7%	2.1%	0.3%	0.3%	7.2%	2.3%	0.3%
Mental Health and Substance Abuse	3.1%	5.3%	3.2%	3.0%	3.2%	5.8%	3.7%	3.2%	3.3%	7.3%	4.0%	3.3%
Cancer	2.5%	5.7%	5.5%	2.5%	2.6%	6.1%	5.8%	2.6%	2.7%	6.5%	6.0%	2.6%
Liver Disease	0.6%	2.1%	1.1%	0.6%	0.7%	4.4%	1.6%	0.7%	0.7%	6.0%	1.9%	0.7%

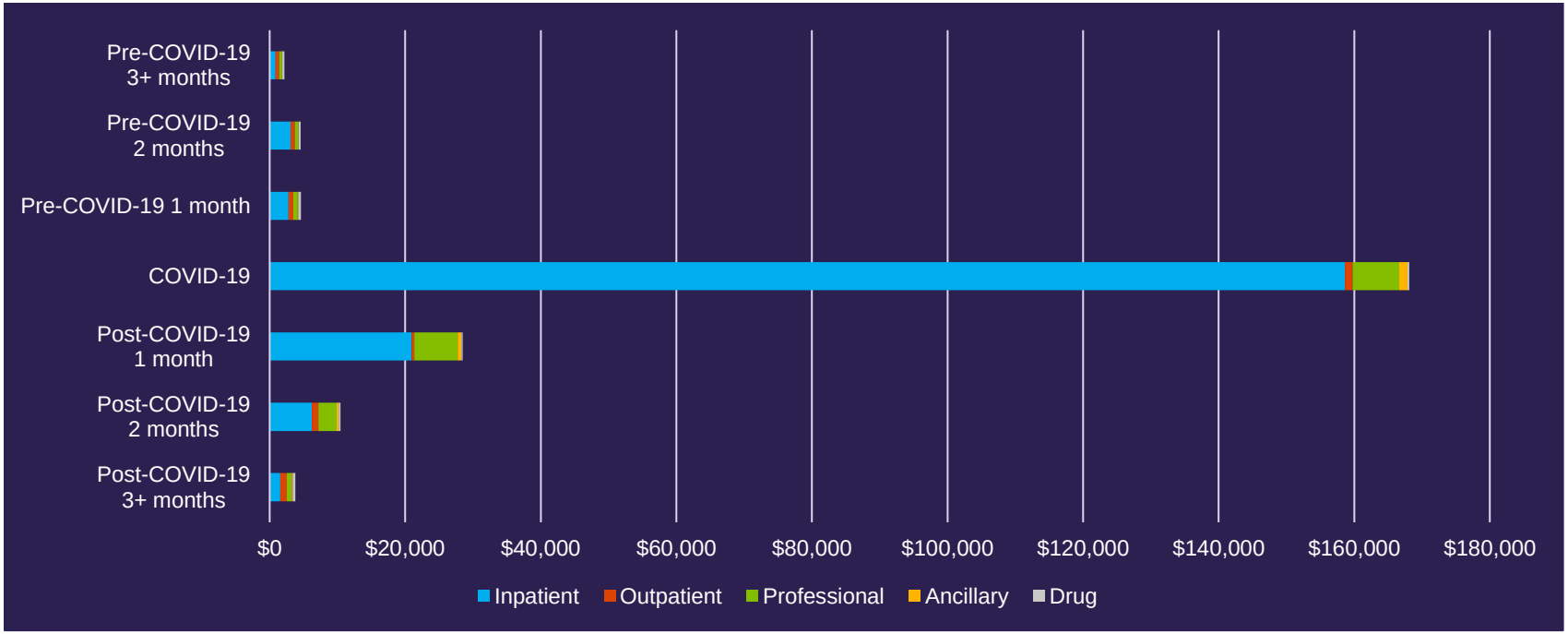
Appendix 2A: Completed Allowed PMPM of Individuals with Severe COVID-19 IP Admits

Service Category	Completed Total Allowed PMPM							Member Count						
	Pre-COVID-19 3+ months	Pre-COVID-19 2 months	Pre-COVID-19 1 month	COVID-19	Post-COVID-19 1 month	Post-COVID-19 2 months	Post-COVID-19 3+ months	Pre-COVID-19 3+ months	Pre-COVID-19 2 months	Pre-COVID-19 1 month	COVID-19	Post-COVID-19 1 month	Post-COVID-19 2 months	Post-COVID-19 3+ months
Inpatient	$881	$3,102	$2,787	$158,619	$20,940	$6,228	$1,549	134	41	61	1,195	268	96	74
Outpatient	$522	$595	$715	$1,150	$407	$952	$983	535	163	208	372	106	145	266
Professional	$409	$540	$648	$6,875	$6,385	$2,697	$712	881	483	611	1,180	877	444	404
Ancillary	$50	$41	$90	$1,201	$560	$310	$157	243	89	119	571	303	225	210
Drug	$331	$290	$383	$250	$177	$259	$390	848	630	672	721	330	315	376
Total	$2,193	$4,569	$4,622	$168,095	$28,468	$10,446	$3,791	929	735	820	1,197	900	492	431

Appendix 2B: Completed Allowed PMPM of Individuals with Non-Severe COVID-19 IP Admits

	Completed Total Allowed PMPM							Member Count						
Service Category	Pre-COVID-19 3+ months	Pre-COVID-19 2 months	Pre-COVID-19 1 month	COVID-19	Post-COVID-19 1 month	Post-COVID-19 2 months	Post-COVID-19 3+ months	Pre-COVID-19 3+ months	Pre-COVID-19 2 months	Pre-COVID-19 1 month	COVID-19	Post-COVID-19 1 month	Post-COVID-19 2 months	Post-COVID-19 3+ months
Inpatient	$550	$1,110	$1,484	$38,697	$3,158	$1,346	$679	1,331	295	435	13,523	996	357	590
Outpatient	$511	$631	$698	$1,181	$616	$687	$598	5,959	1,625	2,192	5,217	2,599	2,185	4,003
Professional	$364	$471	$550	$2,971	$1,202	$662	$445	9,875	5,405	6,748	13,395	9,769	6,922	8,359
Ancillary	$38	$47	$53	$478	$182	$103	$61	2,473	743	897	5,869	3,597	2,500	2,547
Drug	$321	$354	$376	$384	$384	$383	$405	9,258	6,241	6,985	11,157	8,174	6,805	8,308
Total	$1,784	$2,614	$3,161	$43,711	$5,542	$3,180	$2,188	10,371	7,677	8,787	13,545	11,009	8,915	9,506

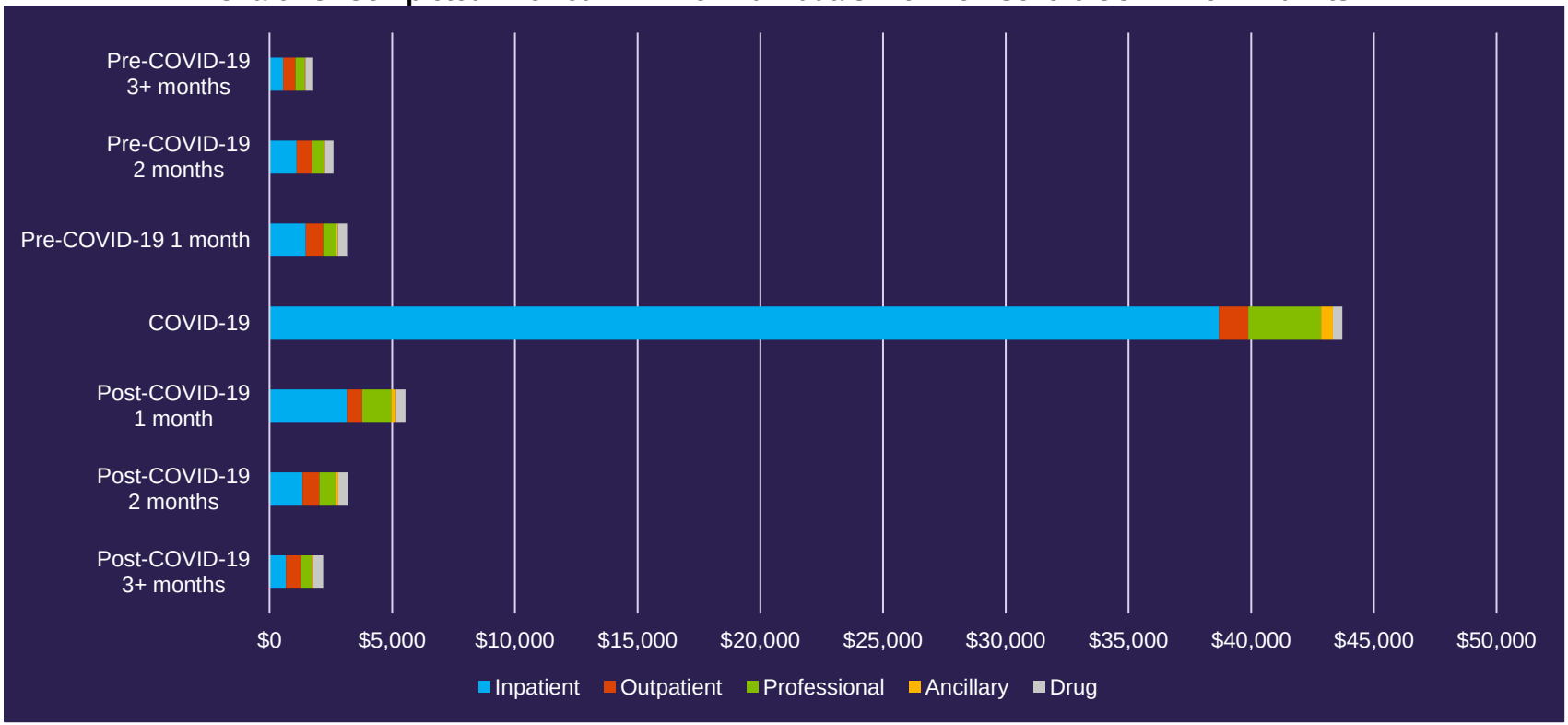
Chart 2B: Completed Allowed PMPM of Individuals with Severe COVID-19 IP Admits



Appendix 2C: Completed Allowed PMPM of Individuals with COVID-19 Diagnoses and at least one HCC (Non Admitted)

	Completed Total Allowed PMPM						Member Count							
Service Category	Pre-COVID-19 3+ months	Pre-COVID-19 2 months	Pre-COVID-19 1 month	COVID-19	Post-COVID-19 1 month	Post-COVID-19 2 months	Post-COVID-19 3+ months	Pre-COVID-19 3+ months	Pre-COVID-19 2 months	Pre-COVID-19 1 month	COVID-19	Post-COVID-19 1 month	Post-COVID-19 2 months	Post-COVID-19 3+ months
Inpatient	$264	$399	$485	$4,925	$1,149	$646	$447	22,381	2,515	2,906	23,615	5,881	3,306	9,136
Outpatient	$313	$376	$393	$853	$513	$482	$470	113,292	28,398	31,365	83,083	36,731	31,270	69,954
Professional	$338	$393	$423	$972	$631	$503	$449	178,525	108,199	118,499	203,694	129,068	111,032	149,217
Ancillary	$24	$28	$32	$101	$52	$40	$34	45,461	9,856	10,595	22,486	16,021	13,145	25,386
Drug	$360	$394	$405	$421	$409	$422	$462	165,643	115,464	121,066	152,262	125,019	116,351	145,955
Total	$1,299	$1,592	$1,739	$7,273	$2,754	$2,093	$1,861	182,027	145,348	154,199	207,682	160,675	146,198	163,381

Chart 2C: Completed Allowed PMPM of Individuals with Non-Severe COVID-19 IP Admits



Appendix 2D: Completed Allowed PMPM of Individuals with COVID-19 Diagnoses and no HCCs (Non Admitted)

Service Category	Completed Total Allowed PMPM							Member Count						
	Pre-COVID-19 3+ months	Pre-COVID-19 2 months	Pre-COVID-19 1 month	COVID-19	Post-COVID-19 1 month	Post-COVID-19 2 months	Post-COVID-19 3+ months	Pre-COVID-19 3+ months	Pre-COVID-19 2 months	Pre-COVID-19 1 month	COVID-19	Post-COVID-19 1 month	Post-COVID-19 2 months	Post-COVID-19 3+ months
Inpatient	$22	$11	$11	$139	$28	$19	$20	6,856	212	205	2,350	434	258	972
Outpatient	$68	$69	$69	$292	$106	$87	$93	127,985	20,229	23,292	106,596	27,634	21,215	64,200
Professional	$111	$119	$132	$375	$157	$140	$143	298,767	126,618	148,423	390,417	156,892	126,822	220,963
Ancillary	$4	$3	$3	$10	$4	$4	$4	37,602	4,808	5,036	9,104	5,689	4,998	14,621
Drug	$41	$43	$45	$53	$45	$46	$50	249,297	114,180	122,748	184,535	26,590	118,211	200,940
Total	$247	$244	$260	$870	$341	$297	$310	311,479	176,054	197,319	403,718	206,086	178,924	260,602

Appendix 3A: Individuals – COVID-19 vs No COVID-19 % Change

HCC Condition Group	% Change COVID-19 (2019 to 2020/2021)		% Change Non-COVID-19 (2019 to 2020/2021)		Difference (Non COVID-19 vs COVID-19)	
	Diabetes	No HCC	Diabetes	No HCC	Diabetes	No HCC
Diabetes	N/A	3.3%	N/A	1.7%	N/A	1.7%
Respiratory Arrest	10.6%	2.7%	0.4%	0.2%	10.1%	2.6%
Asthma/COPD	4.6%	5.3%	1.4%	3.0%	3.2%	2.3%
Infection	4.3%	1.2%	0.3%	0.2%	4.0%	1.0%
Heart Disease	3.2%	0.8%	1.2%	0.4%	2.0%	0.5%
Lung Disease	1.6%	0.6%	0.3%	0.2%	1.3%	0.4%
Immune Disorders	0.7%	0.2%	0.3%	0.1%	0.4%	0.1%
Kidney Disease	0.6%	0.1%	0.4%	0.0%	0.2%	0.0%
Mental Health and Substance Abuse	0.5%	0.4%	0.3%	0.3%	0.2%	0.1%
Cancer	0.3%	0.2%	0.3%	0.1%	0.1%	0.0%
Liver Disease	0.2%	0.1%	0.2%	0.0%	0.1%	0.0%

Appendix 3B: Individuals – COVID-19 vs No COVID-19 2019 Prevalence Rates

HCC Condition Group	2019 Prevalence of COVID-19 Individuals: Diabetes	2019 Prevalence of COVID-19 Individuals: No HCC
Diabetes	N/A	0.0%
Respiratory Arrest	1.4%	0.0%
Asthma/COPD	10.6%	0.0%
Infection	1.8%	0.0%
Heart Disease	5.1%	0.0%
Lung Disease	1.2%	0.0%
Immune Disorders	0.6%	0.0%
Kidney Disease	0.6%	0.0%
Mental Health and Substance Abuse	0.8%	0.0%
Cancer	0.5%	0.0%
Liver Disease	0.5%	0.0%

Appendix 3C: Individuals – COVID-19 vs No COVID-19 Demographic Summary: HCC Counts by Gender

Diabetes	Total HCC Count		Total HCC Count				
Gender	(COVID-19 - 2019)	(COVID-19 - 2020/2021)	(No COVID-19 - 2019)	(No COVID-19 - 2020/2021)	Change COVID-19 (2019 to 2020/2021)	Change Non-COVID-19 (2019 to 2020/2021)	Difference (Non-COVID-19 vs COVID-19)
Female	1.65	2.04	1.56	1.63	0.39	0.07	0.32
Male	1.57	2.04	1.44	1.56	0.47	0.12	0.35

Appendix 4A: No HCC

Gender	Total HCC Count (COVID-19 - 2019)	Total HCC Count (COVID-19 - 2020/2021)	Total HCC Count (No COVID-19 - 2019)	Total HCC Count (No COVID-19 - 2020/2021)	Change COVID-19 (2019 to 2020/2021)	Change Non-COVID-19 (2019 to 2020/2021)	Difference (Non-COVID-19 vs COVID-19)
Female	-	0.31	-	0.17	0.31	0.17	0.14
Male	-	0.27	-	0.12	0.27	0.12	0.14