

Prevalence and costs of Post-COVID-19 conditions (Long COVID) in Washington, 2020-2022.

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Summary

- As many as 440,000 Washington adults may have experienced Post COVID-19 conditions (PCC, aka "long COVID") in 2022, based on a Centers for Disease Control and Prevention (CDC) survey.
- PCC is more common in patients with preexisting chronic health conditions, and patients who were hospitalized with COVID-19. PCC risk increases with age.
- Many PCC patients are hospitalized (29%) in the year following infection. In some PCC patients (29%) symptoms persisted for more than nine months.
- PCC patients incurred \$63,122 per-capita annual direct medical cost in the year after their COVID-19 infection over and above their annual cost in the pre-COVID-19 year. In total, PCC patients incurred \$1.53 billion more direct medical costs in the year after their infection than in the previous year.

Background

Many survivors of COVID-19 infection continue to experience symptoms weeks or months after the acute infection has cleared – a condition referred to as Post-COVID-19 Conditions (PCC),

commonly known as Long COVID. Commonly reported symptoms include fatigue, headache, cough, shortness of breath, and skeletal and muscle pain^{1,2}. Many also report anxiety, depression or sleep disorders². People with PCC are at higher risk for more severe health outcomes such as cardiovascular events, stroke, and death³.

Based on a national survey, the Centers for Disease Control and Prevention (CDC) estimated that in June 2022, 18.9% of adults who had COVID-19 later experienced PCC, or 7.5% of the adult population. In June 2023, those estimates dropped to 11% of adults with COVID-19, or 6% of all adults⁴. Approximately a quarter of people with PCC reported significant activity limitation⁴.

In addition to the health impacts on a person's quality of life, the economic impact of PCC is likely to be considerable. On top of direct medical costs, 44% of PCC patients of working age reported being out of the workforce and 51% reported working reduced hours due to PCC⁵. If these percentages hold for Washington, then approximately 440,000 Washington adults experienced PCC in 2022, with 150,000 out of the workforce and 174,000 working reduced hours.

In this report, we examine prevalence, outcomes, and direct medical costs for PCC patients from medical claims data in the Washington All-Payer Claims Database (WA-APCD).

Study population

We drew the study population from WA-APCD members diagnosed with COVID-19 between March 2020 and December 2021. We described methods for identifying COVID-19 patients in previous reports⁶. We further restricted the study population to only include patients with continuous medical coverage for one year before and after their COVID-19 diagnosis. Of 531,508 patients with a COVID-19 diagnosis, 251,549 met the continuous follow-up enrollment criterion and were included in this study.

WA-APCD is missing coverage for about 17% of lives covered by commercial insurance. At the time of our analysis, WA-APCD included claims from Medicare Advantage, but only included Medicare fee-for-service claims through 2019. To compensate for the missing data, we multiplied patient counts and cost totals for commercially insured patients by a factor of 1.20 and Medicare Advantage totals by a factor of 3.17, as we described in previous reports⁶.

Post-COVID-19 conditions

We identified PCC patients following the published methods of DeVries et al³. We identified claims with diagnoses for selected PCC conditions (Table 1) between 4 and 12 weeks after a COVID-19 diagnosis (for a complete list of diagnosis codes, see DeVries et al³.) We excluded claims for diagnoses of anxiety or depression if the patient had a previous history of the condition in the year before their COVID-19 diagnosis. We defined PCC as patients with

three or more diagnoses on two or more distinct dates. After adjusting for missing data, out of 337,465 (adjusted count) patients with a COVID-19 diagnosis, 24,236 (adjusted count) patients were identified with PCC.

Results

Symptoms

The top five most common symptoms among PCC patients were COVID-19 diagnosis (59% of patients), anxiety (30%), shortness of breath (25%), depression (22%), and chronic fatigue (20%). The full list of symptoms is given in Table 1. Note that anxiety and depression represent new onset of symptoms not previously diagnosed in the year before initial COVID-19 infection. It is difficult to be certain in claims data whether subsequent COVID-19 diagnoses represent symptoms continuing from the original infection, or reinfection.

Prevalence

After adjusting for missing data, 7.2% of COVID-19 patients were identified as PCC. This is lower than CDC prevalence estimates⁴ of 18.9%. This study is based on medical claims while the CDC employed a survey. In a survey, respondents can self-report experiencing symptoms, even if they never received a diagnosis or treatment that would generate a claim. Percentages in this report are likely to underestimate the true population prevalence.

Prevalence of PCC varied by patient demographics and medical history (Table 2). PCC prevalence increased with age, (up to 18.4% for age 75 and older) and was slightly higher among females than males (7.5% vs 6.8%). Patients with three or more preexisting chronic health conditions were more likely to experience PCC (11.4%), as were patients whose COVID-19 infection resulted in hospitalization (14.2% PCC)

or intensive care (28.0% PCC). These patterns are consistent with risk factors for PCC that have been identified in published studies⁷.

PCC diagnoses in claims data also varied geographically. Among patients who live in metropolitan ZIP codes, 7.6% were identified with PCC, while only 4.0% of rural and small-town patients were identified with PCC. This difference likely reflects differences in access to care rather than actual disease prevalence. Urban residents have greater access to care, and so are more likely to be diagnosed.

Outcomes and cost

Many patients with PCC continue to experience symptoms for many months (Table 3). As many as 28% of PCC patients were still experiencing symptoms more than nine months after getting a COVID-19 diagnosis. In addition, 29% were hospitalized during the follow-up year.

PCC was associated with considerable direct medical cost (Table 4). First, since PCC was more likely in members with preexisting chronic conditions, PCC patients had higher baseline costs per-member-per-month (PMPM) in the year before their COVID-19 infection (\$1,501 PMPM for PCC patients, versus \$489 PMPM for non-PCC COVID patients). Then, since PCC patients were more likely to have been hospitalized, they had higher costs during the first 28 days after their infection (\$34,988 PMPM for PCC vs 5,533 PMPM for non-PCC patients).

Costs for PCC patients gradually declined over the follow-up year from \$8,112 PMPM during the 28-84 day post-COVID-19 period to \$3,435 PMPM for the remainder of the follow-up year (85-360 days). Non-PCC COVID-19 patients also experienced higher cost during their post-

COVID-19 (\$1,181 PMPM) and follow-up (\$1,177) compared to their pre-COVID costs.

Over the course of the year after a COVID-19 infection, PCC patients incurred \$63,122 per capita annual cost over and above their annual cost in the pre-COVID-19 year. In total, PCC patients accounted for \$1.94 billion total direct medical cost in the year following COVID-19 infection, or \$1.53 billion above the pre-COVID-19 baseline.

Conclusions

PCC, or Long COVID, is a complex syndrome whose causes and treatments are not yet understood. Some question whether PCC is specific to COVID-19, or whether it is an instance of a more general (and equally puzzling) post-infectious syndrome that experts have recognized for some time⁸. Either way, the widespread prevalence of COVID-19 means that the impact of PCC on the population is also widespread. As we stated above, perhaps as many as 440,000 Washington adults have experienced PCC in 2022, incurring \$1.53 billion in direct medical costs. On an individual level, PCC patients are burdened with poor health outcomes, possibly including hospitalization, disability, or death.

Strengths and limitations

By using medical claims to assess PCC, we were able to track a cohort of individuals over time. We were able to connect preexisting conditions, COVID-19 severity, and post-COVID-19 outcomes at an individual level. Medical claims also include direct medical costs, both insurance paid and paid out-of-pocket by the patient.

We already discussed two limitations to our data: First, our data for commercial payers and Medicare are incomplete. Though we adjusted for missing data in our estimates, this assumes

that the commercial and Medicare members in the database are similar to those not included, which may not be the case.

Second, claims data only includes encounters with the health care system that generate insurance claims. Members who contracted COVID-19 but who never saw a doctor for it would not be included in the study population, while members who suffered in silence with lingering symptoms would not be identified as PCC. **As a result, all our percentages probably underestimate the true population prevalence.**

A third limitation is that since APCD claims are not linked to death certificates, we cannot

identify members who may have died during the study period. Published studies⁶ have shown increased mortality risk among PCC patients, but we could not assess this. In fact, the continuous enrollment requirement would exclude members who died from the study population, introducing a potential survivorship bias to our results.

Finally, it should be noted that this is not a controlled study. Comparisons between PCC and non-PCC patients are confounded by their differing risk factors and COVID-19 experience.

Tables

Table 1: Symptoms of post-COVID conditions (PCC), with percent of PCC patients experiencing each symptom. Patients may experience more than one symptom. Percentages are adjusted to compensate for missing data.

Symptom	Adjusted percent of PCC patients
COVID-19 diagnosis	59.1
Anxiety	29.7
Shortness of breath	25.0
Depression	21.7
Myalgic encephalitis (chronic fatigue)	19.6
Persistent chest pain or pressure	17.0
Headaches	12.3
Pneumonia	10.8
Cough	9.6
Muscle and body aches	9.0
Post COVID-19 condition diagnosis	7.8
Insomnia	7.5
Hypoxia	7.2
Fever or chills	6.8
Diarrhea	6.0
Brain fog	4.6
Sore throat	4.3
Joint pain	2.1
Tachycardia	1.9
COVID sequelae	1.6
Night sweats	0.7
Loss of taste or smell	0.3

Table 2: Percent of COVID-19 patients who experience PCC between 4 and 12 weeks (28-84 days) following COVID-19 infection. Percentages are adjusted to compensate for missing data.

	Adjusted percent with PCC
All COVID-19 patients	7.2
Age < 35	2.5
Age 35-64	7.4
Age 65-74	12.5
Age 75+	18.4
Female	7.5
Male	6.8
3 or more risk conditions	11.4
COVID inpatient	14.2
COVID ICU	28.0
Metropolitan	7.6
Micropolitan	5.9
Small town / rural	4.0

Table 3: Percent experiencing adverse health outcomes in the year following COVID-19 infection for PCC patients, and COVID-19 patients who were not identified as PCC. Percentages are adjusted to compensate for missing data.

	Adjusted percent	COVID	
		No PCC	PCC
Persistent symptoms 90-180 days	6.2	42.0	
Persistent symptoms 181-270 days	6.4	31.6	
Persistent symptoms 271-360 days	6.6	27.9	
Hospitalized 90-360 days	8.6	28.9	

Table 4: Per-member-per-month (PMPM) medical cost, insurance paid plus out of pocket, before and after COVID-19 infection.

	Adjusted PMPM total cost (\$)	COVID No PCC	PCC
Pre-COVID	489	1,501	
COVID period: Up to 28 days	5,533	34,998	
Post-COVID: 28-84 days	1,181	8,112	
Follow-up: 85 to 365 days	1,177	3,435	

References

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