

Increased Healthcare Resources Utilization and Costs of Long COVID in Community-managed Adult Patients in France

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INTRODUCTION

- Long-term sequelae of COVID-19, also known as long COVID, refers to a constellation of persistent symptoms and health issues that continue beyond the acute phase of COVID-19.
- While long COVID is commonly observed in patients hospitalized for acute COVID, non-hospitalized or patients with milder form of the illness have been also found to frequently develop sequelae.¹
- Prior studies on long-COVID associated healthcare resource utilization (HCRU) and costs have shown a significant burden to the healthcare system.²⁻⁵ However, the economic burden of long COVID in France remains unclear.

OBJECTIVE

- To compare healthcare resource utilization (HCRU) and direct and indirect costs between patients with previous SARS-CoV-2 infection who developed long-COVID, patients with previous SARS-CoV-2 infection who did not develop long-COVID, and contemporaneous controls without SARS-CoV-2 infection.

METHODS

- We conducted a retrospective cohort study using the electronic records of confirmed and/or probable COVID-19 patients in the primary care setting from The Health Improvement Network (THIN) data between 03/2020 and 08/2023.
- Long-COVID was defined per World Health Organization (WHO) as suggestive symptoms present ≥ 3 months following acute SARS-CoV-2 infection.
- Propensity score matching on age, gender, duration of follow-up, Charlson Comorbidity Index (CCI) and BMI was conducted.⁶⁻⁸
- Patient characteristics, HCRU and costs of each cohort were summarized.

RESULTS

- After propensity score matching, a total of 74,280 patients requesting medical attention were included, 24,940 in each cohort.

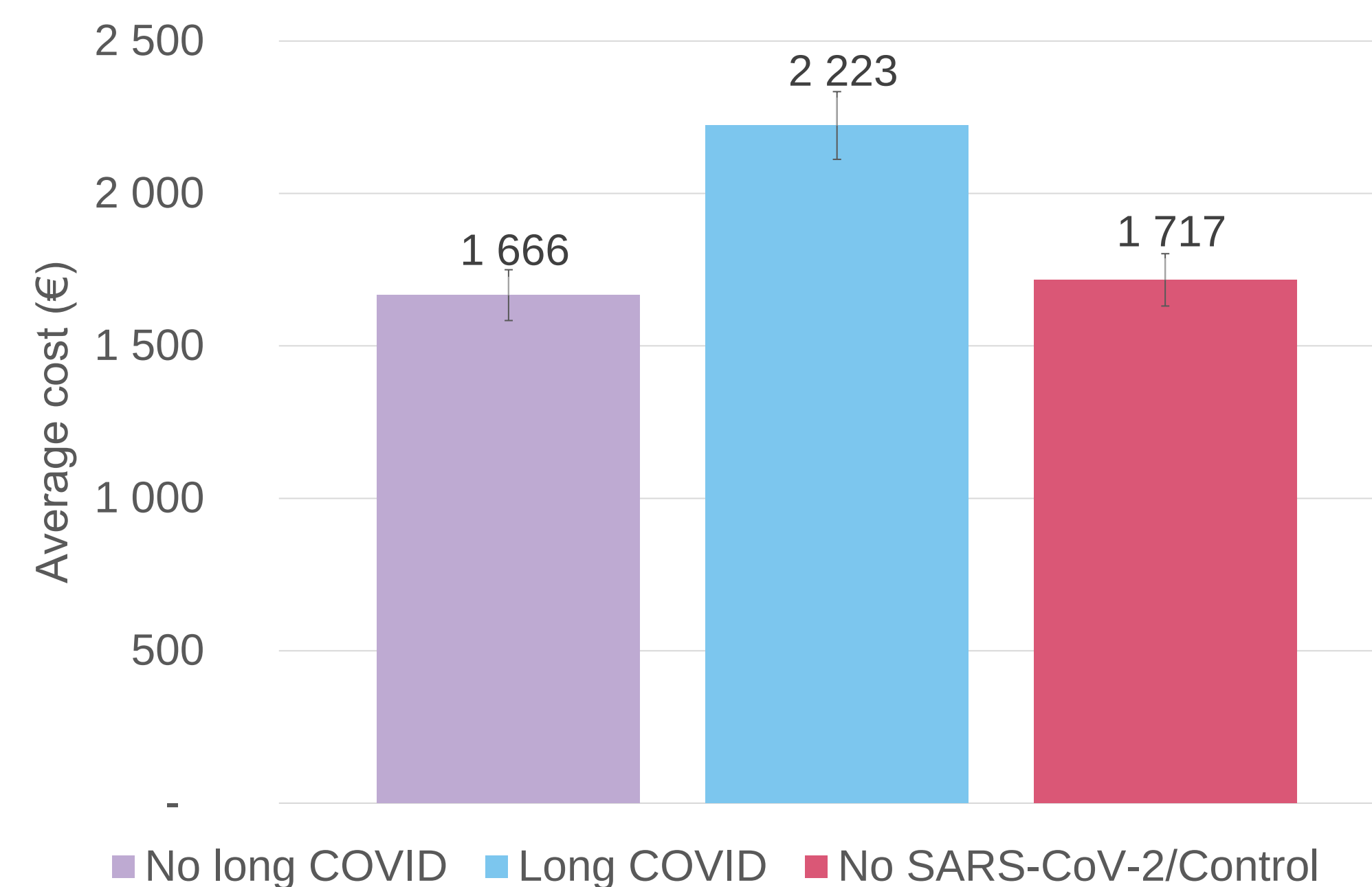
Table 1 Patients Characteristics after propensity score matching

Patients Characteristics	N = 74,280		
	Long COVID N=24,940	No Long COVID N=24,940	No SARS-CoV-2/Control N=24,940
Age mean ($\pm$ SD)	50.6 ($\pm$ 17.4)	50.6 ($\pm$ 17.4)	50.7 ($\pm$ 17.3)
Gender N (%)			
Women	15,637 (63)	15,635 (63%)	15,800 (63%)
Men	9,303 (37)	9,305 (37%)	9,140 (37%)
CCI N (%)			
0	8,577 (34%)	8,583 (34%)	8,406 (34%)
1-2	8,879 (36%)	8,885 (36%)	8,901 (36%)
3-4	4,189 (17%)	4,180 (17%)	4,272 (17%)
>4	2,315 (9%)	2,312 (9%)	2,415 (10%)
Follow-up in months mean ($\pm$ SD)	16.93 ($\pm$ 6.3)	16.95 ($\pm$ 6.2)	16.88 ($\pm$ 6.1)

RESULTS (continued)

- HCRU and costs were the highest in patients with long COVID during the first year following acute infection, with per-patient-per-year cost of €2,223

Figure 1. Comparison of long-COVID associated cost across cohorts



- Comparing those who developed long-COVID vs not, long-COVID patients had the highest costs due to sick leaves (€180 higher), followed by medication use in retail pharmacies (€137 higher) and healthcare consultations (€88 higher).

Table 2. HCRU and cost comparison Long COVID vs. Acute COVID

	Mean per patient per year (PPPY)		
	No Long COVID N=29,940	Long COVID N=29,940	Additional cost (€)
Consultations by healthcare encounters	256	342	+86
Medical act	303	376	+73
Medication use in retail pharmacies	412	548	+137
Biological test	100	132	+32
Sick leaves	459	640	+180
Medical transport	21	29	+8
Medical devices	115	156	+41
Total	1,666	2,223	+557

- Comparing those who developed long-COVID vs never infected with SARS-Cov-2, long-COVID patients had the highest costs due to retail pharmacy use (€152 higher), followed by sick leaves (€120 higher) and GP consultations (€60 higher).

Table 3. HCRU and cost comparison Long COVID vs. Not COVID

	Mean per patient per year (PPPY)		
	No SARS-CoV-2/Control N=29,940	Long COVID N=29,940	Additional cost (€)
Consultations by healthcare encounters	247	342	+95
Medical act	288	376	+88
Medication use in retail pharmacies	397	548	+152
Biological test	103	132	+29
Sick leaves	520	640	+120
Medical transport	28	29	+1
Medical devices	135	156	+21
Total	1,717	2,223	+506

CONCLUSIONS

- HCRU and costs are higher among patients identified with long COVID following acute infections in France, highlighting the societal burden of long COVID and the importance of long-term management of SARS-CoV-2 infection.
- The presented cost might be underestimated depending on accessibility to care.

References

- Katsarou MS, Iasonidou E, Osarogue A, Kalafatis E, Stefanatou M, Pappa S, Gatzonis S, Verentzioti A, Gounopoulos P, Demponeras C, Konstantinidou E, Drakoulis N, Asimakos A, Antonoglou A, Mavronasou A, Spetsioti S, Kotanidou A, Katsaounou P. The Greek Collaborative Long COVID Study: Non-Hospitalized and Hospitalized Patients Share Similar Symptom Patterns. *J Pers Med*. 2022 Jun 17
- Valdivieso-Martínez B, Sauri I, Philibert J, et al. Impact of Long-COVID on Health Care Burden: A Case Control Study. *Journal of Clinical Medicine* 2023;
- McNaughton CD, Austin PC, Sivaswamy A, et al. Post-acute health care burden after SARS-CoV-2 infection: a retrospective cohort study. *CMAJ* 2022;
- Tartof SY, Malden DE, Liu IA, et al. Health Care Utilization in the 6 Months Following SARS-CoV-2 Infection. *JAMA Netw Open* 2022;
- Katz GM, Bach K, Bobos P, et al. Understanding How Post-COVID-19 Condition Affects Adults and Health Care Systems. *JAMA Health Forum* 2023;
- Zhao QY, Luo JC, Su Y, Zhang YJ, Tu GW, Luo Z. Propensity score matching with R: conventional methods and new features. *Ann Transl Med*. 2021 May
- Reiffel JA. Propensity-Score Matching: Optimal, Adequate, or Incomplete? *J Atr Fibrillation*. 2018 Dec 31
- Lee B, Kim NE, Won S, Gim J. Propensity score matching for comparative studies: a tutorial with R and Rex. *J Minim Invasive Surg*. 2024 Jun 15

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Disclosures

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