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Long COVID during Omicron: Patients' characteristics, vaccine uptake and healthcare resource utilisation

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INTRODUCTION

- Recent data from the UK's Office for National Statistics (2024) indicated that long COVID affected 3.3% of the population in England and Scotland (approximately 2 million people)[1].
- Risk factors for long COVID include being female, smoking, immunosuppression, prior hospitalisation, and comorbidities such as obesity, hypertension, cardiovascular, cerebrovascular, respiratory, and kidney disease[2].
- There is limited research on the impact of vaccine uptake on the development of long COVID, especially during Omicron period.

AIM

- To describe characteristics, vaccine uptake and healthcare resource utilisation (HCRU) in patients with and without long COVID in the UK primary care setting.

METHODS

Study Design

Retrospective | EHR | Cohort | Real World

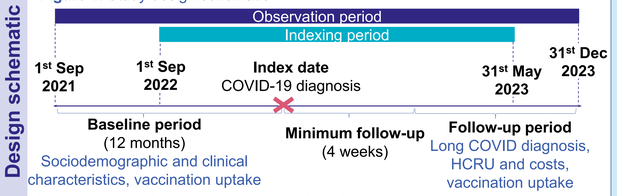
The Health Improvement Network (THIN) UK

Patients

- Age ≥18 years
- Confirmed or suspected COVID-19 episode within the index period
- Eligible for the Autumn 2022 and/or Spring 2023 seasonal COVID-19 vaccination in the UK[3].
- ≥12 months of pre-index and ≥4 weeks of post-index continuous registration with a GP
- Individuals with a COVID-19 diagnosis <3 months prior to their index date were excluded

Design schematic

Figure 1. Study design schematic



Censored at: 1-year follow-up post index, date of transfer out of practice, death, or 31 December 2023

METHODS (continued)

Exposure

Cases (long COVID):

≥1 primary care clinical code for long COVID symptoms[4] or a long COVID primary care diagnostic or referral clinical code observed ≥4 weeks[5] after index.

Controls:

Patients that did not develop long COVID after index.

Outcomes

- Sociodemographics
- Clinical characteristics
- Vaccination uptake
- HCRU
- Primary care costs

Statistical analyses

Comparisons between patients with long COVID vs those without long COVID were performed using appropriate statistical tests: t-tests for continuous variables, Mann-Whitney U tests for ordinal variables, Fisher's exact tests for categorical variables, and Wald tests for HCRU rates, at a two-sided significance level of 0.05.

RESULTS

- A total of 5,661 adults with COVID-19 and eligible for seasonal COVID-19 vaccination were included in the study; of whom, 49.0% (n=2,772) developed long COVID during follow-up.
- Statistically significant differences (p<0.05) were observed between long COVID cases and comparators without long COVID **(Table 1).**
- Compared to comparators, a greater proportion of cases were older (≥65 years: 51.5% vs. 46.6%), female (61.3% vs 64.9%), ever-smokers (40.9% vs 46.5%), overweight or obese (41.7% vs. 32.9%) and had a higher comorbidity burden.
- Whilst a similar proportion of cases and comparators had received seasonal COVID-19 vaccination pre-index (44.9% vs 44.3%), the timing of the vaccinations differed. Fewer cases received a COVID-19 vaccination more than 6-months before their index COVID-19 infection (54.8% vs 58.2%). However, a greater proportion were vaccinated after their index infection (58.4% vs 53.7%).
- During the follow-up period, cases had statistically higher primary care consultation rates, mean cost, and hospitalisation rates compared to comparators (p<0.05) **(Table 2).**

RESULTS (continued)

Table 1. Baseline sociodemographic, clinical characteristics and vaccination uptake in long COVID cases and comparators.

	Long COVID cases (n=2,772)	Comparators (n=2,889)	p-value
Age (years) at index			
18 - <50 years	339 (12.2)	428 (14.8)	
50 - <65 years	1,005 (36.3)	1,113 (38.5)	
65 - <75 years	576 (20.8)	525 (18.2)	≤0.001
75 - <85 years	558 (20.1)	507 (17.5)	
85+ years	294 (10.6)	316 (10.9)	
Sex, n (%)			
Female	1,799 (64.9)	1,770 (61.3)	≤0.01
Smoking status, n (%)	n=2,622	n=2,719	
Non-smoker	1333 (50.8)	1536 (56.5)	
Ex-smoker	909 (34.7)	833 (30.6)	≤0.001
Current smoker	380 (14.5)	350 (12.9)	
BMI (kg/m²), n (%)			
Underweight (<18.5)	46 (1.7)	35 (1.2)	
Normal weight (18.5-24.9)	353 (12.7)	345 (11.9)	
Overweight (25.0-29.9)	463 (16.7)	445 (15.4)	≤0.001
Obese (≥30.0)	694 (25.0)	507 (17.5)	
Unknown	1,216 (43.9)	1,557 (53.9)	
Quan-CCI score, n (%)			
0	2,025 (73.1)	2,256 (78.1)	
1-2	646 (23.3)	537 (18.6)	
3-4	91 (3.3)	81 (2.8)	≤0.001
≥5	10 (0.4)	15 (0.5)	
COVID-19 infections prior to index infection			
Mean (SD)	0.2 (0.5)	0.1 (0.4)	≤0.001
Received a 2022-2023 seasonal COVID-19 vaccination			
Yes	1,244 (44.9)	1,279 (44.3)	0.65
Time since last COVID-19 vaccination pre-index, n (%)			
<3 months	546 (19.7)	486 (16.8)	
3-6 months	708 (25.5)	723 (25.0)	≤0.01
>6 months	1,518 (54.8)	1,680 (58.2)	
COVID-19 vaccination uptake post-index, n (%)			
Yes	1,619 (58.4)	1,551 (53.7)	≤0.001

RESULTS (continued)

Table 2. Healthcare resource use (HCRU) and costs during follow-up long COVID cases and comparators.

	Long COVID cases (n=2,772)	Comparators (n=2,889)	p-value
Primary care consultation rate (95% CI), per-person per-month			
	1.61 (1.59, 1.62)	0.91 (0.90, 0.92)	≤0.001
Mean primary care consultation costs (£, SD), per-person per-month			
	82 (63)	54 (69)	≤0.001
Hospitalisation rate (95% CI), per-person per-month			
	0.07 (0.07, 0.07)	0.04 (0.04, 0.05)	≤0.001

LIMITATIONS

- No standardised global definition for long COVID exists, leading to potential misdiagnosis or misclassification.
- Secondary care HCRU information in the THIN UK database is limited, potentially underestimating hospitalisation rates.
- As patients were required to have a diagnosis of COVID-19 (after the end of routine COVID testing/reporting), it is likely that these patients have more health seeking behaviour.

CONCLUSIONS

- Despite Omicron being associated with lower long COVID incidence than earlier variants[6], HCRU and cost differences were observed between long COVID cases and comparators.
- Adherence to UK COVID-19 vaccination recommendations was generally low across both groups.
- These findings contribute to the evidence base of long COVID in the Omicron period and can contribute to informing policy decisions regarding prevention strategies for long COVID.

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Abbreviations: BMI: Body mass index; CCI: Charlson Comorbidity Index; CI: Confidence interval; COVID: Coronavirus disease; EHR: Electronic health record; GP: General practitioner; HCRU: healthcare resource utilisation; SD: Standard deviation; THIN: The Health Improvement Network

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