

Headache and brain fog are the most frequent and persistent symptoms in a cohort of long-COVID patients, regardless of the severity of the acute infection.

Carlucci G 1,2, Marchi L 1, Lotti A 1, Azzolini F 3, Massacesi L 1,2

1 Department of Neurosciences, University of Florence.

2 Department of Emergency Neurology, Careggi University Hospital, Florence, Italy.

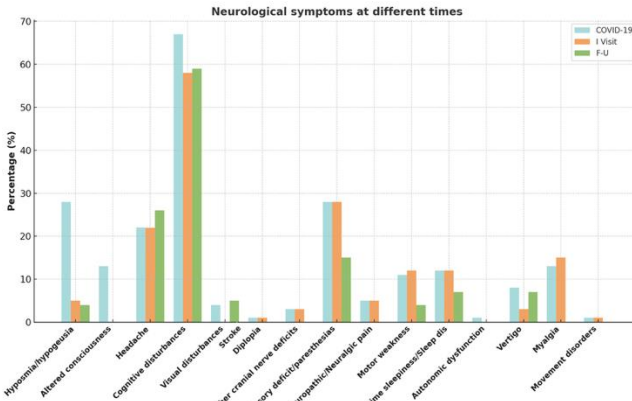
3 Unit of Neurology, IRCCS Neuromed, Pozzilli (IS), Italy

Objectives: Neurological symptoms are increasingly recognized as part of the clinical spectrum of COVID-19, both in the acute and post-acute phase, sometimes persisting over time and configuring a neurological phenotype of Long COVID. The aim of this study was to collect data from individuals diagnosed with COVID-19 who experienced neurological manifestations, to estimate the frequency, types, and prognostic impact of neurological involvement related to SARS-CoV-2 infection. The goal was to deepen understanding of NeuroCOVID and contribute to the improvement of clinical management and the development of future care strategies.

Materials and Methods: A standardized Regional Registry was created to collect data from patients with a confirmed diagnosis of COVID-19 and neurological symptoms that emerged either during hospitalization or in the outpatient setting. **Results:** At Florence Centre (AOU Careggi), 76 patients were included (53% male, mean age 54±13 years). Multiple comorbidities were present in 80% of patients. The most common neurological symptoms were cognitive deficits (67%) ('brain fog'), anosmia/dysgeusia (26%), headache (22%), and sensory disturbances/ paresthesias (28%). Some of these symptoms, such as hyposmia/ageusia and sensory disturbances, showed partial or complete resolution at 1-year follow-up. Others, particularly cognitive deficits and headache, tended to persist over time.

Demographic Characteristics and Medical History

	(n=76)
Age (mean ± SD)	54±13
Sex Female	36 (47%)
Education > 12 years	32 (42%)
GENERAL MEDICAL HISTORY	
Premorbid mRankin Scale	
- 0 - 1 (no disability):	76 (100%)
- 2 - 3 (mild/moderate disability)	0 (0%)
- 4 - 5 (severe disability)	0 (0%)
General Comorbidities	60 (79%)
- Arterial hypertension	22 (37%)
- Diabetes	5 (8%)
- Cardiovascular disease	5 (8%)
- Chronic kidney disease	0 (0%)
- Chronic liver disease	0 (0%)
- Chronic pulmonary disease	12 (20%)
- Cancer	7 (12%)
- Immune-mediated disease	2 (3%)
- Immunosuppression	4 (7%)
- Psychiatric disorders	5 (8%)
- Other	46 (77%)
Neurological Comorbidities	24 (32%)
- Cerebrovascular diseases	1 (4%)
- Inflammatory CNS diseases	0 (0%)
- Epilepsy	0 (0%)
- Movement disorders	0 (0%)
- Degenerative dementias	0 (0%)
- Neuromuscular diseases	0 (0%)
- Headache:	8 (33%)
- Other	17 (71%)

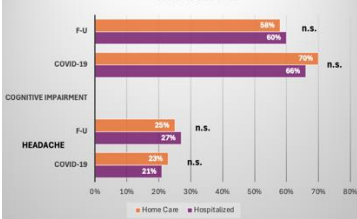


Clinical Features of SARS-CoV-2 Infection

	(n=76)
Hospitalization	53 (70%)
- Ordinary ward	35 (66%)
- Intermediate/Intensive care	18 (34%)
Home management	23 (30%)
Hospital stay (days), median (IQR) (n=50)	12 (16)
COVID-19 Systemic Complications	55 (72%)
- Respiratory failure	47 (86%)
- Pneumonia	48 (87%)
- Cardiovascular complications	2 (4%)
- Renal failure/dialysis	2 (4%)
- Coagulation disorders/DIC	1 (2%)
- Sepsis/Septic shock	6 (11%)
- ECMO	0 (0%)
- Other	20 (36%)
Onset of Neurological Symptoms/Signs	
- During infection	51 (67%)
- After hospitalization/resolution	25 (33%)
Persistence at discharge (hospitalized)	48 (91%)
mRankin Scale at discharge (hospitalized, n=27)	
- 0 - 1 (no disability):	18 (67%)
- 2 - 3 (mild/moderate disability)	9 (33%)
- 4 - 5 (severe disability)	0 (0%)

Neurological symptoms at different times.	COVID-19	1 Year*	F-U**
Neurological Symptoms/Signs			
- Hyposmia/hyposgeusia	21 (28%)	4 (5%)	1 (4%)
- Altered consciousness	10 (13%)	0 (0%)	0 (0%)
- Headache	17 (22%)	17 (22%)	7 (9%)
- Cognitive disturbances	51 (67%)	44 (58%)	16 (59%)
- Meningitis/Encephalitis	0 (0%)	0 (0%)	0 (0%)
- Seizures/Status epilepticus	0 (0%)	0 (0%)	0 (0%)
- Stroke	0 (0%)	0 (0%)	1 (5%)
- Visual disturbances	3 (4%)	0 (0%)	0 (0%)
- Diplopia	1 (1%)	1 (1%)	0 (0%)
- Other cranial nerve deficits	2 (3%)	2 (3%)	0 (0%)
- Sensory deficit/paresthesias	21 (28%)	13 (18%)	4 (15%)
- Neurophysiologic pain	4 (5%)	4 (5%)	0 (0%)
- Motor weakness	8 (11%)	9 (12%)	1 (4%)
- Daytime sleepiness/Sleep dist	9 (12%)	9 (12%)	2 (7%)
- Autonomic dysfunction	0 (0%)	1 (1%)	0 (0%)
- Syncope	1 (1%)	0 (0%)	0 (0%)
- Vertigo	6 (8%)	2 (3%)	2 (7%)
- Myalgia	10 (13%)	11 (15%)	0 (0%)
- Movement disorders	1 (1%)	1 (1%)	0 (0%)
- Ataxia	0 (0%)	0 (0%)	0 (0%)
- Myelopathy	0 (0%)	0 (0%)	0 (0%)
- Peripheral neuropathy	0 (0%)	0 (0%)	0 (0%)

Headache and cognitive impairment stratified by severity of Covid-19 and time



Discussion: Neurological symptoms are a frequent and clinically significant component of SARS-CoV-2 infection, presenting with heterogeneous patterns. Our data show that while some symptoms may be mild and reversible, others may result in persistent functional impairment up to one year after infection. Among these, brain fog and headache were the most frequent and long-lasting, regardless of the initial severity of COVID-19.

Conclusion: These findings support the need for careful neurological monitoring in COVID-19 patients and for targeted, long-term follow-up, given the possibility that these symptoms may persist and negatively impact quality of life and functional performance.



24-28 Ottobre 2025
Padova Congress

55° CONGRESSO
SOCIETÀ ITALIANA
DI NEUROLOGIA