Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Letter to the Editor

Post-COVID-19 functional status six-months after hospitalization

To the Editor

We read with interest the article by Garrigues et al.[1] where they described persistent symptoms and altered quality of life 100 days after hospitalization for Coronavirus disease 2019 (COVID-19). COVID-19 was first reported on December 31, 2019. Because it has only been studied for just over eleven months, our understanding of this disease is still incomplete, particularly its sequelae and long-term outcomes. Previous studies of critically COVID-19 patients have focused their investigations on clinical characteristics during their Hospitalization admission[2–4]. However, long outcomes (≥ 6 months) of hospitalized patients with COVID-19 have not still been studied. These patients are susceptible to developing reduced functional status that impact their ability to care for themselves and to perform usual activities of daily living in the months following Hospital admission[5]. The aim of this study was to describe functional status and the presence of persistent dyspnea six months after hospitalization, of a prospective identified cohort of patients hospitalized by COVID-19 during the March-April outbreak.

We included all adult patients who were sufficiently medically ill to require hospital admission between March 1 to April 30, 2020 with confirmed acute respiratory syndrome coronavirus (SARS-CoV-2) infection by positive result on polymerase chain reaction testing of a nasopharyngeal sample. We collected demographic data, and Hospital outcomes. All patients who survived Hospital admission were included to assess functional status, and persistent dyspnea (on slight exertion) using a structured interview six months after hospitalization. Functional status was assessed according to the recently described post-COVID-19 functional status scale (PCFS), which consists in an ordinal scale (six grades) for assessment of patient-relevant functional limitations[6]. Grade 0 reflects the absence of any functional limitation, grade 1: negligible limitations with persistent symptoms but this has no effect on everyday life, grade 2: limitations in everyday life, occasionally need to avoid or reduce usual activities, grade 3: limitations in everyday life and the patient is not able to perform all usual activities, grade 4: severe functional limitations requiring assistance with activities of daily living, grade D: death of a patient. Persistent dyspnea correlated with COVID-19 were also obtained. Additionally, patients were asked to retrospectively recount their functional status 1–3 months before COVID-19. These surveys were conducted by trained study investigators. The ethics committee of Galicia, Spain (code No. 2020–188) approved this study and informed consent was obtained from all patients. Clinical outcomes were monitored until November 15, 2020, the date of last follow-up. All analyses were performed using R (version 4.0.2; R Foundation for Statistical Computing) and IBM SPSS (version 26; SPSS, Inc, Chicago, IL, USA). Multivariable logistic regression analyses were used to determine factors prior to and during Hospitalization associated with low functional status at six months after hospitalization. All tests were two-sided with a significance level of $p < 0.05$.

A total of 242 COVID-19 patients were admitted to the Hospital during the study period. The mean age was 65.9 (14.1) years, and 144 (59.5) were male. Hypertension (44.2%), hyperlipidemia (37.2%), and obesity (28.9%) were the most common comorbidities. Forty-four (18.2%) patients needed ICU admission with a median (IR) length of stay of 13 (7.25–30.50) days. Thirty-one (12.8%) patients needed mechanical ventilation and 8 (3.3%) tracheostomy. Two hundred and two patients were discharged from Hospital with a median (IR) Hospital stay of 10 (7–17) days. At six months 183 patients completed the questionnaires (32 who needed ICU and 151 who did not need ICU).

Table 1 displays functional status of the study population 6 months after COVID-19. A decreased functional status measured with PCFS scale was reported in 87 (47.5%) patients. Female sex, age, length of hospital stay, mechanical ventilation, and ICU admission were associated with limitations in the functional status (grade II-IV of the PCSF). A higher incidence of ICU patients reported a decrease in their functional status compared with not ICU patients (81.3% vs 40.4%, $P < 0.001$). A decreased in two grades in the functional status was also reported more frequently in ICU patients (56.3% vs 6%, $P < 0.001$). Limitation in their everyday life (grade 2–4 in the PCSF) was referred in 56.4% of ICU patients compared with 17.9% in not ICU patients ($P < 0.001$) (Table 1). Sex, age, length of Hospital stay, comorbidity and need for ICU admission have been included as independent variables, and a multivariate logistic regression model were conducted. Age (OR = 2.600, 95% CI: 1.192–5.671), and length of Hospital stay (OR = 1.049, 95% CI: 1.009–1.090) was associated with higher risk of limitations in the functional status (grade II-IV of the PCSF). Dyspnea on slight exertion was reported in only 19 patients (10.4%), however ICU patients recounted more frequently dyspnea compared with not ICU patients (37.5% vs 4.6%, $P < 0.001$).

This cross-sectional observational study has provided preliminary information about the functional status of hospitalized COVID-19 survivors. We found that hospitalized patients with COVID-19, a large proportion of them had diminution of the functional status 6 months after hospitalization. In a previous study with a shorter follow-up period (14–21 days), Tenforde et al.[7] found in a telephone survey of nonhospitalized symptomatic COVID-19 patients, that 35% of them had not returned to their usual state of health and had persistent symptoms such fatigue, cough and headache. In another study with a 60-day follow-up, Carfi et al.[8] reported that 87% of COVID-19 patients discharged from hospital were still experiencing at least one symptom, and 44% of then had worsened their quality of life. Assessment of func-

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Table 1
Functional status of the study sample (No = 183).

Post-COVID-19 functional status scale grade:	Before COVID-19 No = 183	6 months After COVID-19 No = 183	*P* value	Before COVID-19			6 months after COVID-19		
				ICU patients No = 32	Not ICU patients No = 151	P value	ICU patients No = 32	Not ICU patients No = 151	P value
0: No limitations in my everyday life.	155 (84.7)	81 (44.3)	**<0.001**	31 (96.9)	124 (82.1)	0.153	6 (18.8)	75 (49.7)	**<0.001**
1: Negligible limitations, (still have persistent symptoms).	19 (10.4)	57 (31.1)		1 (3.1)	18 (11.9)		8 (25.0)	49 (32.5)	
2: Limitations in my everyday life, occasionally need avoid or reduce usual activities	3 (1.6)	27 (14.8)		0 (0.0)	3 (2.0)		10 (31.3)	17 (11.3)	
3. Limitations in my everyday life, and I am not able to perform all usual activities.	5 (2.7)	12 (6.6)		0 (0.0)	5 (3.3)		6 (18.8)	6 (4.0)	
4. Severe limitations. I am dependent from another person due to symptoms.	1 (0.5)	6 (3.3)		0 (0.0)	1 (0.7)		2 (6.3)	4 (2.6)	

Data are expressed as n (%) or mean (SD). Functional status was measured using the Post-Covid-19 Functional Status scale. Bold values are statistically significant.

tional limitation is needed in COVID-19 survivors to estimate the long-term burden of this illness[9–10]. Prospective longitudinal studies measuring objective parameters such as pulmonary function testing, 6-min walk test, quality of life, and detection of depression, anxiety and post-traumatic stress disorder will provide more informative data to understanding of the overall long-term outcomes of SARS-CoV-2 infection.

A limitation of the study is that present study only included patients admitted of one hospital. Thus, the results may not reflect the experience and results of hospitalized survivors in hospitals in other regions. Regardless, these preliminary results are shared to inform long-term functional of COVID-19 patients who needed Hospital admission.

Declaration of Competing Interest

The authors declare the absence of conflict of interests.

Summary statement

At six months, a large proportion of COVID-19 patients who needed Hospital admission had reduced functional status. This decline in functional status was greater among patients who needed ICU admission compared with patients who did not.

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