



## Health Impact on the Elderly Survivors of COVID-19

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### Abstract

**Purpose:** To analyze factors associated with 6-month mortality and readmissions, functional and cognitive impairment, and affective disorders in patients over 70 years of age survived hospital admission for SARS-CoV-2.

**Methods:** Patients aged >70 years, discharged after hospitalization with COVID-19. Outcome variables: Mortality, readmissions, functional and cognitive impairment, and mood disorder.

**Results:** 165.6 months after hospital discharge, 13% died and 23.8% required at least one readmission. The functional decline at 3 months was associated with a higher risk of mortality (OR 9.23; 95% CI 1.6-53.28), functional deterioration (OR 14.44; 95% CI 5.10-40.85) and cognitive deterioration (OR 3.02; 95% CI 1.36-6.69). The appearance of post-hospitalization functional deterioration was associated with mortality (OR 5.33; 95% CI 1.11-25.73) and functional deterioration at 6 months (OR 3.92; 95% CI 1.68-9.12). Finally, cognitive worsening at 3 months was associated with risk of mortality (OR 8.67; 95% CI 1.58-47.58), functional deterioration (OR 2.88; 95% CI 1.28-6.49), and cognitive worsening (OR 20.89; 95% CI 7.69-56.8).

**Conclusion:** The impact on health following the consequences of COVID are described at the functional level highlighting the main role of cognitive and mood impairment.

**Keywords:** Elderly; Functional decline; Cognitive deterioration; Mood disorder; COVID-19

### Introduction

The COVID-19 pandemic has had a devastating impact on older people from the beginning of the pandemic to the present day. Referring to the report of the National Epidemiological Surveillance Network on the situation of COVID-19 in Spain, it reports that from the beginning of the pandemic until May 21<sup>st</sup>, 2020: 37.3% of the infected population are over 70 years of age with a mortality rate of 87% [1]; while from June to the present this percentage decreases to 11.4% with a mortality rate of 41.9% of those who died from SARS-CoV-2 infection [2]. These reflect that this population is a highly affected age group. Following the evolution of the pandemic, more has been learned about the virus, its management and treatment, as well as its implications in terms of mortality and morbidity. Data on the medium- and long-term consequences on the health status of older people who have been affected by COVID-19 [3] are still limited. The follow-up of these patients represents a new healthcare need that requires a multidisciplinary, protocolised and equitable approach throughout the National Health System [4]. Therefore, this brief report aimed to analyze factors associated with mortality at 6 months and readmissions, functional and cognitive decline, and affective disorders in patients aged >70 years surviving after hospital admission for SARS-CoV-2.

### Materials and Methods

Longitudinal observational study of patients >70 years discharged from the Hospital Central de la Cruz Roja, Madrid, from March 20<sup>th</sup> to May 31<sup>st</sup>, 2020 with a diagnosis of SARS-CoV-2 infection, defined according to PCR confirmation criteria or as suspected cases according to compatible clinical, analytical and/or radiological data. OCTA-COVID Cohort.

### Data collection process

At admission, socio-demographic variables were collected from the clinical history (age, sex); comorbidity (Charlson Index, >2 high comorbidity); polypharmacy, the Quick Sepsis related Organ Failure Assessment score (Q-Sofa)  $\geq 2$  as high risk of mortality in suspected sepsis. Functional status using Barthel Index (BI) (independent: 100, mild dependency: 60-99, moderate dependency: 40-59, severe dependency: 20-39 and maximum dependency: 0-19 points). Cognitive status with Red Cross Mental (RCM) which ranges from 0 (no cognitive impairment) to 5 (severe cognitive

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impairment),  $\geq 2$  as dementia. Frailty using the Clinical Frailty Scale (CFS), 1–4 as non-frail, 5–6 as mildly to moderately frail and 7–9 as severely frail. At discharge, functional status and length of hospital stay were collected. At 3 and 6 months post-discharge, a telephone interview was conducted by a trained geriatrician with the patient or, in the presence of cognitive decline, the reference family member or the nursing home staff. The following outcome variables were collected: Mortality and hospital readmission were collected from the computerized primary care program; functional decline (decrease  $\geq 10$  points in the BI compared to the baseline); cognitive decline (decrease of 1 point on the RCMS compared to the baseline); depressive semiology (the presentation of one or more of the criteria for the diagnosis of depressive disorder in the Diagnostic and Statistical Manual of Mental Disorders-V (DSM-V)) and the presence of dyspnea according to the modified Medical Research Council (mMRC) (level of dyspnea according to physical activity).

### Statistical analysis

Continuous variables are descriptively summarized using the mean  $\pm$  Standard Deviation (SD), and categorical variables are expressed as percentages. Student's *t* test was used to compare the quantitative variables, and the  $\chi^2$  test for categorical variables. The influence of the baseline variables on the outcome variables at 6 months was analyzed by binary logistic regression model, calculating the Odds Ratio (OR) and the corresponding 95% Confidence Interval (CI). The significant baseline variables in the univariate analysis were adjusted for age and sex. The statistical analysis was performed in SPSS 26.0.

### Ethical approval

The study was approved by the Clinical Research Ethics Committee of the Hospital Universitario de La Paz, Madrid, registered PI-4131.

## Results

During the period from March 20<sup>th</sup> to May 31<sup>st</sup>, 2020, 300 patients older than 70 years were admitted to hospital, 187 were discharged, of whom 8 were readmitted 48 hours after discharge, and 14 were excluded for refusal of consent, leaving a sample for analysis of 165 patients. The baseline characteristics of the sample are shown in Table 1. The functional, cognitive and depressive impairment at 3 months are described in Table 2. At 6 months, 21 patients (13%) died in the hospital and 23.8% required at least one readmission to hospital. Of those who died, 57% occurred in the first month post-discharge, the main causes being respiratory (57.14%) and cardiac (14.29%) pathology, the most frequent causes of readmission were respiratory (36.1%), cardiological (25%) and urinary (16.7%) pathologies. Of the survivors at 6 months, more than half of the sample had some of the following sequela: Functional impairment (41.7%), cognitive worsening (31.3%) or depressive symptoms (42.4%). In the multivariate analysis adjusted for age and sex of the baseline variables associated with mortality, readmissions, functional or cognitive deterioration or mood disorder at 6 months; the presence of functional deterioration at discharge and its persistence at 3 months were associated with a higher risk of mortality. In addition, cognitive worsening or the readmissions at 3 months were also associated with mortality. Functional impairment at discharge and its persistence at 3 months as well as cognitive and mood deterioration and the presence of dyspnea at 3 months were associated with persistence of functional impairment at 6 months (Table 3). Finally, the presence of functional impairment and cognitive worsening at 3 months were significantly associated with cognitive worsening at 6 months.

**Table 1:** Demographic and clinical characteristics of the study sample of >70 years old survivors of SARS-CoV-2 infection.

Age (years, SD)	85.85 $\pm$ 6.73
Female (%)	69.1
Nursing home pre-admission (%)	65.5
Length of hospitalization (days)	15.63 $\pm$ 8.63
Frailty (SD)	5.89 $\pm$ 1.95
Clinical Frailty Scale (%)	
1-4	27.3
5-6	4.8
7-9	47.9
Charlson Index >2 (%)	33.9
Q-Sofa $\geq 2$ (%)	13.3
CURB-65 $\geq 2$ (%)	53.3
Polypharmacy (%)	
<5	32.10%
5-9	43.60%
$\geq 10$	24.20%
Pneumonia at admission (%)	82.3
Previous Barthel index <40	26.6
Functional decline at discharge (%)	23.6
Previous dementia (%)	43.6
Previous depressive disorder (%)	38.8

**Table 2:** Variable at 3 months.

Functional decline (%)	27.2
Readmission (%)	20
Dyspnea at 3 months (%)	29.8
Functional impairment (%)	27.2
Cognitive decline (%)	25.8
Presence of depressive symptoms (%)	51

## Discussion

We describe the health status after hospitalization for COVID-19 in a cohort of patients older than 70 years who survived admission. The OCTA-COVID study [5] describes in-hospital mortality in 37%; and the presence of delirium, dementia and high CURB-65 values as predictors of mortality. It should be noted that the patients studied were not ICU candidates and were treated on the ward. With respect to high comorbidity and frailty [6] there are differences with other studies that do relate it. We found that mortality at 6 months was 13%, lower than that described by Walle Hansen et al. [7] in a cohort of patients over 60 years of age (21%), a younger population and a quarter developed severe COVID, twice that in the present sample. The readmission rate of 23.8% was very similar to that described in the 3-month follow-up (20%), with respiratory pathology being the main cause. The incidence of post-hospitalization functional impairment 6 months after discharge was 41.7% higher than that described at 3 months (27.2%), which could be related to dyspnea as a persistent symptom limiting ambulation and the performance of basic activities of daily living. According to Lloyd [9], the presence or absence of functional recovery after 1 month was associated with long-term outcome. A functional dependence is described as factor associated

**Table 3:** Logistic regression analysis of baseline variables associated to mortality risk, readmission, functional and cognitive decline, and depressive symptoms at 6 months (adjusted for age and sex).

	<b>Mortality</b>	<b>Readmission</b>	<b>Functional decline</b>	<b>Cognitive impairment</b>	<b>Depressive symptoms</b>
Charlson Index >2	1 (0.18-5.65)	1.97 (0.68-5.74)	2.04 (0.96-4.31)	0.51 (0.22-1.19)	1.71 (0.81-3.62)
BI<40 baseline	<b>5.36 (1.1-26.24)</b>	1.21 (0.38-3.86)	0.54 (0.23-1.29)	0.33 (0.11-0.94)	0.53 (0.22-1.26)
BI<40 at 3 months	<b>20.01 (2.24-178.39)</b>	2.56 (0.89-7.43)	1.23 (0.57-2.66)	0.61 (0.26-1.45)	0.74 (0.34-1.62)
Functional decline on admission	<b>5.33 (1.11-25.73)</b>	1.73 (0.59-5.12)	<b>3.92 (1.68-9.12)</b>	2.21 (0.99-4.96)	1.71 (0.77-3.79)
Functional decline at 3 months	<b>9.23 (1.6-53.28)</b>	2.53 (0.89-7.15)	<b>14.44 (5.10-40.85)</b>	<b>3.02 (1.36-6.69)</b>	1.42 (0.66-3.08)
Cognitive deterioration at 3 months	<b>8.67 (1.58-47.58)</b>	2.13 (0.74-6.18)	<b>2.88 (1.28-6.49)</b>	<b>20.89 (7.69-56.8)</b>	1.93 (0.87-4.27)
Mood disorder at 3 months	2.55 (0.48-13.69)	1.39 (0.5-3.92)	<b>2.06 (1.04-4.06)</b>	<b>2.33 (1.13-4.84)</b>	<b>4.11 (2.01-8.43)</b>
Readmissions at 3 months	<b>14.69 (2.6-82.99)</b>	<b>5.45 (1.83-16.18)</b>	0.98 (0.39-2.47)	1.26 (0.48-3.29)	0.61 (0.23-1.62)
Dyspnea at 3 months	0.91 (0.17-5.01)	1.98 (0.67-5.80)	<b>7.08 (3.03-16.51)</b>	1.98 (0.67-5.80)	<b>3.87 (1.80-8.33)</b>

BI: Barthel Index

Bold value indicates statistical significance

with mortality and readmission [8], which highlights the need for early follow-up of this group affected by a new disease that is impacting on all areas of comprehensive geriatric assessment. The presence of affective disorder at 3 months was the only factor associated with functional, cognitive and mood worsening at 6 months. A quarter of the patients were cognitively worse and almost half of the patients had some depressive symptomatology, almost twice as many as described by Huang et al. [10], in a younger population and with a better baseline functional status. This high percentage of depressive disorder could be related to the presence of depressive disorder in 39% of their medical history. Despite the limitations of our study, such as the small sample size and being a single-center study, we would like to highlight the prevalence of functional impairment, cognitive worsening and the presence of affective symptomatology in a typical geriatric population (high frailty, polypharmacy and comorbidity) that is usually underrepresented in research studies.

## Conclusion

COVID-19 causes a worsening of the health of the elderly after hospitalization, highlighting not only the presence of severe functional impairment, but also the important role of cognitive and mood impairment, whose early detection could contribute to the selection of patients at higher risk of medium-long term sequela for closer follow-up.

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