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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Original Study

Clinical Characteristics, Frailty, and Mortality of Residents With COVID-19 in Nursing Homes of a Region of Madrid

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A B S T R A C T

Objectives: To describe the clinical characteristics, 30-day mortality, and associated factors of patients living in nursing homes (NH) with COVID-19, from March 20 to June 1, 2020.
Design: This is a retrospective study. A geriatric hospital-based team acted as a consultant and coordinated the care of older people living in NHs from the hospital.
Setting and Participants: A total of 630 patients aged 70 and older with Coronavirus Disease 2019 COVID-19 living in 55 NHs.
Methods: A logistic regression was performed to analyze the factors associated with mortality. In addition, Kaplan-Meier curves were applied according to mortality and its associated factors using the log-rank Mantel-Cox test.
Results: The diagnosis of COVID-19 was mainly made by clinical compatibility (N = 430). Median age was 87 years, 64.6% were women and 45.9% were transferred to be cared for at the hospital. A total of 282 patients died (44.7%) within the 30 days of first attention by the team. A severe form of COVID-19 occurred in 473 patients, and the most frequent symptoms were dyspnea (n = 332) and altered level of consciousness (n = 301). According to multiple logistic regression, male sex ($P = .019$), the Clinical

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Frailty Score (CFS) ≥6 ($P = .004$), dementia ($P = .012$), dyspnea ($P < .001$), and having a severe form of COVID-19 ($P = .001$), were associated with mortality, whereas age and care setting were not.
Conclusions and Implications: Mortality of the residents living in NHs with COVID-19 was almost 45%. The altered level of consciousness as an atypical presentation of COVID-19 should be considered in this population. A severe form of the disease, present in more than three-quarters of patients, was associated with mortality, apart from the male sex, CFS ≥6, dementia, and dyspnea, whereas age and care setting were not. These findings may also help to recognize patients in which the Advance Care Planning process is especially urgent to assist in the decisions about their care.

The World Health Organization (WHO) declared coronavirus disease 2019 (COVID-19) a public health emergency of international concern on March 11, 2020.[1–3] The clinical range of this infectious disease varies from asymptomatic to critical cases,[4,5] the older population being the group with the highest risk of hospitalization and mortality.[6–8] In this regard, the impact of COVID-19 on older people living in nursing homes (NHs) has been particularly serious at national and international scales.[9] By June 23, it is estimated that a total of 19,553 people with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) have died in NHs during the COVID-19 pandemic in Spain, representing 68.1% of all confirmed deaths from COVID-19 in our country.[9] Living in community, the lack of personal protective equipment for workers or the health vulnerability due to frequent conditions like frailty, dependence, dementia or high burden of comorbidities are some of the factors that have contributed to the expansion and lethality of the virus in this setting.[10]

With respect to clinical symptoms in older individuals, they also present cough, dyspnea and fever as the most common, whereas delirium, lower temperature, and abdominal pain have been described as atypical presentations as compared with younger patients.[11] However, data in this particular group of patients living in NHs are still scarce and come from subgroup analysis in observational studies.[12]

This research aims to describe the clinical characteristics, 30-day mortality, and risk factors for mortality in older patients with COVID-19 living in NHs in the area of influence of a hospital in the region of Madrid during the first wave of the COVID-19 pandemic, from March 20 to June 1, 2020.

Methods

Geriatric Hospital-based Team Procedure

In March 2020, the Health Authorities of Madrid created the position of the geriatric hospital-based team to act as a consultant to the NH physicians and coordinate the care of older people living in these settings from the hospital, covering from 8 AM to 10 PM, 7 days a week. In this hospital, a working group was constituted, including 5 geriatricians and 14 other health care workers.

The geriatric hospital-based team assessed residents at the request of the NH physicians, who provided a first description of the present illness, mainly by telephone. Additional information was obtained from the electronic health record (EHR) used in Madrid for primary and tertiary care integration. The decisions about the management of the patients had to take into account both the characteristics of the NH (whether that center had a qualified doctor, a 24-hour nurse, and the available material, mainly oxygen, drugs, and nursing equipment) and the situation of residents (the comprehensive geriatric assessment and the clinical presentation). If the patient could be adequately attended at the NH, it was recommended that he or she remained there, and if not, they were referred to the hospital. The transmission of information to patients and their relatives was carried out by the staff of the NH.

After this initial evaluation, the necessary clinical procedures were carried out, that is, request for ambulances, the delivery of oxygen and hospital medications, the adjustment of oral treatments in the EHR and, when needed, the mobilization of human resources. The prescription included a treatment regimen for 5 days for each patient with the dosage, schedule, and form of administration: This individual package was delivered from the hospital to the NH and included (1) antibiotics, (2) fluid therapy, (3) enoxaparin, (4) hydroxychloroquine, (5) paracetamol, and (6) inhalers. In addition, frequent supplies of palliative drugs and steroids were also provided to be used when the patient suffered from distress or sepsis according to the WHO recommendation at that time.[13]

The therapeutic protocol for COVID-19 in the NH was agreed with the Department of Infectious Diseases and was in common with that of the hospital. Updates to the protocol were communicated periodically to the NH physicians.

Any changes in the clinical situation of a resident or members of the staff of the NH were evaluated and the appropriate clinical decisions were taken.

Population and Type of Study

The study population consisted of the residents attended by the geriatric hospital-based team of a public university hospital during the period of the COVID-19 pandemic, from March 20 to June 1, 2020. This hospital covers a population of 312,000 inhabitants in the north of Madrid, including 55 NHs with nearly 4200 older residents.

This is a descriptive, observational, retrospective, and longitudinal study. We included only patients aged 70 and older with COVID-19 attended by the geriatric hospital-based team. We excluded those attended by the team with not enough data in the EHR to obtain a diagnosis of COVID-19.

The study complied with good clinical practice standards set forth in the Declaration of Helsinki of 1975 and was approved by the relevant institutional review boards: Ethical and Research Committee of the hospital (reference, HULP4178).

Variables and Data Collection

Mortality rate within 30 days after the first geriatric hospital-based team attention in patients diagnosed with COVID-19 was our main outcome. The diagnosis of COVID-19 was made based on positive SARS-CoV-2 polymerase chain reaction (PCR), positive serology, or clinical compatibility (at least 1 of the following symptoms at the initial evaluation: fever, arthromyalgia, headache, upper respiratory tract symptoms, dyspnea, epileptic seizures, chest pain, abdominal pain, cough, nausea or vomiting, diarrhea, hemoptysis, ageusia, or anosmia). We categorized a case as *severe* when any of the following were initially present: temperature >38°, systolic blood pressure <100 mm Hg, heart rate >100 beats per minute, basal saturation less than 90%, respiratory rate >30 per minute, or altered level of consciousness.[13,14] We also recorded age, sex, previous intake of angiotensin-converting enzyme inhibitors or angiotensin receptor

blockers and the presence of any of the following comorbidities: hypertension, cirrhosis, diabetes, chronic renal disease, obesity, chronic neurological disease, active smoking, heart failure, chronic inflammatory disease, ischemic heart disease, solid neoplasm, hematological neoplasm, chronic obstructive pulmonary disease (COPD), or sleep apnea syndrome. With respect to the comprehensive geriatric assessment, the previous Barthel Index (BI)[15] and the cognitive status according to the Global Deterioration Scale were collected.[16] Frailty was assessed through the Rockwood Clinical Frailty Scale (CFS), taking into account the preexisting level of function and mobility, considering the usual cutoff points, from (1) very fit to (9) terminally ill.[17] The treatments used were grouped into (1) antibiotics (ie, ceftriaxone 2 g intravenous, azithromycin 500 mg or cefixime 400 mg), (2) fluid therapy, (3) enoxaparin, (4) hydroxychloroquine, and (5) inhalers.

Finally, we recorded whether the patient was being treated in the hospital or in the NH. If in the hospital, we additionally recorded length of stay and whether the patient was re-admitted within the first 30 days after their first care.

Statistical Analysis

Results for continuous and categorical variables are reported as median and interquartile range and number (percentage), respectively. Differences between survivors and nonsurvivors, patients admitted to the hospital and those who were not, and those classified as severe and mild cases were examined using the Mann-Whitney *U* test and the χ^2 test for continuous and categorical variables, respectively. Multiple logistic regression was carried out to assess factors associated with mortality. We explored and found association between the tools that explore functional domains (ie, CFS and BI), through Spearman's rho correlation test, including only the CFS in the multiple logistic regression. Therefore in the model, the mortality was adjusted for age, sex, hospital admission, CFS $\geq$6, dementia, hypertension, COPD, sleep apnea syndrome, dyspnea, epileptic seizures, abdominal pain, cough, anosmia, and severe case. Finally, Kaplan-Meier curves were made for overall survival and for the main factors associated with mortality, applying a log-rank Mantel-Cox test. The existence of statistical significance was considered when the *P* value was less than .05. The analysis was performed with IBM SPSS Statistics program version 21.0 (IBM Corp., Armonk, NY).

Results

Demographics and Baseline Clinical Characteristics

Of the 841 patients attended by the geriatric hospital-based team, 630 presented COVID-19 and complied with the criteria for inclusion in the study. Most of the diagnoses were based on clinical compatibility (n = 430) with the disease (Figure 1). The median age was 87 years (82.9–91.1) and 407 were women (64.6%). As shown in Table 1, the median of comorbidities per patient was 2 (1–3) and the most frequent were hypertension (n = 408, 64.8%), chronic neurological disease (n = 67, 10.6%), diabetes (n = 110, 17.5%), heart failure (n = 69, 11%), chronic renal disease (n = 67, 10.6%), and ischemic heart disease (n = 64, 10.2%). The most frequent symptoms at presentation were dyspnea (n = 332, 52.7%), altered level of consciousness (n = 301, 47.8%), fever (n = 243, 38.6%), and cough (n = 101, 16.3%). Regarding the treatment regimen, 354 patients (56.9%) received antibiotics, 296 fluid therapy (47%), 466 inhalers (74%), 502 enoxaparin (79.7%), and 91 hydroxychloroquine (14.4%).

Characteristics of the Population According to the Location of Attention

A total of 289 patients (45.9%) were transferred and treated at the hospital, and 341 (54.1%) remained in the NH. Table 2 shows that in the NH, the disease was less often diagnosed by PCR than in the hospital (13.5 vs 48.8, percentage). Patients attended at the NH were significantly older (88 vs 87, median age), frailer (CFS 7 vs CFS 6, median), presented a lower BI (30 vs 45, median), more frequently had dementia (57.8 vs 39.4, percentage), and presented fewer comorbidities (1 vs 2, median). However, there was no difference in the severity of the cases (74.2 vs 76.1, percentage), or in the mortality (Supplementary Figure 1) of patients attended in either setting (46.3 vs 42.9, percentage).

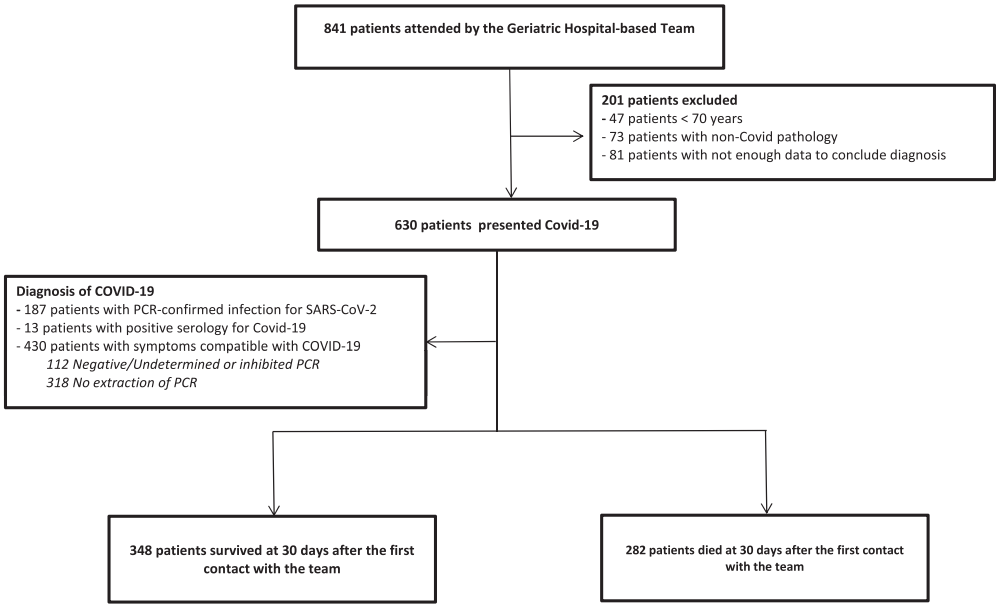

Fig. 1. Flow chart.

Table 1
Baseline Characteristics of Study Participants and Characteristics of the Population According to Survival Status

Variable	Total (N = 630)	Alive (n = 348)	Dead (n = 282)	*P* Value
Age, y	87 (82.9–91.1)	87 (82.5–91.5)	87 (82.5–91.5)	.433
Age by groups, y				
70–75	49 (7.8)	30 (8.6)	19 (6.7)	.696
76–80	66 (10.5)	39 (11.2)	27 (9.6)	
81–85	120 (19)	68 (19.5)	52 (18.4)	
86–90	207 (32.9)	114 (32.8)	93 (33.0)	
>90	188 (29.8)	97 (27.9)	91 (32.3)	
Sex				
Female	407 (64.6)	240 (69.0)	167 (59.2)	.011
Male	223 (35.4)	108 (31.0)	115 (40.8)	
Comprehensive geriatric assessment				
Clinical Frailty Scale	7 (6–8)	7 (5.5–8.0)	7 (6–8)	<.001
Barthel Index	36 (7–65)	40.5 (10–71)	30 (4.5–55.5)	<.001
Dementia	311 (49.4)	148 (42.5)	163 (57.8)	<.001
Global Deterioration Scale	6 (5–7)	6 (5–7)	6 (5–7)	.665
Comorbidities per patient	2 (1–3)	2 (1.5–2.5)	2 (1–3)	.749
Most frequent comorbidities				
Hypertension	408 (64.8)	222 (63.8)	186 (66.0)	.572
Cirrhosis	3 (0.5)	1 (0.3)	2 (0.7)	.589
Diabetes	110 (17.5)	57 (16.4)	53 (18.8)	.427
Chronic renal disease	67 (10.6)	32 (9.2)	35 (12.4)	.193
Obesity	36 (5.7)	15 (4.3)	21 (7.4)	.092
Chronic neurological disease	153 (24.3)	83 (23.9)	70 (24.8)	.777
Active smoking	14 (2.2)	8 (2.3)	6 (2.1)	.885
Heart failure	69 (11)	37 (10.6)	32 (11.3)	.775
Chronic inflammatory disease	19 (3)	11 (3.2)	8 (2.8)	.813
Ischemic heart disease	64 (10.2)	36 (10.3)	28 (9.9)	.864
Solid neoplasm	58 (9.2)	38 (10.9)	20 (7.1)	.098
Hematological neoplasm	8 (1.3)	2 (0.6)	6 (2.1)	.149
COPD	67 (10.6)	43 (12.4)	24 (8.5)	.119
Sleep apnea syndrome	16 (2.5)	8 (2.3)	9 (3.2)	.492
ACE inhibitors or ARBs	105 (16.6)	60 (17.2)	45 (16.0)	.667
Symptoms				
Fever	243 (38.6)	107 (30.7)	133 (47.2)	<.001
Arthromyalgia	4 (0.6)	1 (0.3)	3 (1.1)	.330
Headache	1 (0.2)	2 (0.6)	1 (0.4)	.999
Symptoms of upper respiratory tract	12 (1.9)	5 (1.4)	7 (2.5)	.340
Dyspnea	332 (52.7)	140 (40.2)	192 (68.1)	<.001
Epileptic seizures	7 (1.1)	5 (1.4)	2 (0.7)	.469
Chest pain	4 (0.6)	4 (1.1)	0 (0.0)	.132
Abdominal pain	7 (1.1)	3 (0.9)	4 (1.4)	.706
Cough	101 (16.3)	49 (14.1)	52 (18.4)	.138
Vomiting	18 (2.9)	16 (4.6)	2 (0.7)	.004
Diarrhea	18 (2.9)	14 (4.0)	4 (1.4)	.051
Hemoptysis	0 (0.0)	0 (0.0)	0 (0.0)	NA
Ageusia	0 (0.0)	0 (0.0)	0 (0.0)	NA
Anosmia	2 (0.3)	1 (0.3)	1 (0.4)	.999
Alteration of the level of consciousness	301 (47.8)	148 (42.5)	153 (54.3)	.003
Vital signs				
Temperature (° Celsius)	37.4 (36–38.8)	37.2 (36.5–37.9)	37.7 (37.1–38.3)	<.001
Systolic blood pressure (mm Hg)	115 (89–141)	120 (110–130)	110 (97–123)	<.001
Heart rate (beats per minute)	85 (62–108)	84 (76–92)	87 (73–101)	.016
Basal saturation (%)	90 (81–99)	92 (88–96)	88 (84–92)	<.001
Respiration rate (breaths per min)	24 (14–34)	21.5 (18.5–24.5)	27 (23–31)	<.001
Severe case*	473 (75.08)	227 (65.2)	246 (87.2)	<.001
Treatment regimens				
Antibiotic	354 (56.9)	194 (55.7)	160 (56.7)	.803
Fluidotherapy	296 (47.0)	149 (42.8)	147 (52.1)	.020
Hydroxychloroquine	91 (14.4)	48 (13.8)	33 (11.7)	.436
Enoxaparin	502 (79.7)	299 (85.9)	203 (72.0)	<.001
Inhalers	466 (74.0)	231 (66.4)	235 (83.3)	<.001
Location of attention				
Nursing home	338 (53.6)	183 (52.6)	158 (56.0)	.389
Hospital	292 (46.3)	165 (47.4)	124 (44.0)	

ACE, angiotensin-converting enzyme; ARB, angiotensin receptor blocker; COPD, chronic obstructive pulmonary disease.
Results are expressed as n (%) or median (Q1–Q3).

*Severe case if any of the following were present: temperature >38°, systolic blood pressure <100 mm Hg, heart rate >100 beats per minute, basal saturation less than 90%, respiratory rate >30 per minute, altered level of consciousness.

Table 2
Characteristics of the Population According to the Location of Attention

Variable	Nursing Home (n = 341)	Hospital (n = 289)	*P* Value
Aged, y	88 (83.5–92.5)	87 (82.0–92.0)	.012
Aged by groups, y			
70–75	21 (6.2)	28 (9.7)	.255
76–80	31 (9.1)	35 (12.1)	
81–85	64 (18.8)	56 (19.4)	
86–90	116 (34.0)	91 (31.5)	
>90	109 (32.0)	79 (27.3)	
Sex			
Female	227 (66.6)	180 (62.3)	.262
Male	114 (33.4)	109 (37.7)	
Diagnosis of COVID-19			
PCR-confirmed infection for SARS-CoV-2	46 (13.5)	141 (48.8)	<.001
Positive serology for COVID-19	3 (0.9)	10 (3.5)	.023
Symptoms compatible with COVID-19	292 (85.6)	138 (47.8)	<.001
Negative/Undetermined or inhibited PCR	3 (0.9)	109 (37.7)	<.001
No extraction of PCR	289 (84.8)	29 (10.0)	<.001
Comprehensive geriatric assessment			
Clinical Frailty Scale	7 (6–8)	6 (5–7)	<.001
Barthel Index	30 (5–55)	45 (20–70)	<.001
Dementia	197 (57.8)	114 (39.4)	<.001
Global Deterioration Scale	6 (5.3–6.7)	5 (4–6)	.048
Comorbidities per patient	1 (0.5–1.5)	2 (1–3)	<.001
Most frequent comorbidities			
Hypertension	206 (60.4)	202 (69.9)	.013
Cirrhosis	1 (0.3)	2 (0.7)	.596
Diabetes	52 (15.2)	58 (20.1)	.112
Chronic renal disease	30 (8.8)	37 (12.8)	.104
Obesity	20 (5.9)	16 (5.5)	.859
Chronic neurological disease	76 (22.3)	77 (26.6)	.204
Active smoking	5 (1.5)	9 (3.1)	.162
Heart failure	34 (10.0)	35 (12.1)	.391
Chronic inflammatory disease	6 (1.8)	13 (4.5)	.045
Ischemic heart disease	32 (9.4)	32 (11.1)	.485
Solid neoplasm	30 (8.8)	28 (9.7)	.700
Hematological neoplasm	4 (1.2)	4 (1.4)	.999
COPD	25 (7.3)	42 (14.5)	.003
Sleep apnea syndrome	7 (2.1)	10 (3.5)	.277
ACE inhibitors or ARBs	49 (14.4)	56 (19.4)	.093
Symptoms			
Fever	147 (43.1)	93 (32.2)	.005
Arthromyalgia	2 (0.6)	2 (0.7)	.999
Headache	3 (0.9)	0 (0.0)	.254
Symptoms of upper respiratory tract	10 (2.9)	2 (0.7)	.040
Dyspnea	186 (54.5)	146 (50.5)	.313
Epileptic seizures	4 (1.2)	3 (1.0)	.999
Chest pain	3 (0.9)	1 (0.3)	.629
Abdominal pain	1 (0.3)	6 (2.1)	.052
Cough	67 (19.6)	34 (11.8)	.007
Vomiting	8 (2.3)	10 (3.5)	.403
Diarrhea	11 (3.2)	7 (2.4)	.546
Anosmia	2 (0.6)	0 (0.0)	.503
Severe case*	253 (74.2)	220 (76.1)	.577
Treatment regimens			
Antibiotic	199 (58.4)	155 (53.6)	.234
Fluidotherapy	168 (49.3)	128 (44.3)	.212
Hydroxychloroquine	11 (3.2)	70 (24.2)	<.001
Enoxaparin	256 (75.1)	246 (85.1)	.002
Inhalers	259 (76.0)	207 (71.6)	.217
Mortality at 30 d	158 (46.3)	124 (42.9)	.389
Place of death			
Hospital	0 (0.0)	124 (42.9)	<.001
Nursing home	158 (46.3)	0 (0.0)	

ACE, angiotensin-converting enzyme; ARB, angiotensin receptor blocker; COPD, chronic obstructive pulmonary disease; COVID-19, Coronavirus Disease 2019; PCR, polymerase chain reaction; SARS-CoV-2, severe acute respiratory syndrome coronavirus 2.
Results are expressed as n (%) or median (Q1–Q3).

*Severe case if any of the following were present: temperature >38°, systolic blood pressure <100 mm Hg, heart rate >100 beats per minute, basal saturation less than 90%, respiratory rate >30 breaths per minute, altered level of consciousness.

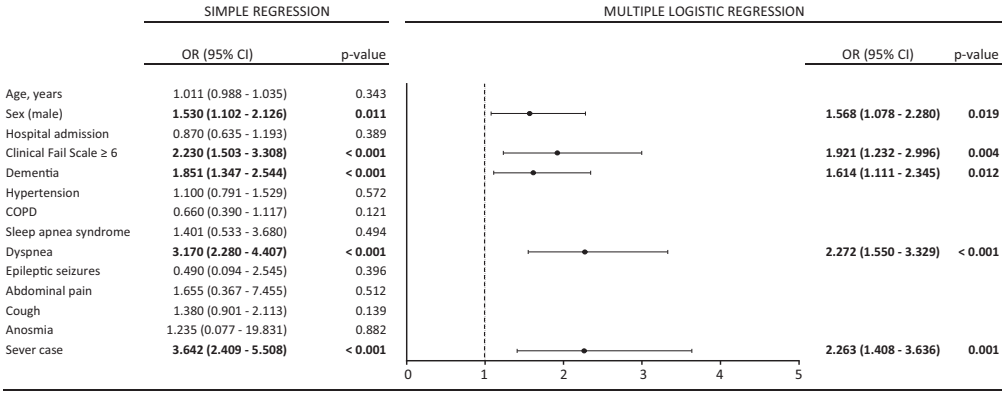

Fig. 2. Multiple logistic regressions analyzing the factors associated with mortality.

Characteristics of the Population According to the Severity of COVID-19

We identified 473 patients (75.08%) presenting with a severe form of the disease. In these cases, dementia was significantly more frequent (52.2 vs 40.8, percentage), whereas there were no differences in age, sex, and BI. Fever (43.1 vs 22.9, percentage) and dyspnea (65.1 vs 15.3, percentage), were more frequent in severe forms. Regarding the treatment regimen, antibiotic (66.6 vs 24.8, percentage), inhalers (90.3 vs 24.8, percentage), fluidotherapy (61.1 vs 5.1, percentage) and hydroxychloroquine (15.6 vs 4.5, percentage) were prescribed more in these cases. Finally, mortality (58.6% vs 30.6%) was significantly higher in the severe forms of the disease (Supplementary Table 1).

Characteristics of the Population According to Survival Status and Factors Associated With Mortality

Within 30 days of the first care, 282 patients (44.76%) died, as presented in Table 1. Compared with COVID-19 survivors, nonsurvivors showed a lower BI (30 vs 40.5, median), more frequently presented dementia (57.8% vs 42.5%), and were significantly frailer (CFS 7 [6–8] vs CFS 7 [5.5–8.0]) (Supplementary Figure 2). There were no differences in any of the comorbidities between the groups. Nonsurvivors showed a higher temperature (37.7° vs 37.2°, median), higher respiratory rate (27 vs 21.5, median), and higher heart rate per minute (87 vs 84, median). Moreover, basal saturation (88% vs 92%, median) and systolic blood pressure were lower (110 mm Hg vs 120 mm Hg, median) in nonsurvivors. As expected, severe cases (87.2% vs 65.2%) were more frequent in nonsurvivors. However, there were no statistically significant differences in the mortality of patients attended at the NH or in the hospital.

A Spearman correlation between BI and CFS scales was established with an $r = -0.974$, and therefore we just include CFS in the logistic regression analyses as a measurement of functional status of the patient. According to logistic regression analyses (Figure 2), male sex, dementia, dyspnea, presenting a severe form of the illness, and the CFS $\geq$6 were factors significantly associated with mortality. No multiplicative interactions were found between CFS, dyspnea and severe case. In Figure 3, survival curves according to overall survival and Kaplan-Meier curves were made with the main factors associated with mortality applying a log-rank Mantel-Cox test.

Discussion

To our knowledge, this is the first study that provides information about clinical characteristics and outcome of older residents of NHs with COVID-19 attended by a geriatric hospital-based team. Disappointingly, almost 45% of the patients died within 30 days of the first attendance. Fever, dyspnea, cough, and altered level of consciousness were the most frequent symptoms at presentation. Approximately three-quarters of the residents showed a severe form of COVID-19. Male sex, CFS score $\geq$6, dementia, dyspnea, and having a severe clinical form of COVID-19 were factors associated with mortality, whereas the age and the setting in which the resident was treated had no impact on mortality.

The high number of deaths in the NH have been a critical piece of the worldwide pandemic numbers, with 19% to 72% of COVID-19 deaths occurring in these settings.[9,18] Particularly in Madrid, from March 8 to April 19, 2020, 19% of older patients (n = ~8300 cases) living in these facilities died, a sixfold increase compared with the same period in previous years.[19] The high mortality we reported in our study (44.76%) is consistent with previous publications on hospitalized patients with COVID-19 aged 80 and older.[6,20,21] However, it contrasts with the 22.4% shown in a coordinated on-site medicalization program conducted in 4 care homes of Seville with 272 residents, where only 23.5% of patients were hospitalized, suggesting that the population did not present forms of COVID-19 as severe as ours.[22] Moreover, according to preliminary results, approximately 60% of the older population living in care facilities in Madrid have humoral immunity to SARS-CoV-2, implying that approximately 2500 residents in our area of influence would have been affected by COVID-19.[23] These data suggest that we may have attended more severe cases and, therefore, with worse prognosis.

According to recent studies, and in line with our findings, delirium has been described as a clinical manifestation in older patients with COVID-19.[11,24] In this regard, we did not evaluate the other items of the Confusion Assessment Method (ie, acute and fluctuating course, inattention, or disorganized thinking); however, we suspect that the incidence of delirium was high due to the large number of patients presenting altered level of consciousness and the prevalence of dementia in our sample. These data also reveal the importance of identifying atypical presentations of this disease in the older population.[25]

According to the literature and in consonance with our results, frailty or dementia are factors associated with mortality more than age or comorbidities in older patients with COVID-19.[11,26,27] These are very common conditions in older residents in NHs, typically leading to frequent visits to emergency departments and admissions to hospital in a nonpandemic.[28] Several issues regarding how to better care for this population have become even more compelling during the pandemic, many related to adequately identifying which patients benefit from hospitalization. The risk/benefit of hospitalizations of older residents living in NHs, the medicalization of these facilities, and the screening tools for an adequate referral to the hospital are unresolved issues of

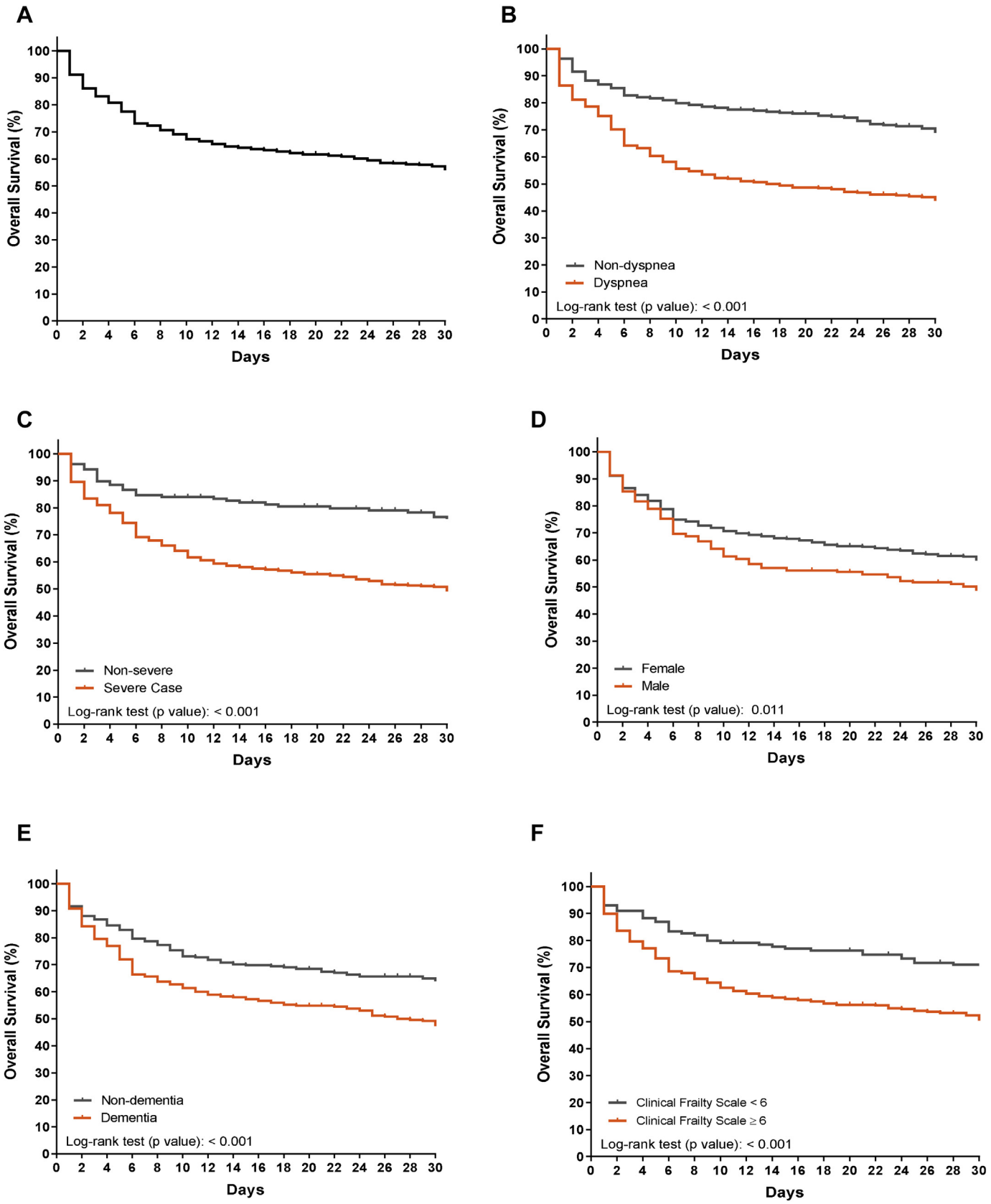

Fig. 3. Survival curves. (A) Kaplan-Meier curves for overall survival. (B) Kaplan-Meier curves according to presence of dyspnea vs non-dyspnea. Log-rank Mantel-Cox test. (C) Kaplan-Meier curves according to severity of the case. Log-rank Mantel-Cox test. (D) Kaplan-Meier curves according to sex. Log-rank Mantel-Cox test. (E) Kaplan-Meier curves according to presence of dementia vs nondementia. Log-rank Mantel-Cox test. (F) Kaplan-Meier curves according to CFS. Log-rank Mantel-Cox test.

paramount importance during the COVID-19 pandemic.[29] The similar mortality observed in residents treated with the same therapeutic protocol for SARS-CoV-2 in both settings suggests that the comprehensive and tailored intervention by the geriatric hospital-based team were appropriate. However, advance care planning was absent in most of the residents evaluated, a tool that should be included to improve the care and decision-making process.[30]

In addition to being retrospective, our study is limited by the fact that the disclosure of the SARS-CoV-2 protocol in care facilities allowed the NH physicians to manage mild cases that are not included in our registry. Of note, the availability of a stock of palliative medicines and corticoids did not allow monitoring the end-of-life scenario in the NH, whose adequate management is essential in this lethal disease and in some cases may alter outcomes.[31]

Conclusions and Implications

Almost 45% of the older patients with COVID-19 living in NHs died within 30 days of the first contact with the geriatric hospital-based team. Apart from the classical symptoms, altered level of consciousness is an atypical presentation of COVID-19 and should be taken into account for its diagnosis. Approximately three-quarters of the residents showed a severe form of COVID-19 that was associated with higher mortality. Sex, CFS score $\geq$6, dementia, and dyspnea were factors that contributed to increased mortality, whereas the age and whether the patient was treated in the hospital or in the NH had no impact on mortality. These findings may also help to recognize patients in which the advance care planning process is especially urgent to assist in the decisions about their care.

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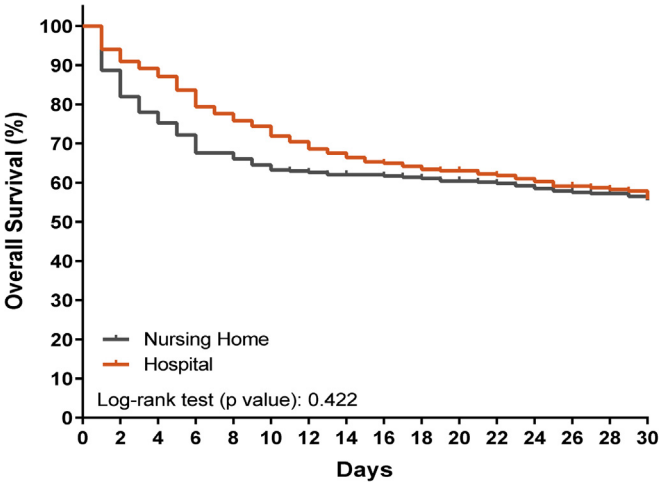
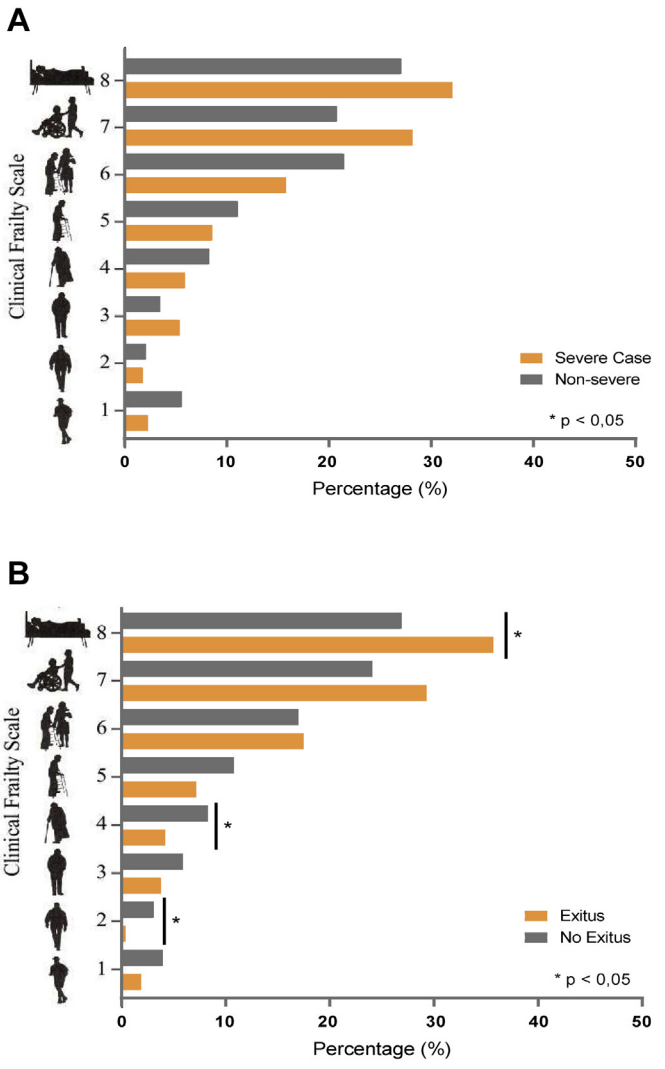


Supplementary Fig. 1. Kaplan-Meier curves according to location of attention.



Supplementary Fig. 2. CFS. (A) CFS and severity. (B) CFS and mortality.

Supplementary Table 1
Characteristics of the Population According to the Severity of the Clinical Presentation of COVID-19

Variable	Nonsevere (n = 157)	Severe Case* (n = 473)	*P* Value
Age, y	88 (83.5–92.5)	87 (82.8–91.2)	.344
Age by groups, y			
70–75	10 (6.4)	39 (8.2)	.425
76–80	12 (7.6)	54 (11.4)	
81–85	36 (22.9)	84 (17.8)	
86–90	53 (33.8)	154 (32.6)	
>90	46 (29.3)	142 (30.0)	
Sex			
Male	52 (33.1)	171 (36.2)	.491
Female	105 (66.9)	302 (63.8)	
Comprehensive geriatric assessment			
Clinical Frailty Scale	6 (4.5–7.5)	7 (6–8)	.037
Barthel Index	45 (13–77)	35 (8–62)	.077
Dementia	64 (40.8)	247 (52.2)	.013
Global Deterioration Scale	6 (5–7)	6 (5–7)	.773
Comorbidities per patient	2 (1–3)	1 (0.25–1.75)	.044
Most frequent comorbidities			
Hypertension	108 (68.8)	300 (63.4)	.223
Cirrhosis	1 (0.6)	2 (0.4)	.999
Diabetes	31 (19.7)	79 (16.7)	.384
Chronic renal disease	17 (10.8)	50 (10.6)	.928
Obesity	10 (6.4)	26 (5.5)	.683
Chronic neurological disease	39 (24.8)	114 (24.1)	.852
Active smoking	4 (2.5)	10 (2.1)	.757
Heart failure	24 (15.3)	45 (9.5)	.045
Chronic inflammatory disease	5 (3.2)	14 (3.0)	.999
Ischemic heart disease	17 (10.8)	47 (9.9)	.749
Solid neoplasm	16 (10.2)	42 (8.9)	.622
Hematological neoplasm	1 (0.6)	7 (1.5)	.687
COPD	16 (10.2)	51 (10.8)	.835
Sleep apnea syndrome	3 (1.9)	14 (3.0)	.583
ACE inhibitors or ARBs	27 (17.2)	78 (16.5)	.837
Symptoms			
Fever	36 (22.9)	204 (43.1)	<.001
Arthromyalgia	1 (0.6)	3 (0.6)	.999
Headache	0 (0.0)	3 (0.6)	.999
Symptoms of upper respiratory tract	3 (1.9)	9 (1.9)	.999
Dyspnea	24 (15.3)	308 (65.1)	<.001
Epileptic seizures	3 (1.9)	4 (0.8)	.374
Chest pain	2 (1.3)	2 (0.4)	.260
Abdominal pain	2 (1.3)	5 (1.1)	.999
Cough	25 (15.9)	76 (16.1)	.966
Vomiting	5 (3.2)	13 (2.7)	.784
Diarrhea	7 (4.5)	11 (2.3)	.172
Anosmia	0 (0.0)	2 (0.4)	.999
Treatment regimens			
Antibiotic	39 (24.8)	315 (66.6)	<.001
Fluidotherapy	8 (5.1)	289 (61.1)	<.001
Hydroxychloroquine	7 (4.5)	74 (15.6)	<.001
Enoxaparin	118 (75.2)	384 (81.2)	.104
Inhalers	39 (24.8)	427 (90.3)	<.001
Location of attention			
Nursing home	88 (56.1)	253 (53.5)	.577
Hospital	69 (43.9)	220 (46.5)	
Mortality at 30 d	36 (22.9)	246 (52.0)	<.001

ACE, angiotensin-converting enzyme; ARB, angiotensin receptor blocker; COPD, chronic obstructive pulmonary disease; COVID-19, Coronavirus Disease 2019.
Results are expressed as n (%) or median (Q1-Q3).

*Severe case if any of the following were present: temperature >38°, systolic blood pressure <100 mm Hg, heart rate >100 beats per minute, basal saturation less than 90%, respiratory rate >30 per minute, altered level of consciousness.