

## ORIGINAL ARTICLE

## Factors associated with revisits by patients with SARS-CoV-2 infection discharged from a hospital emergency department

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**Objective.** To analyze emergency department (ED) revisits from patients discharged with possible coronavirus disease 2019 (COVID-19).

**Methods.** Retrospective observational study of consecutive patients who came to the ED over a period of 2 months and were diagnosed with possible COVID-19. We analyzed clinical and epidemiologic variables, treatments given in the ED, discharge destination, need to revisit, and reasons for revisits. Patients who did or did not revisit were compared, and factors associated with revisits were explored.

**Results.** The 2378 patients included had a mean age of 57 years; 49% were women. Of the 925 patients (39%) discharged, 170 (20.5%) revisited the ED, mainly for persistence or progression of symptoms. Sixty-six (38.8%) were hospitalized. Odds ratios (ORs) for the following factors showed an association with revisits: history of rheumatologic disease (OR, 2.97; 95% CI, 1.10–7.99;  $P = .03$ ), digestive symptoms (OR, 1.73; 95% CI, 1.14–2.63;  $P = .01$ ), respiratory rate over 20 breaths per minute (OR, 1.03; 95% CI, 1.0–1.06;  $P = .05$ ), and corticosteroid therapy given in the ED (OR, 7.78; 95% CI, 1.77–14.21,  $P = .01$ ). Factors associated with hospitalization after revisits were age over 48 years (OR, 2.57; 95% CI, 1.42–4.67;  $P = .002$ ) and fever (OR, 4.73; 95% CI, 1.99–11.27;  $P = .001$ ).

**Conclusions.** Patients under the age of 48 years without comorbidity and with normal vitals can be discharged from the ED without fear of complications. A history of rheumatologic disease, fever, digestive symptoms, and a respiratory rate over 20 breaths per minute, or a need for corticosteroid therapy were independently associated with revisits. Fever and age over 48 years were associated with a need for hospitalization.

**Keywords:** COVID-19. SARS-CoV-2. Emergency health services. Revisits.

### *Factores asociados a revisita en pacientes con diagnóstico de infección por SARS-CoV-2 dados de alta de un servicio de urgencias hospitalario*

**Objetivo.** Analizar las visitas y los factores asociados a la misma en pacientes con diagnóstico de posible COVID-19 dados de alta de un servicio de urgencias hospitalario (SUH).

**Método.** Estudio observacional, retrospectivo que incluyó pacientes consecutivos que consultaron al SUH en un periodo de 2 meses y fueron diagnosticados de posible de COVID-19. Se analizaron variables clínico-epidemiológicas, tratamiento administrado en urgencias, destino final, revisita al SUH y motivo de esta. Se hizo un análisis comparativo entre ambos grupos (revisita sí/no) y se identificaron factores asociados a la revisita.

**Resultados.** Se incluyeron 2.378 pacientes (edad media 57 años; 49% mujeres). De los pacientes dados de alta (39% del total;  $n = 925$ ), 170 (20,5%) reconsultaron al SUH, principalmente por persistencia o progresión de síntomas, y 66 (38,8%) precisaron ingreso. Los factores relacionados con la revisita fueron: antecedentes de enfermedad reumatológica [OR: 2,97 (IC 95%: 1,10-7,99,  $p = 0,03$ )], síntomas digestivos [OR: 1,73 (IC 95%: 1,14-2,63,  $p = 0,01$ )], frecuencia respiratoria  $\geq 20$  [OR: 1,03 (IC 95%: 1,0-1,06,  $p = 0,05$ )] y haber recibido tratamiento con esteroides en urgencias [OR: 7,78 (IC 95%: 1,77-14,21,  $p = 0,01$ )]. Los factores asociados al ingreso en la revisita fueron la edad  $\geq 48$  años [OR: 2,57 (IC 95%: 1,42-4,67,  $p = 0,002$ )] y presentar fiebre [OR: 4,73 (IC 95%: 1,99-11,27,  $p = 0,001$ )].

**Conclusión.** Los pacientes con posible COVID-19 menores de 48 años, sin comorbilidad y con signos vitales normales podrían ser dados de alta desde urgencias sin temor a sufrir complicaciones. Los antecedentes de enfermedad reumatológica, fiebre, síntomas digestivos, frecuencia respiratoria  $\geq 20$ /min o necesidad de tratamiento con esteroides fueron factores independientes de revisita, y la fiebre y edad  $\geq 48$  años de necesidad de ingreso.

**Palabras clave:** COVID-19. Infección SARS-CoV-2. Urgencias. Revisita.

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## Introduction

On December 31, 2019, the health authorities in Wuhan, China, reported a cluster of cases of pneumonia of unknown origin<sup>1</sup>. The genetic sequence of the responsible pathogen, a new coronavirus that the World Health Organization (WHO) labeled a type 2 coronavirus causing severe acute respiratory syndrome (SARS-CoV-2), would soon be known and the disease it produced was called COVID-19<sup>2</sup>. This presents a very varied clinical spectrum, ranging from mild cases that run like a common cold, to severe forms that can cause severe respiratory distress and multi-organ failure<sup>3</sup>.

In just a few weeks, SARS-CoV-2 had spread to more than 188 countries and infected more than 7.7 million people, causing hundreds of thousands of deaths and overburdening health systems to unthinkable extents<sup>4</sup>. In Spain, up until 11 June, 243,209 cases had been reported, of which 51.2% required hospitalization and 4.8% admission to an intensive care unit (ICU)<sup>5</sup>. Since the beginning of the pandemic, health services have been forced to adapt their daily activities to cope with the growing number of patients requiring care<sup>6,7</sup>. In this scenario, hospital emergency departments (EDs) were instrumental in managing the crisis, identifying cases and channeling the large volume of patients arriving at hospital centers each day<sup>8</sup>. They performed triage, clinical assessment and initial treatment of the patient, agreed on the therapeutic intensity to be applied in the case of clinical deterioration and, based on all this data, decided on the most appropriate care mechanism for the patient's medical care. Although these are all actions that are usually carried out in the ED, they take on greater importance in an exceptional situation such as the one experienced.

A large number of studies have been published so far describing different aspects of COVID-19, many of them focused on identifying the factors related to the risk of suffering a severe disease<sup>9,10</sup>. However, more than 80% of patients develop mild forms that do not require hospitalization<sup>11</sup>. For many of these patients, the symptoms resolve in a matter of days, but in some cases they are exacerbated, more or less rapidly, leading to a referral to the emergency department and sometimes to hospital admission. It is essential to identify the factors associated with this clinical progression in order to establish in which patients an outpatient follow-up can be considered and in which ones closer surveillance is necessary due to the risk of clinical deterioration<sup>12</sup>.

The aim of this study is to determine the need for revisits, with or without subsequent hospital admission, of patients treated for possible COVID-19 discharged from the emergency department and, secondarily, to identify the factors associated with such revisits.

## Method

### *Scope of the study and patients*

The present study was carried out in the Emergency Area of the Hospital Clínic de Barcelona (HCB), a third

level university hospital and reference center for adult care of the Esquerra Comprehensive Healthcare Area, which provides healthcare coverage to a population of 523,725 people (2020 data)<sup>13</sup>. The hospital has 552 conventional hospitalization beds and 92 beds in ICU or semi-critical units. During the pandemic, the number of conventional hospitalization beds was 443, due to the fact that all rooms were converted to single rooms. ICU or semi-critical unit beds were increased to 160, an integrated care service (home hospitalization) was available for 250 patients, as well as a medicalized hotel with 150 beds expandable to 300.

Patients were included in the study on the basis that they had visited the ED during a two-month period (from March 1 to April 30, 2020) with a final diagnosis of possible COVID-19. In the case of a positive PCR, it was considered "confirmed COVID-19". In patients with PCR (polymerase chain reaction) not performed or undetectable, but with a clinical picture of acute respiratory infection of sudden onset of any severity and with fever, cough, or feeling of shortness of breath, together with the presence or not of other symptoms such as odynophagia, anosmia, ageusia, muscle aches, diarrhea or headache, it was considered "probable COVID-19". All of them were identified in an electronic database as "possible COVID-19".

### *Design and selection of variables*

An exploratory and non-interventionist analysis was carried out. Retrospectively, the authors performed a review of the electronic medical records of all patients identified in a database as "Possible COVID-19" to confirm their inclusion in the study.

The variables collected were related to several clinical and exploratory aspects: 1) demographic: age, sex, sociofamily situation and Barthel's index; 2) pathological background: cardiovascular risk factors, cardiovascular and respiratory history, chronic renal disease (glomerular filtration rate < 30 ml/min/1.73 m<sup>2</sup>), venous thromboembolic disease, chronic liver disease, rheumatological disease, dementia, neoplasm (solid or hematological), immunosuppression, and abbreviated Charlson index<sup>14</sup>; 3) current symptoms: fever, cough, odynophagia, dyspnea, chest pain, hemoptysis, syncope, lower extremity pain/growth, gastrointestinal, neurological; 4) physical examination: vital signs, respiratory auscultation, neurological examination; 5) laboratory parameters complete blood count, biochemistry, and coagulation tests; 6) radiological findings; 6) PCR for SARS-CoV-2 detection; 7) treatment administered in the emergency department: antivirals, antimicrobials, interleukin inhibitors, heparin, corticosteroids; 8) oxygen support required in the emergency department; 9) other support treatments; and 10) final destination.

Variables related to follow up included the need to revisit the emergency department, date of revisit, reason for revisit (persistence or progression of symptoms, related or not to COVID-19), and final destination on revisit. The follow-up period ended on May 30, 2020.

## Statistical analysis

The analysis of the results was done with the statistical program SPSS (version 20.0; SPSS, Inc., Chicago, USA). The variable 'Revisit' was considered a dependent variable. In order to make the analysis univariate and multivariate, the dependent variable was dichotomized into two categories: 'No-revisit' and 'Revisit' (which included revisit and discharge and revisit and admission). The continuous variables were presented in the form of mean and standard deviation (SD) or median (according to their homogeneity) and the categorical variables in the form of percentages. To make the comparative analysis between groups of patients, the Chi-square test was used to compare categorical variables and the Student's T for the continuous variables. For the variables that did not meet the criteria of normality, non-parametric tests were applied. A multivariate analysis by means of logistic regression was performed to analyze the independent variables related to 'Revisit', including the factors with a value of  $p < 0.1$  in the univariate analysis. For significant variables with a proportion of 10% or more of missing values, the command for imputation of missing values was implemented, using the mode if it was a categorical variable, or the median if it was a continuous variable. Finally, a stratified analysis was performed to compare the value of the odds ratio in the three categories of the variable 'Revisit' (n-revisit, revisit-discharge, and revisit-admission). Values of  $p < 0.05$  were considered significant.

## Ethical aspects

The study was accepted by the Research Ethics Committee of the Hospital Clínic de Barcelona (code no. 2020/0645) and has been carried out following at all times the general recommendations and, specifically, with regard to the confidentiality of the data collected in the Declaration of Helsinki on Biomedical Research.

## Results

### Description of the series

During the study period, 2,541 patients with suspected SARS-CoV-2 infection were identified. In 163, no clinical data were available, so the medical records of 2,378 patients who were included in this study were finally reviewed.

Table 1 describes the clinical-epidemiological characteristics of the patients. The mean age was 57, and men predominated slightly (51%). In general, these were independent patients with little comorbidity, with high blood pressure (33%) and diabetes mellitus (21%) being the most frequent comorbidities.

Regarding the form of presentation of the disease, fever (78%), cough (69%) and dyspnea (46%) were the most frequent clinical manifestations, followed by digestive symptoms (29%). On physical examination,

respiratory auscultation was abnormal in more than half of the cases (56%).

Most patients were requested for some complementary exploration: the most frequent was the chest radiography (94%) and secondly the basic general analysis (84%). The results of these explorations are described in Table 1. PCR was performed for detection of SARS-CoV-2 in 1,023 patients (43%) testing positive in 745. There were no significant differences in the basal characteristics or clinical picture between the groups of patients who were tested and those who were not. The most frequently prescribed antiviral treatment in the ED was azithromycin in 1,150 patients (52%), followed by hydroxychloroquine in 1,062 (47%) and lopinavir/ritonavir in 931 (40%).

After evaluation in the emergency department, 925 patients (39%) were discharged and the rest needed hospitalization, 911 (39%) in conventional ward and 75 (3%) in ICU/intermediate. Total mortality in the series was 202 patients (8%), 39 (2%) of whom died in the emergency department.

### Characteristics of the revisit and associated factors

Of the 925 patients discharged from the ED, 97 (10.5%) were lost to follow-up. Of the remaining patients analyzed ( $n = 828$ ), 170 re-visited the ED (20.5%) and, of these, 104 (61.2%) were discharged and 66 (38.8%) required admission. Most of the patients who consulted did so for persistence or progression of symptoms and this percentage was higher in patients requiring admission after consultation (74% versus 54%,  $p = 0.005$ ). Three patients died during admission: two of them were elderly patients with advanced comorbidities and the third died in the socio-health center where he was referred after discharge.

Table 2 shows the clinical-epidemiological characteristics of the patients who visited the emergency department again. The univariate analysis shows that the variables significantly associated with the revisit were age (mean 48 vs 45 years,  $p = 0.02$ ), history of rheumatological disease (5% vs 2%,  $p = 0.02$ ) or dementia (3% vs 1%,  $p = 0.02$ ), Charlson's index abbreviated  $\geq 1$  points (17% vs 12%,  $p = 0.04$ ), Barthel's index  $\leq 90$  points (4% vs 2%,  $p = 0.01$ ), presence of fever (75% vs 68%,  $p = 0.03$ ), pain or edema in the lower extremities (4% vs 2%,  $p = 0.04$ ), digestive symptoms (32% vs 21%,  $p = 0.03$ ), presence of radiological interstitial infiltration (19% vs 14%,  $p = 0.04$ ), lower lymphocyte count ( $p = 0.01$ ), lower glomerular filtrate ( $p = 0.03$ ), positive SARS-CoV-2 PCR result (11% vs 8%,  $p = 0.01$ ) or having received steroid treatment in the emergency department (4% vs 1%,  $p = 0.003$ ). After multivariate analysis (Table 3), the factors independently related to the need for revisiting were having a history of rheumatological disease [OR: 2.97 (95% CI: 1.107.99,  $p = 0.03$ )], presenting digestive symptoms [(OR: 1.73 (95% CI: 1,142.63,  $p = 0.01$ )], a respiratory rate equal to or greater than 20/min [OR: 1.03 (95% CI: 1.01.06,

**Table 1.** Clinical-epidemiological characteristics of patients admitted to the ED with confirmed or suspected diagnosis of COVID-19

	Valid n (%)	Lost n (%)	Total n (% valid)
<b>Sex</b>	2,378 (100)	0	
Female			1,166 (49)
Male			1,212 (51)
<b>Age in years [mean (SD)]</b>	2,378 (100)	0	57 (DE: 19)
<b>Social and family situation</b>	2,315 (97)	53 (3)	
Living alone			207 (9)
Living with family or caretaker			1,197 (52)
Living in residence or SHC			200 (9)
<b>Origin</b>	2,268 (95)	110 (5)	
Home address			1,282 (57)
PCC			534 (24)
PCEC			200 (9)
Residence/SHC			187 (8)
<b>Triage level</b>	2,341 (98)	37 (2)	
Level 1			7 (0,3)
Level 2			214 (9)
Level 3			1,697 (73)
Level 4/5			390 (17)/32 (1)
<b>Comorbidities</b>			
Arterial hypertension	2,319 (98)	59 (2)	753 (33)
Dyslipemia	2,315 (97)	63 (3)	483 (21)
Diabetes mellitus	2,304 (97)	74 (3)	306 (13)
Smoking	2,192 (92)	186 (8)	256 (12)
Neoplasia	2,306 (97)	79 (3)	
Solid			199 (9)
Hematology			41 (2)
Dementia	2,300 (97)	78 (3)	166 (7)
Obesity	2,070 (87)	308 (13)	142 (7)
COPD	2,297 (97)	81 (3)	142 (6)
Chronic renal failure	2,299 (97)	79 (3)	140 (6)
Bronchial asthma	2,297 (97)	81 (3)	135 (6)
Immunosuppression	2,304 (97)	74 (3)	127 (6)
Ischemic cardiopathy	2,296 (97)	82 (3)	116 (5)
Cerebrovascular disease	2,301 (97)	77 (3)	108 (5)
Heart failure	2,301 (97)	77 (3)	104 (5)
Rheumatological disease	2,305 (97)	73 (3)	79 (3)
<b>Charlson's abbreviated index</b>	2,278 (96)	100 (4)	
0 points			1,521 (67)
1 point			457 (20)
2-5 points			300 (13)
<b>Barthel Scale</b>	2,262 (95)	116 (5)	
< 20 points (dep, total)			57 (3)
20-60 points (dep, grave)			102 (5)
61-90 points (dep, moderate)			85 (4)
91-100 points (dep, mild, indep)			2,018 (89)
<b>Clinical manifestations</b>			
Fever	2,359 (99)	19 (1)	1,828 (78)
Cough	2,338 (98)	40 (2)	1,612 (69)
Dyspnea	2,283 (96)	95 (4)	1,046 (46)
Diarrhoea	2,231 (94)	147 (6)	451 (20)
Chest pain	2,203 (93)	175 (7)	262 (12)
Headache	2,199 (92)	179 (8)	259 (12)
Anosmia	2,087 (89)	291 (9)	215 (10)
Dysgeusia	2,083 (88)	295 (13)	217 (10)
Expectancy	2,270 (95)	108 (5)	210 (9)
Nausea/Vomiting	2,202 (93)	176 (7)	190 (9)
Odinophagy	2,205 (93)	173 (7)	186 (8)
Confusion	2,184 (92)	194 (8)	116 (5)
Abdominal pain	2,185 (92)	193 (8)	91 (4)
Altered level of consciousness	2,178 (92)	200 (8)	66 (3)
<b>Vital signs [mean (SD)]</b>			
Axillary temperature in (°C)	2,182 (92)	196 (8)	36 (0,9)
Systolic blood pressure (mmHg)	2,068 (87)	310 (13)	130 (42)
Diastolic blood pressure (mmHg)	2,064 (87)	314 (13)	77 (17)
Heart rate (bpm)	1,835 (77)	543 (23)	88 (17)
Breathing rate (brpm)	1,791 (75)	587 (25)	20 (7)
O <sub>2</sub> saturation (%)	2,203 (93)	175 (7)	96 (5)

(Continues)

	Valid n (%)	Lost n (%)	Total n (% valid)
<b>Physical examination</b>			
Respiratory auscultation	2,309 (97)	69 (3)	
Normal			1,129 (49)
Crackles			1054 (46)
Roncus			136 (6)
Sibilants			89 (4)
Neurological exploration	2,158 (91)	220 (9)	
GCS 14 points or less			61 (3)
<b>Chest X-ray</b>	2,363 (99)	15 (1)	
Not performed			133 (6)
Normal			750 (32)
Interstitial infiltration			1,196 (51)
Alveolar infiltration			225 (10)
<b>Other imaging tests</b>	2,271 (96)	107 (4)	
Pulmonary CT			91 (4)
<b>Analytical [mean (SD)]</b>			
Leukocytes/mm <sup>3</sup>	1,954 (82)	424 (18)	7,364 (12,239)
Lymphocytes/mm <sup>3</sup>	1,951 (82)	427 (18)	1,250 (1,594)
Hemoglobin (g/L)	1,848 (78)	530 (22)	129 (33)
Platelets/mm <sup>3</sup> (x 10 <sup>3</sup> )	2,008 (84)	370 (16)	213 (89)
C-reactive protein (mg/dL)	1,971 (83)	407 (17)	10,34 (9,7)
Glomerular filtration (mL/min)	2,006 (84)	372 (16)	77 (21)
AST (U/L)	1,891 (80)	487 (20)	44 (77)
ALT (U/L)	1,923 (81)	455 (19)	40 (71)
GGT (U/L)	1,917 (81)	461 (19)	65 (123)
Alkaline phosphatase (U/L)	1,900 (80)	478 (20)	86 (64)
Total bilirubin (mg/dL)	1,923 (81)	455 (19)	0,6 (1,5)
LDH (U/L)	1,811 (76)	567 (24)	386 (427)
<b>Nasopharyngeal smear</b>	2,363 (99)	15 (1)	
Not done			1,340 (57)
Positive			745 (31)
Negative			278 (12)
<b>Treatment in the ED</b>			
Oxygen therapy	2,291 (96)	87 (4)	
No oxygen therapy			1,550 (68)
Lenses 2 liters per minute			354 (16)
Ventimask (24-60%)			340 (15)
High flow lenses			19 (1)
NIV			13 (1)
IT+MV			15 (1)
Heparin (any dose)	2,280 (96)	98 (4)	553 (24)
Empirical Antibiotic Therapy	2,031 (85)	347 (15)	634 (31)
Steroids	2,271 (96)	101 (4)	167 (7)
Anti-interleukins	2,230 (94)	148 (6)	47 (2)
Antivirals	2,281 (96)	97 (4)	
Hydroxychloroquine			1,062 (47)
Azithromycin			1,150 (52)
Ritonavir/lopinavir			931 (40)
Remdesivir			8 (< 1)
<b>Destination from the ED</b>	2,362 (99)	16 (1)	
Discharge from the emergency department			925 (39)
Deaths in the emergency department			39 (2)
ICU-Intermediate Admission			75 (3)
Admission to conventional ward			911 (39)
Hospitalization at home			38 (1)
Health Hotel Admission			98 (4)
Admission to another hospital			276 (12)

SHC: social health center; PCC: primary care center; PCEC: primary care emergency center; dep: dependency; indep: independent; COPD: chronic obstructive pulmonary disease; HIV: human immunodeficiency virus; GCS: Glasgow come scale; CT: computed tomography; AST: aspartate aminotransferase; ALT: alanine aminotransferase; GGT: gamma glutamyl transpeptidase; LDH: lactate dehydrogenase; ICU: intensive care unit; NIV: non-invasive ventilation mechanics; IT+MV: intubation and mechanical ventilation SD: standard deviation; brpm: breaths per minute; bpm: beats per minute.

**Table 2.** Univariate analysis of the revisit variable of patients discharged from the emergency department

	No revisit N = 658 n (%)	Revisit N = 170 n (%)	p
<b>Sex</b>			0.2
Female	355 (54)	98 (58)	
Male	303 (46)	72 (42)	
<b>Age in years [mean (SD)]</b>	45 (15)	48 (15)	<b>0.02</b>
<b>Social and family situation</b>			0.4
Living alone	53 (8)	9 (6)	
Living with family or caretaker	298 (47)	80 (51)	
Living in residence or SHC	9 (1)	4 (3)	
<b>Origin</b>			0.8
Home address	458 (71)	111 (67)	
PCC/PCEC	171 (26)	51 (30)	
Residence/SHC	7 (1)	3 (2)	
<b>Triage level</b>			0.2
Level 2	15 (2)	6 (4)	
Level 3	393 (62)	111 (67)	
Level 4/5	224 (35)	49 (29)	
<b>Comorbidities</b>			
Arterial hypertension	88 (13)	27 (16)	0.4
Dyslipemia	63 (10)	18 (11)	0.4
Diabetes mellitus	31 (5)	10 (6)	0.3
Smoking	95 (15)	18 (11)	0.1
Neoplasia	29 (5)	6 (4)	0.3
Dementia	4 (1)	5 (3)	<b>0.02</b>
Obesity	21 (3)	6 (4)	0.5
COPD	17 (3)	8 (5)	0.1
Chronic renal failure	9 (1)	4 (2)	0.3
Bronchial asthma	44 (7)	17 (10)	0.1
Immunosuppression	17 (3)	6 (4)	0.3
Ischemic cardiopathy	10 (2)	5 (3)	0.2
Cerebrovascular disease	5 (1)	4 (2)	0.1
Heart failure	6 (1)	2 (< 1)	0.5
Rheumatological disease	11 (2)	8 (5)	<b>0.02</b>
<b>Charlson's abbreviated index</b>			0.04
0 points	569 (87)	136 (82)	
1 point	67 (10)	19 (12)	
2-5 points	17 (3)	10 (6)	
<b>Barthel Scale</b>			<b>0.01</b>
< 20 points	2 (0.3)	0	
20-60 points	5 (0.8)	0	
61-90 points	4 (0.6)	5 (3)	
91-100 points	639 (97)	159 (94)	
<b>Clinical manifestations</b>			
Fever	443 (68)	128 (75)	0.03
Cough	424 (65)	119 (70)	0.1
Dyspnea	211 (32)	55 (33)	0.4
Diarrhoea	94 (15)	34 (21)	0.03
Chest pain	98 (15)	29 (18)	0.8
Headache	87 (13)	27 (17)	0.1
Anosmia	63 (10)	13 (8)	0.3
Dysgeusia	56 (9)	11 (7)	0.3
Expectancy	45 (7)	18 (8)	0.4
Nausea/Vomiting	41 (6)	18 (11)	0.03
Odinophagy	91 (14)	25 (15)	0.4
Abdominal pain	18 (3)	8 (5)	0.1
Limb pain/edema	8 (1)	6 (4)	<b>0.04</b>

(Continues)

p = 0.05]] and emergency steroid treatment [OR: 7.78 (95% CI: 1.77-14.21, p = 0.01)].

Figure 1 shows the analysis of the factors associated with the stratified variable revisit (no-revisit, revisit-discharge, and revisit-admission). Having a rheumatologi-

	No revisit N = 658 n (%)	Revisit N = 170 n (%)	p
<b>Vital signs [mean (SD)]</b>			
Axillary temperature (°C)	36.6 (0.8)	36.8 (0.8)	0.1
Systolic blood pressure (mmHg)	130 (17)	130 (19)	0.8
Diastolic blood pressure (mmHg)	79 (11)	78 (12)	0.6
Heart rate (bpm)	87 (15)	89 (19)	0.2
Breathing rate (brpm)	18 (4)	20 (12)	<b>0.08</b>
O <sub>2</sub> saturation (%)	98 (3)	98 (1)	0.6
<b>Physical examination</b>			
Abnormal respiratory distress	111 (18)	37 (22)	0.1
No alteration of consciousness	618 (99)	164 (99)	0.9
<b>Chest X-ray</b>			<b>0.04</b>
Not performed	92 (14)	15 (9)	
Normal	429 (65)	108 (64)	
Interstitial infiltration	95 (14)	33 (19)	
Alveolar infiltration	28 (4)	8 (5)	
<b>Other imaging tests</b>			
Pulmonary CT	10 (2)	1 (< 1)	0.3
<b>Analytical [mean (SD)]</b>			
Leukocytes/mm <sup>3</sup>	7,160 (6,250)	6,488 (3,764)	0.2
Lymphocytes/mm <sup>3</sup>	1,641 (867)	1,416 (725)	<b>0.01</b>
Hemoglobin (g/L)	133 (31)	131 (28)	0.5
Platelets/mm <sup>3</sup> (x 10 <sup>3</sup> )	225 (80)	220 (77)	0.5
C-reactive protein (mg/dL)	2.2 (3.3)	2.4 (3.7)	0.6
Glomerular filtration (mL/min)	85 (11)	82 (15)	<b>0.03</b>
AST (U/L)	30 (34)	30 (24)	0.9
ALT (U/L)	31 (41)	30 (24)	0.6
Alkaline phosphatase (U/L)	78 (30)	89 (60)	0.1
Total bilirubin (mg/dL)	0.6 (0.3)	0.5 (0.3)	0.5
LDH (U/L)	213 (69)	212 (52)	0.8
<b>Nasopharyngeal smear</b>			
Not performed	506 (77)	139 (82)	<b>0.01</b>
Positive	52 (8)	19 (11)	
Negative	97 (15)	11 (7)	
<b>Treatment received in the ED</b>			
Oxygen therapy			
Lenses 2 liters per minute	7 (1)	0	0.2
Heparin (any dose)	8 (1)	5 (3)	0.1
Empirical Antibiotic Therapy	26 (5)	10 (7)	0.2
Steroids	3 (1)	6 (4)	<b>0.003</b>
Antivirals			
Hydroxychloroquine	22 (4)	7 (4)	0.4
Azithromycin	96 (15)	28 (17)	0.3
Ritonavir/lopinavir	10 (2)	6 (4)	0.1

SHC: social health center; PCC: primary care center; PCEC: primary care emergency center; COPD: chronic obstructive pulmonary disease; HIV: human immunodeficiency virus; CT: computed tomography; AST: aspartate aminotransferase; ALT: alanine aminotransferase; GGT: gamma glutamyl transpeptidase; LDH: lactate dehydrogenase; ICU: intensive care unit; NIV: non-invasive mechanical ventilation; IT+MV: intubation and mechanical ventilation; SD: standard deviation.

cal disease [OR: 4.52 (95% CI: 1.52-13.47, p = 0.01)], presenting digestive symptoms [OR: 2.08 (95% CI: 1.27-3.39, p = 0.004)] and having required steroid treatment in the emergency department [OR: 7.31 (95% CI: 1.49-35.73, p = 0.01)] were significantly associated with revisits with discharge, while age equal to or greater than 48 years [OR: 2.57 (95% CI: 1.42-4.67, p = 0.002)] and fever as a manifestation of the disease [OR: 4.73 (95% CI: 1.99-11.27, p = 0.001)] were significantly associated with revisits with admission.

**Table 3.** Multivariate analysis of the variable revisit of patients discharged from the emergency department

	No revisit N = 658 n (%)	Revisit N = 170 n (%)	p	Adjusted model		
				OR	95% CI	p
Age in years [mean (SD)]	45 (15)	48 (15)	0.02	1.0	0.99-1.02	0.5
<b>Comorbidities</b>						
Rheumatological disease	11 (2)	8 (5)	0.02	2.97	1.10-7.99	0.03
Dementia	4 (1)	5 (3)	0.02	2.50	0.55-11.49	0.2
<b>Charlson's abbreviated index</b>						
Equal or greater 1 point	84 (13)	29 (17)	0.04	1.16	0.67-2.01	0.6
<b>Barthel Scale</b>			0.01	1.60	0.79-3.27	0.2
< 20 points (total dependence)	2 (0.3)	0				
60-90 points	9 (1)	5 (3)				
91-100 points	639 (98)	159 (96)				
<b>Clinical manifestations</b>						
Fever	443 (68)	128 (75)	0.03	1.41	0.91-2.17	0.1
Limb pain/edema	8 (1)	6 (4)	0.04	1.94	0.59-6.39	0.3
Digestive symptoms (nausea, vomiting and/or diarrhea)	114 (17)	45 (27)	0.006	1.73	1.14-2.63	0.01
<b>Vital signs [mean (SD)]</b>						
Breathing rate (brpm)	18 (4)	20 (12)	0.08	1.03	1.0-1.06	0.05
<b>Chest X-ray</b>						
Lung parenchymal alteration	137 (24.2)	48 (30.3)	0.04	1.16	0.80-1.69	0.4
<b>Analytical [mean (SD)]</b>						
Lymphocytes /mm <sup>3</sup>	1,641 (867)	1,416 (725)	0.01	0.99	0.99-1.01	0.1
Glomerular filtration mL/min	85 (11)	82 (15)	0.03	0.99	0.97-1.01	0.4
<b>Nasopharyngeal smear</b>						
Positive	52 (8)	19 (11)	0.01	1.38	0.77-2.46	0.3
<b>Treatment received in the ED</b>						
Steroids	3 (1)	6 (4)	0.003	7.78	1.77-14.21	0.01

SD: standard deviation; brpm: breaths per minute; OR: odds ratio; 95% CI: 95% confidence interval.

## Discussion

COVID-19 caused by SARS-CoV-2 has evolved into a pandemic since the first cases were detected in December 2019. The ED is a key pillar in a health crisis of this scale<sup>8,15</sup> and the detection of those patients who can be safely discharged is a central aspect of emergency management. The present study shows that 39% of patients treated for possible COVID-19 were discharged directly from the emergency department. Of these, one in five made a new consultation, mainly for persistence of symptoms, although most were discharged again without requiring admission.

First of all, it is interesting to discuss some general aspects of the series presented here. Due to the scarce evidence available, the lack of diagnostic means and effective therapeutic tools, as well as the successive changes in the action protocols, most patients were diagnosed with SARS-CoV-2 disease based on clinical criteria (possible COVID-19). According to the results of our study there were no statistically significant differences between patients who were tested for the disease and those who were not. Despite the limitation of this fact, we think that it is convenient to communicate the healthcare experience in the ED in order to help manage better the future of this pandemic.

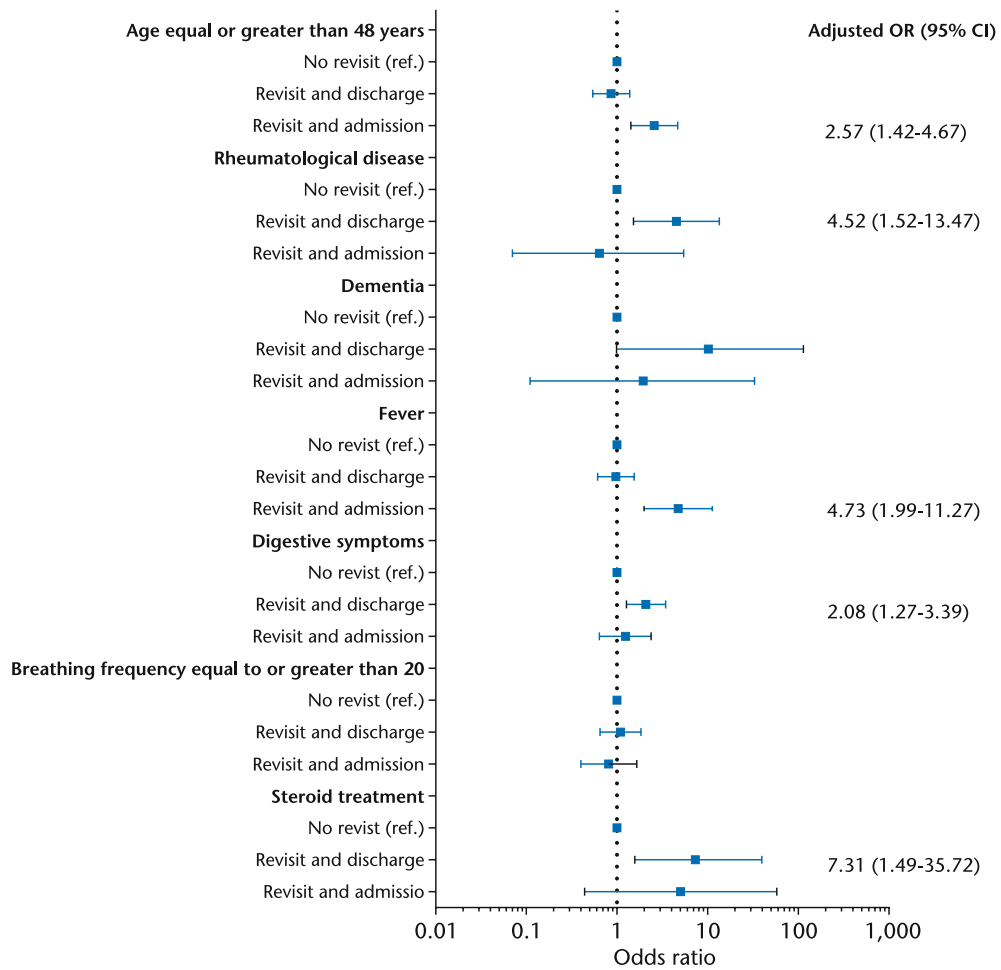
According to the results exposed in the multivariable analysis, the antecedent of rheumatological disease, the presence of digestive symptoms, a respiratory frequency  $\geq 20$  and the use of steroids were identified as independent factors of revisit, although none of them were related

to the need of admission in the revisit. Given the scarce scientific evidence, we only have hypotheses to try to justify these findings. The presence of digestive symptoms in patients with mild forms of COVID-19 have been associated with a longer time to eliminate the virus and a longer clinical route which could justify the greater number of revisits after discharge from the emergency department<sup>16</sup>. The respiratory rate or the use of steroids, used in our series as a treatment for bronchospasm, may indicate the presence of more severe respiratory symptoms and, consequently, a greater probability of revisits. Finally, rheumatological disease, despite only having been described in 19 patients in the series, could be associated with the use of immunosuppressive treatment or condition greater functional limitation, which could also justify greater risk of clinical deterioration and revisits.

Only age greater than or equal to 48 years and the presence of fever were related to the need for admission to the revisit. Fever was the most frequent symptom in patients hospitalized with COVID-19 and its persistence beyond the first week may indicate progression of the disease to severe forms. However, in patients with mild COVID-19, the prevalence of fever is lower (between 11.6% and 45.4%) according to data from several observational studies<sup>17,18</sup>.

In our series, the presence of fever as a manifestation of the disease would allow us to identify a subgroup of patients with a higher risk of complications or torpid evolution.

In previous studies, other factors related to the progression to severe forms of COVID-19, such as the male



**Figure 1.** Graphic representation of the odds ratio (OR) calculated by multivariate analysis of the variable revisit stratified into categories of patients discharged from the emergency department. Numerical OR values are shown in the statistically significant cases.

sex, the presence of comorbidities such as high blood pressure, diabetes mellitus or ischemic heart disease, the finding of pneumonia in the X-ray or certain analytical alterations such as lymphopenia, elevated levels of PCR, LDH or D-dimer among others, have not shown any relationship with the need for revisiting in our series<sup>19,20</sup>. It is possible that this fact can be explained, in part, because the patients who came to our ED were slightly younger than those described for the whole of Spain<sup>21</sup>, with a slight predominance of males, with little comorbidity and degree of dependence. And, also, because of the adoption of a more conservative protocol of action, where patients with mild disease but with some risk factor were admitted, while in other patients, admission was carried out to guarantee isolation measures. This aspect is shown by the fact that 61% of the patients in our series were admitted to the different hospitalization devices available, a figure higher than that reported for Spain as a whole, where hospital admission is between 38.4% and 51.2% depending on the series<sup>5,21</sup>, and in other European Union countries and the United Kingdom, where 30% of confirmed cases required admission<sup>22</sup>. This caution is also evident in

the high percentage of patients who, although having mild symptoms, underwent some complementary examination in the emergency department. Considering that the management of patients with COVID-19 during the pandemic has not been uniform, the strategy followed in our center has been shown to be safe, since only 8% of patients discharged on the first visit required hospital admission during follow-up and, of these, only 3 patients died, indicating a mortality of 0.4% among patients discharged from the ED.

There are several limitations to our study. The main one is that it is a retrospective study and this fact may have influenced the low prevalence of some clinical characteristics, such as obesity or smoking, described as risk factors for serious disease<sup>3,23</sup> or the lack of recording of respiratory frequency in one out of every four patients, a data of interest in a pathology with fundamentally respiratory manifestations. The same is true for some clinical manifestations, such as anosmia and dysgeusia, which may constitute the first symptom and have been shown to be good predictors of the disease<sup>24</sup>, but whose relevance was unknown at the beginning and was not specifically asked in the anamnesis. Neither was the time

of evolution of the symptoms systematically collected, which is of interest when defining the phase of the disease in which the patient is and assessing the probability of presenting clinical deterioration. The lack of a systematized protocol for data collection has led to the existence of missing values in some variables. On the other hand, the study has been carried out in a single center, so the results may not be extrapolated to other scenarios. Finally, the lack of PCR tests for SARS-CoV-2 and the presence of false negatives meant that in a high percentage of patients (68.6%) the diagnosis of COVID-19 was made on the basis of clinical criteria. This was especially important in patients discharged from the emergency department. However, 73% of the PCRs performed in the series were positive, a figure similar to the sensitivity of the technique, which, together with the high incidence of the disease during the study period and the absence of significant differences between patients discharged with PCR performed or not, leads us to believe that most were correctly diagnosed.

Despite these limitations, this paper describes a wide range of patients treated in an ED of a third level hospital and therefore covers the whole spectrum of disease severity. On the other hand, we have not found in the literature any study that, to date, analyzes the factors associated with the need for revisiting in patients discharged from the ED. As conclusions of the study we can say that in a situation of pandemic and overload of the health system, patients under 48 years old without comorbidities and with vital signs within normality can be discharged from the emergency department without fear of presenting serious complications. The risk of re-consultation is greater if the patient has a history of rheumatologic disease, presents digestive symptoms, respiratory rate  $\geq 20$  breaths/minute, or requires steroid treatment at the first visit to the emergency department. This subgroup of patients may benefit from closer follow-up. The presence of fever should be considered as a warning symptom since, in this case, the probability of requiring a hospital admission is higher after the reconsultation.

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