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Characteristics of a Cohort of Ambulatory Patients with SARS-CoV-2 Infection: Based on Hospital Records

Características de una cohorte de pacientes ambulatorios con infección por SARS-CoV-2: basado en un registro hospitalario

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ABSTRACT

Introduction: 80% of patients with SARS-CoV-2 who exhibit mild and moderate disease manifestations receive ambulatory treatment. This study describes the characteristics of a cohort of patients with SARS-CoV-2 infection treated in an ambulatory setting, contributing evidence that improves decision-making in clinical and public health settings.

Materials and Methods: We conducted a single-cohort study in patients with SARS-CoV-2 infection who attended a high-complexity hospital in Colombia from March 2020 to May 2021. A descriptive analysis of sociodemographic data, comorbidities, disease presentation, treatments, and radiological exams was performed. A sub-group analysis of healthcare workers, pregnant women, people under age 18 and above age 60, and

patients with readmissions to the institution was also done. **Results:** A total of 3535 patients required treatment outside the hospital during the entire course of the disease. The most frequently reported symptoms were coughing (65.1%), headache (47.3%), odynophagia (45.8%), and fever (35.7%). Time from symptom onset to the first appointment was 5.7 ± 4.4 days for older adults, 3.6 ± 3.6 days for children, 3.2 ± 3.3 days for healthcare workers, and 2.7 ± 1.9 for pregnant women. One hundred and fifty-seven patients (4.4%) were readmitted to the hospital within the subsequent seven days, and two of these patients died. **Conclusions:** Time from symptom onset to the first consultation was longer in older adults than in other groups, suggesting a need for adapting healthcare services to promote opportune consultation in this population.

Keywords
coronavirus infections; ambulatory care; health personnel; pregnant women; patient readmission.

RESUMEN

Introducción: El 80% de los pacientes con SARS-CoV-2 que presentan manifestaciones leves y moderadas de la enfermedad reciben tratamiento ambulatorio. Este estudio describe las características de una cohorte de pacientes con infección por SARS-CoV-2 tratados ambulatoriamente, para aportar evidencia que mejora la toma de decisiones en entornos clínicos y de salud pública. **Materiales y métodos**: Estudio de cohorte única en pacientes con infección por SARS-CoV-2 que acudieron a un hospital de alta complejidad en Colombia, desde marzo de 2020 a mayo de 2021. Se analizaron de manera descriptiva los datos sociodemográficos, las comorbilidades, la presentación de la enfermedad, los tratamientos y los exámenes radiológicos realizados. También se analizaron subgrupos de trabajadores de la salud, mujeres embarazadas, personas menores de 18 años, mayores de 60 años y reingresos a la institución. **Resultados:** Un total de 3535 pacientes requirieron tratamiento fuera del hospital durante todo el curso de la enfermedad. Los síntomas más frecuentes fueron tos (65,1%), dolor de cabeza (47,3%), odinofagia (45,8%) y fiebre (35,7%). El tiempo desde el inicio de los síntomas hasta la primera consulta fue de 5,7 ± 4,4 días para los adultos mayores, 3,6 ± 3,6 días para los niños, 3,2 ± 3,3 días para los trabajadores de la salud y 2,7 ± 1,9 para las mujeres embarazadas. De los pacientes, 157 (4,4%) fueron readmitidos en el hospital dentro de los 7 días siguientes, y 2 de estos pacientes fallecieron. **Conclusiones**: El tiempo desde el inicio de los síntomas hasta la primera consulta fue mayor en los adultos mayores que en otros grupos, lo que sugiere la necesidad de adecuar los servicios de salud para promover la consulta oportuna en esta población.

Palabras clave
infecciones por coronavirus; asistencia ambulatoria; personal de salud; mujeres embarazadas; readmisión del paciente.

Introduction

The disease produced by the SARS CoV-2 infection (COVID-19) has challenged sanitary services worldwide in many aspects, including the high occupancy of hospitals and the need for strengthening outpatient care and tele-assistance (1,2). This illness has a broad clinical spectrum, ranging from asymptomatic to severe manifestations (1). As many as 70% of individuals with the infection are asymptomatic or mildly symptomatic (3-6), and around 80% of patients with mild and moderate manifestations of the disease receive ambulatory care (1,2).

Decisions on whether ambulatory care should be given to individuals infected with COVID-19 are based on the clinical judgment of healthcare workers and on results of research that characterize the course of the disease in different populations worldwide (3). Researchers have stressed the importance of individual features of the patient, such as age, gender, comorbidities, and the clinical presentation of the disease at the initial assessment, to predict its progression (1).

As of this date, there is little information regarding the sociodemographic, clinic, and laboratory characteristics of patients diagnosed with SARS-CoV-2 infection who receive ambulatory care (2,4). Although some experiences have been published from the United States, Mexico, and France populations (2,5,6), there are no prior studies for the Colombian population. This study describes a cohort of patients with SARS-CoV-2 infection who received ambulatory care in Bogotá D.C., Colombia, to contribute with evidence that aids in decision-making with these patients in a clinical and public health context, the country, and the region. In our institution, patients who received care in the emergency room due to acute respiratory symptoms and were discharged with ambulatory treatment benefited from the tele-assistance follow-up program "Respira" (Breathe).

Materials and Methods

In March 2020, our institution, a high-complexity healthcare center in Bogotá D.C., Colombia, created an institutional clinical registry of SARS-CoV-2 patients. Data was collected retrospectively from two primary sources, the electronic medical record, Sistema de Atención Hospitalaria Integral (SAHI®), and from the hospital's reports to the national system of public health surveillance, the Sistema Nacional de Vigilancia en Salud Pública (Sivigila). The registry included information from all patients that received medical attention in the institution since March 6 (when the first case was documented in Colombia), with SARS-CoV-2 infection confirmed by polymerase chain reaction with reverse transcriptase (RT-PCR), performed through nasopharyngeal smear or aspiration. Data was registered and stored in the Research Electronic Data Capture REDCap® system version 9.1.18. The registry and the study were approved by the Committee of Investigations and Institutional Ethics (IRB) of the Faculty of Medicine of Pontificia Universidad Javeriana and Hospital Universitario San Ignacio.

This is an observational, descriptive, single-cohort study conducted from data in the registry from March 6, 2020, to May 31, 2021.

The following variables were included for the analysis: sociodemographic data, comorbidities, the clinical presentation of the disease, established treatment in the emergency room, and radiological exams. An analysis was also performed of the following sub-groups of patients: pregnant women, children, older adults (age 60 or older), healthcare workers, and patients who were readmitted to our hospital. Healthcare workers included doctors, nurses, speech therapists, scrub nurses, physical therapists, dentists, psychologists, bacteriologists, social workers, nutritionists, pharmaceutical chemists, practicing nurses, clinical laboratory and pharmacy staff, orderlies, ambulance drivers, technicians, and technologists.

For patients readmitted to our hospital due to COVID-19, we adopted a definition proposed by the Colombian Ministry of Health: "Patient readmitted within seven days of being discharged after receiving care in an emergency room area for respiratory patients" (6). To determine readmission, a follow-up was performed through the electronic medical record for all patients. Survival of readmitted patients was verified through the public database available for public consultation from the National Civil State Registry (RENEC).

A descriptive analysis was carried out using the Software STATA 16®. Qualitative variables were described with absolute and relative frequency measurements expressed as percentages. Central tendency measurements, average or median, and dispersion measurements were established according to distribution for quantitative variables.

Results

From March 2020 to May 2021, a total of 20,623 patients with suspected SARS-CoV-2 infection were admitted to the emergency room of our hospital. Of these, 6178 (37%) had a positive molecular test, and 3,535 (57.2%) received ambulatory care on their first consultation (Figure 1).

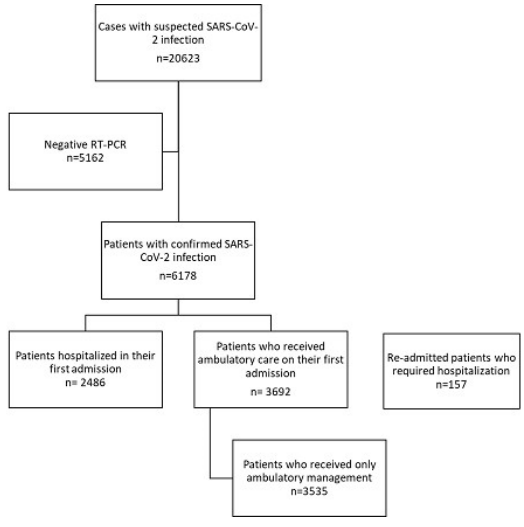

Figure 1.
Flow chart of suspected and confirmed cases of SARS-CoV-2 infection

The mean age of patients in the cohort was 36.6 ± 14.5 years, with a median of 34 (Interquartile range [IQR] 22, 63) and

2,025 (57.3%) were women. The sub-group with the highest representation of subjects were healthcare workers, whose mean age was below the cohort's average. The 27 pregnant women had a mean age of 28.1 years, a range of 17 to 40 years (Table 1).

Table 1.
Demographic variables

	Patients (n; %)	Age in years (Mean, SD)	Female gender (n; %)
Ambulatory patients	**3535**	36.6 ± 14.5 Median 34 IQR (22,63)	2,025 (57.3%)
Sub-group of patients			
Healthcare workers	863 (26.6)	33.3 ± 8.9	627 (72.7)
Older adults	260 (7.4)	68.7 ± 8.3	123 (47.3)
Children	127 (3.6)	9.3 ± 5.6	62 (48.8)
Pregnant women	27 (1.5)	28.1 ± 6.7	27 (100)

SD: standard deviation, IQR: interquartile range.
Source: Own elaboration

Of the 3535 patients in the cohort, 3425 (96.9%) consulted because of symptoms related to COVID-19. The rest were asymptomatic close contacts. A high percentage of the symptomatic patients reported cough (65.1%), headache (47.3%), odynophagia (45.8%), and fever (35.7%). Also, 14.7% of patients experienced dyspnea, reported according to the Modified Medical Research Council (mMRC) scale (Table 2). Forty-five patients consulted with ophthalmological symptoms, and just 26 patients consulted because of dermatological symptoms. Fourteen patients described sleepiness.

Table 2.
COVID-19 symptoms at admission of all ambulatory patients and sub-groups of interest

COVID-19-associated symptom	All ambulatory patients	Healthcare workers	Senior adults	Children	Pregnant women
	n = 3535	n = 863	n = 260	n = 127	n = 27
Asymptomatic	108 (3.1%)	45 (5.2%)	17 (6.5%)	7 (5.5%)	0
Cough	2300 (65.1%)	546 (63.3%)	175 (67.3%)	59 (46.5%)	20 (74.1%)
Headache	1673 (47.3%)	425 (49.3%)	65 (25.0%)	48 (37.8%)	17 (63.0%)
Odynophagia	1619 (45.8%)	440 (51.0%)	69 (26.5%)	32 (25.2%)	10 (37.0%)
Fever	1263 (35.7%)	231 (26.8%)	90 (34.6%)	67 (52.8%)	13 (48.2%)
Weakness	1125 (31.8%)	254 (29.4%)	89 (34.2%)	22 (17.3%)	6 (22.2%)
Myalgia and arthralgia	1118 (31.6%)	273 (31.6%)	68 (26.2%)	10 (7.9%)	6 (22.2%)
Rhinorrhea	954 (27.0%)	237 (27.5%)	45 (17.3%)	47 (37.0%)	10 (37.0%)
Anosmia	879 (24.8%)	177 (20.5%)	32 (12.3%)	11 (8.7%)	7 (25.9%)
Dysgeusia	752 (21.3%)	150 (17.4%)	37 (14.2%)	9 (7.1%)	5 (18.5%)
Dyspnea	519 (14.7%)	97 (11.2%)	73 (28.1%)	4 (3.2%)	4 (14.8%)
Diarrhea	524 (14.8%)	106 (12.3%)	40 (15.4%)	27 (21.3%)	1 (3.7%)
Nausea or vomiting	272 (7.7%)	45 (5.2%)	26 (10.0%)	15 (11.8%)	4 (14.8%)
Abdominal pain	146 (4.1%)	20 (2.3%)	15 (5.8%)	11 (8.7%)	1 (3.7%)

When analyzing only healthcare workers, 45 patients (5.2%) were asymptomatic close contacts. The time from symptom onset to the consultation was 3, 3.2 ± 3.3 days. Five hundred and nineteen patients (14.8%) reported respiratory distress. The level of dyspnea described by the patients according to mMRC: grade 0, 1%; grade 1, 10.3%; grade 2, 34%; grade 3, 10.35%. Also, seven patients reported ophthalmological symptoms (see Table 2).

In the group of elderly adults, 17 (6.5%) were asymptomatic close contacts for COVID-19. Time from symptom onset was 5.7 ± 4.4 days. 73 patients (28.1%) reported dyspnea: grade 0, 4.1%; grade 1, 9.6%; grade 2, 17.8%; grade 4, 19.2% according to the mMrc scale (see Table 2).

In the children group, seven patients were asymptomatic (5.5%). Symptom onset was 3.6 ± 3.6 days. Four patients had dyspnea without classifying the degree of respiratory distress. Four patients reported ophthalmological symptoms.

All pregnant women exhibited COVID-19-related symptoms at the moment of consultation. The time of symptom onset was 2.6 ± 1.8 days (see Table 2).

Comorbidities

One out every four patients receiving ambulatory management had a previous disease history (n = 1018; 28.8%). The most frequent comorbidities were cardiovascular, 300 (29.4%), followed by

endocrinological, 245 (24.1%), and respiratory, 135 (13.2%). Regarding tobacco use, a high percentage of the cohort were non-smokers (87.0%), while active smokers totaled just 5.37%. Forty-eight patients (1.4%) reported a history of psychoactive drugs use (Figure 2).

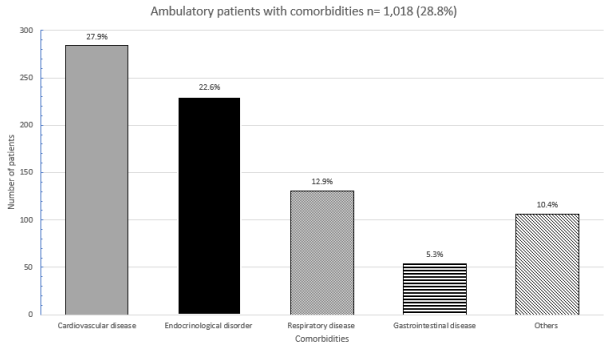

Figure 2.
Comorbidities in ambulatory patients
Note. In cardiovascular disease we studied arterial hypertension, heart failure, myocardial infarction, stroke, vascular disease, and pulmonary embolism. In endocrinological disorder we in included hypothyroidism and type 2 diabetes mellitus. Asthma, obstructive sleep apnea-hypopnea syndrome, chronic obstructive pulmonary disease, and pulmonary hypertension were included in respiratory disease. Gastrointestinal disease included gastroesophageal reflux and liver disease. In other diseases, neoplasm, depression/anxiety, human immunodeficiency virus/acquired immunodeficiency syndrome, connective tissue disease, and chronic kidney disease were studied.

Among healthcare workers, 205 (23.75%) reported comorbidities. In the senior adult group, 182 (70.0%) reported comorbidities. In the children group, 39 (30.7%) reported a previous disease, and eight pregnant women (29.6%) reported a history of some illness.

Readmissions

Of the 3535 patients diagnosed with COVID-19 by RT-PCR test, who initially received ambulatory care, 157 (3.6%) were readmitted within seven days of the first consultation and required hospitalization. The hospitalized patients were 93 females (59.2%), five of them pregnant. These patients returning to the emergency room had an average of 38.9 ± 13.6 years and symptom onset of 4.7 ± 3.6 days before consultation. Of the patients who consulted a second time, 42 were healthcare workers, ten were older than 60, and six were under 18.

The most frequent symptoms reported were cough (65.0%), fever (49.0%), and sore throat (43%), followed by headache (42.0%), myalgia, and arthralgia (31.0%), and dyspnea (20.4%). Concerning the degree of dyspnea in patients who reported this symptom in the first consultation, two patients reported grade 1, five reported grade 2, four reported grade 3, and two reported grade 4.

Of the 157 patients who consulted a second time, 77 (74.8%) did not report any comorbidity. Of those who reported hypothyroidism (7), blood hypertension (6), type-2 diabetes mellitus (3), and dyslipidemia (2) were the most frequent.

Regarding the outcomes, six patients required Intensive Care Unit admission with orotracheal intubation due to acute respiratory distress syndrome. Four required vasopressor support, two of whom died. The two patients who died were 58-year-old males with no comorbidities. Both patients initially consulted due to fever and cough, with an onset of symptoms three and four days before consultation, respectively. Both patients reported dyspnea and fever at readmission. One of the patients had coinfection by Influenza B and primary bacteremia by β-lactamase-producing *Klebsiella pneumoniae*. The other patient developed acute kidney injury, KDIGO 1.

Laboratory tests and diagnostic imaging

Workup of the 3,535 ambulatory patients included laboratory studies in 510 (14.4%) and chest radiography in 526 (14.9%). The X-ray was normal in 303 patients (56.8%), and 67 patients (12.6%) showed the pattern that has been typically associated with COVID-19 infection (i.e., interstitial infiltrates). In patients with a chest x-ray, 198 referred difficulty breathing, 43

described it in the mMRC scale as a grade 3 or 4, 125 required oxygen, and 96 had a previous respiratory condition.

Computed tomography of the chest was performed for 126 patients (3.6%). The radiological pattern reported was typical for COVID-19 (CO-RADS 5) in 84 patients (66.6 %), suspicious (CO-RADS 4) in 14 (11.1%), unclear (CO-RADS 3) in five (3.4%), infection other than COVID-19 (CO-RADS 2) in 19 (15.1%), and normal (CO-RADS 1) in four (3.2%).

Management in the emergency room

Pharmacological management in the emergency room was required for 1763 (49.9%) patients. Of these, 136 (3.9%) required low-flow supplementary oxygen. All patients achieved oxygen independence before hospital discharge. Analgesia was administered with non-opioids in 996 patients (56.5%) and with opioids in 71 (80.3%).

A total of 591 (28.4%) patients were given isotonic solution; 310 (17.5%) antithrombotic; 183 (10.4%) gastric protection; 181 (10.3%) bronchodilators; 93 (5.3%) required antiemetic treatment; 173 (9.8%) anti-hypertensive treatment; 639 (36.2%) antibiotics; and 25 (1.4%) systemic antihistamines.

Discussion

This is the first cohort of ambulatory COVID-19 patients studied in Colombia. The results contribute to the knowledge of populations with SARS-CoV2 infection who are eligible for ambulatory treatment. This cohort presented a low proportion of readmissions that required in-hospital management.

In this cohort analyzed in this study, the median age was 36 years (IQR 23.63), and most patients were female. When comparing males and females in the general cohort or in the interest groups, no differences were identified in the average age. One of the largest outpatient cohorts described is in the COVID-call study, conducted in Paris from March 24-April 6, 2020. This cohort included 1,487 individuals, 700 (47%) male and 752 (51%) female (lost data n = 35), with a median age of 44 (IQR 32.57) (2). Data from the Paris cohort were similar to data gathered from the cohort of 2,785 outpatients described by Mikami and colleagues in the New York metropolitan area, with a median age of 47 (IQR 34.60) years, 48.9% being female (6). The cohort's median age in our study is below the median age of the Paris and New York populations and has a higher female proportion. This result might be explained by the fact that healthcare workers made a third of the consultation with an average age of 33.3 years, and 72.7% were female. The differences may also correlate with the Colombian population pyramid that has a younger population compared to the other two cohorts.

Due to higher exposure to the virus during their work, healthcare practitioners are one of the segments of the population most vulnerable to infection caused by SARS-CoV-2. Their risk is three times higher than that of the general population (HR: 3.4; CI 95%: 3.37 – 3.43) (7). Lethality of the virus in healthcare workers worldwide has been reported at 0.4 to 0.7%, a lower rate than in the general population, probably related to age (8). In Colombia, 62% of doctors are younger than age 50 (9). The average age of healthcare workers with SARS-CoV-2 infection in Bogotá D.C. is 36 ± 10.7 years, and of the 24,643 workers infected since the onset of the pandemic, 18,524 (75.2%) were female (10).

Asymptomatic individuals with COVID-19 were 3.1% of the consultations. Analysis of this group shows that the patients are mainly in close contact with SARS-CoV-2 infection cases. For asymptomatic healthcare workers, a separate study was conducted in our institution to determine the prevalence of antibodies against SARS-CoV-2 in interns, residents, and doctors providing healthcare to COVID-19 patients. The study showed evidence of previous infection by SARS-CoV-2 in asymptomatic healthcare workers at a high rate (>3%) (11).

We found the main symptoms similar to those reported in the Paris cohort, although the proportions vary. Sore throat was more frequent in the Colombian cohort (2). The proportion of symptoms such as anosmia and loss or alteration of taste was similar in the cohort of Paris and the cohort of this study, 24.8% v. 21.2% and 28% v. 20.4%, respectively. Breathing difficulty was more frequent in the Paris cohort, 32% (2) compared with 14.7% in ours. Conspicuously, children had more gastrointestinal symptoms. This finding is consistent with the report by Waterfield in the analysis of 1007 children in the United Kingdom, who reported symptoms such as fever (31%), gastrointestinal symptoms (19%), and headache (18%) (12). In this cohort, pregnant women consulted for headache more frequently than the rest of the cohort.

The number of days from symptom onset to consultation was lowest for healthcare workers and pregnant women, and highest for older adults. Studies have described that, during the pandemic, factors such as mandatory confinement of older adults, distancing from their supporting networks, acceleration of their cognitive decline due to lack of social stimulus during isolation, fear of going to the hospital, changes in the healthcare model from the traditional in-person model to one based on virtual or tele-assistance (13), and a requirement to report symptoms through mobile applications or websites as a requirement to access orientation and emergency care can create barriers and contribute to a less promptly consultation in older adults with COVID-19 symptoms and a detriment of their previous health disorders (13,14).

The most described comorbidity in the New York cohort was arterial hypertension (13.1%), followed by type-2 diabetes mellitus (9%), cancer (5.7%), obesity (4.7%), and asthma (3.5%). Arterial hypertension was also the most frequently reported comorbidity in this study (24.9%). Asthma (9.6%) was the second most frequent comorbidity, followed by type-2 diabetes mellitus.

For diagnostic imaging, 15.0% of patients underwent chest X-Ray (CXR). The majority had a normal report (56.8%), and a small proportion showed the COVID-19 typical pattern (12.6%). This could be explained by the low severity of the clinical presentation of the viral infection (15), consistent with the outpatient status. According to the literature, CXR has a balanced general precision (76%-86%) with 89% sensibility. The specificity, however, is operator-dependent (16). In this cohort, computed tomography of the chest was performed on 126 patients of those 84 of them (66.6%) had a COVID-typical pattern (CO-RADS 5) (15).

Strikingly, the majority of the 157 readmitted patients did not have any preexisting illnesses. Their frequent symptoms were cough, fever, and sore throat. It is important to stress that a systematic evaluation and external validation of 22 prognosis models of COVID-19 (6) showed that oxygen saturation in blood was the only variable for predicting clinical deterioration, with an area under the curve (AUC) of 0,76 (CI 95%: 0,71-0,81). This parameter does not have the net benefit of other predictive models, so hospitalization should be considered for patients with desaturation on admission (17). To date, we did not find a study that analyses the readmission of patients initially given ambulatory management. There were only two fatal outcomes of readmitted patients in this cohort, which does not exceed 1% of outpatients, and accounts for 1.3% of the patients readmitted. In the New York cohort, 52 (1.9%) individuals on ambulatory management died (6).

Limitations

As our study is retrospective and based on data captured from the standard medical record filled in the emergency room, it is possible that some information is missing. A high proportion of patients lacked data on anthropometric variables (body weight and height), therefore these parameters were not included in the analysis. This study was conducted before vaccination for COVID-19, therefore the information is not collected. Data in this study was taken from the medical records in the HUSI, so it is impossible

to determine whether patients in the cohort received healthcare whether it was outpatient or if they required hospitalization in other hospitals during the period of observation. This could underestimate the number of readmissions and fatal outcomes. Additionally, our hospital provides healthcare to a population with sociodemographic characteristics. One of those characteristics is that most patients consulting with the HUSI belong to the contributory regime, the branch of the Colombian health system that provides coverage to people who can pay. This circumstance is associated with better socioeconomic conditions and better health outcomes than the subsidized regime (18).

In conclusion, most published studies on patients with SARS-CoV-2 infection describe the experience and outcomes of patients hospitalized and admitted to intensive care units, even though the highest proportion of patients, near 80%, receive ambulatory care.

The decision to keep COVID-19 patients on ambulatory management will always carry a level of uncertainty. The experiences of this cohort, however, show that healthcare teams analyze the risk of discharging a patient according to their experience and the best evidence available. In the institution of this study, predictor factors such as oxygen saturation higher than 90%, availability of oxygen at home, and adequate control of comorbidities are considered. This cohort had a low proportion of patients readmitted to the hospital or dying. For this reason, we suggest taking these conditions into account in the decision-making process.

Also, this study examined an outsized proportion of healthcare workers due to higher risk of infection for that population and due to the nature of the institution as a university hospital.

Proportion of symptoms reported by patients in the first consultation may vary among different cohorts. General symptoms such as cough, headache, sore throat, fever, myalgia, and arthralgia are the most frequent, and remain so among cohorts from different countries.

Time from symptom onset to consultation may be lengthier in older adults than for other age groups. It is important to adapt healthcare services to promote opportune consultation in older adults by reducing barriers related to distance in their supporting networks. It is also important to keep in mind that technology has a lower penetrance in this group, and this can limit communication and access to information.

We consider that this study contributes relevant information for decision-making in healthcare of patients in priority care, home, and emergency settings. It can help with optimizing healthcare resources, avoiding unnecessary hospitalizations, and adjusting local guidelines.

More studies are needed to determine the evolution of the disease and to identify new health conditions after a COVID-19 episode in patients who received home-based care with mild to moderate manifestations of the disease. These patients can exhibit sequels that deserve follow-up and support, immediately and in the long term.

Conflicts of interest

We declare no conflicts of interest.

Financial declarations

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