

EPIDEMIOLOGICAL AND CLINICAL CHARACTERISTICS OF PATIENTS WITH COVID-19 USING TELEMEDICINE, THEIR DISEASE EVOLUTION AND HOSPITALIZATION RATE IN MISIONES, ARGENTINA

JUAN CARLOS LUJAN FALKOWSKI¹, ENRIQUE J. DESCHUTTER², GUSTAVO SILVA²,
SILVINA ORTEGA², JOSÉ M. RAMOS-RINCÓN³

¹Cátedra Farmacología, Universidad Nacional de Misiones, Argentina, ²Departamento de Microbiología, Facultad de Ciencias Exactas, Químicas y Naturales, Universidad Nacional de Misiones, Argentina, ³Departamento de Medicina Clínica, Facultad de Medicina, Universidad Miguel Hernández de Elche, Alicante, España

E-mail: jose.ramosr@umh.es

Coronavirus disease 2019 (COVID-19) is caused by severe acute respiratory syndrome coronavirus type 2 (SARS-CoV-2), a novel coronavirus first identified in Wuhan, Hubei Province (China), in December 2019¹. The first case in the municipality of Posadas (the capital of Misiones Province, Argentina), was detected on 27 March 2020. Approximately 30% of the population of Misiones resides in this city, and the vast majority of workers have health coverage provided through the Social Security Institute (*Instituto de Previsión Social*, IPS)². In Misiones Province, it is considered that the spread of the virus has been mediated by the proximity of the borders with Brazil and Paraguay, as well as by domestic movements between Misiones and the province of Corrientes, with high viral transit and/or close contact with people infected by SARS-CoV-2.

Outpatient monitoring is a critically important measure in patients with COVID-19, recommended by international organizations and the National Ministry of Health³. Monitoring of patients with COVID-19 reduces the risk of adverse outcomes, including hospitalizations and mortality³. The IPS created the Home Follow-up Service for patients in May 2020 in order to provide clinical indications for self-care to outpatients with COVID-19 and to enable health providers to distinguish between clinical forms that can be followed on an ambulatory basis from severe forms requiring hospitalization. Information is

available on the clinical characteristics and disease course in hospitalized patients in Argentina⁴⁻⁶. There is several international literatures about management of patients with COVID-19 at home with telehealth, so there is a systematic review by Khoshrounejad et al.⁷ analyzing the telehealth-based services during the COVID-19 pandemic. The authors reviewed 5005 studies of which 64 (from 18 countries) were selected.

This study aims to describe epidemiological and clinical characteristics, the disease course, and the hospitalization rate in patients with COVID-19 using the IPS home follow-up service from 1 January to 31 March 2021. It included patients with a diagnosis of COVID-19 in line with official Ministry of Health guidelines, that is, (1) by laboratory confirmation with either PCR detection of the viral genome or antigen testing, or (2) according to the criteria for defining a suspected case: "close contact with a confirmed case of COVID-19, who, within 14 days of contact, presents symptoms as determined by protocol"¹.

The clinical assessment data were collected by a group of primary health care physicians affiliated with the IPS and specialists in diagnostic imaging who were responsible for evaluating and analyzing the epidemiological and clinical variables of interest. The study included patients covered by the IPS who agreed to participate and gave their informed consent by telephone and/or video consultation and who

requested telephone or home follow-up for COVID-19, with the following symptoms: (1) fever and uncomplicated illness (self-perceived local symptoms in the upper respiratory tract, with or without non-specific symptoms such as muscle pain or atypical symptoms in the elderly); (2) mild pneumonia: (confirmed with chest X-ray and without signs of severity); alveolar oxygen saturation (SaO_2) > 90% in room air; CURB-65 \leq 1 (British Thoracic Society); or (3) severe pneumonia, failure of \geq 1 organ, SaO_2 < 90% in room air, or respiratory rate of \geq 30.

Patients underwent an initial clinical consultation by video or telephone, and the variables were collected. The attending physician determined the need for home follow-up, in line with protocols for self-isolation and the loan of pulse oximeters for home use. The intervention modality included video consultations and/or home visits by a professional with appropriate personal protective equipment⁸. Home visits were carried out according to professional criteria and the severity of each case. The Bioethics Committee of the *Hospital Escuela de Agudos Dr. Ramón Madariaga* of the Ministry of Public Health of the Government of Misiones approved the study.

A total of 72 patients were included; their demographic and clinical characteristics are shown in Table 1. Thirty-eight patients were over 65 years of age, and among this age group, 7 (10%) patients presented respiratory distress, which was monitored using pulse oximeters. Patients with uncomplicated disease were symptomatic for a mean period of 5.3 days (SD 2.1); patients with mild pneumonia, 6.9 days (SD 3.1); and those with severe pneumonia, 8.0 days (SD 2.5) ($p < 0.005$). The mean age in patients with uncomplicated disease (57.3 years), mild pneumonia (52.9 years), and severe pneumonia (56.9 years) were not similar ($p = 0.078$). Patients aged 65 years and older (38) constituted 53% of the cases (mean age 72.9 years, SD 5.7). They presented low oxygen saturation: 92% to 94% in 7 patients (10%), and <92% in 3 (4%). Older patients also had a longer symptomatic period (mean 6.5 days, SD 3.0). Five of the 72 patients were hospitalized due to COVID-19 (6.9%, 95% CI 2.6 to 16.1). The main criterion for admission was SaO_2 of less than 90%, as measured with the pulse oximeters delivered to the patient's homes. All

Table 1 | Characteristics of included patients (n = 72)

Variable	N (%)*
Age in years, mean	58 (SD 21)
Aged over 65 years	38 (52.8)
Men	30 (41.7)
Duration of symptoms from diagnosis to resolution, mean	5.6 (SD 2.8)
Comorbidities†	27 (37.5)
Empiric antibiotic treatment	19 (26.4)
Empiric corticosteroid treatment	10 (13.9)
Hospitalization	5 (6.9)
Death	1 (1.4)
Signs/symptoms	
Fever	72 (100)
$\geq 38.5^\circ\text{C}$	29 (40.3)
<38.5°C	43 (59.7)
Cough	55 (76.4)
Headache	28 (38.9)
Myalgia	15 (20.8)
Difficult breathing	7 (9.7)
Diarrhea and/or vomiting	5 (6.9)
Odynophagia	4 (5.6)
O₂ saturation	(0.0)
95% to 97%	61 (84.7)
92% to 94%	7 (9.7)
< 92%	3 (4.2)
Severity of COVID-19	
Uncomplicated illness	61 (84.7)
Mild pneumonia	7 (9.7)
Severe pneumonia	4 (5.6)
Criteria met for diagnosis	
Laboratory confirmed (PCR or antigen testing)	44 (61.1)
Close contact with confirmed case + compatible symptoms within 14 days	28 (38.9)

*Unless otherwise noted

†Chronic obstructive pulmonary disease (n = 7), stroke sequelae (n = 6), bacterial pneumonia (n=6), congestive heart failure (n = 2). No hypertension was detected, and in many patients antihypertensive medicine was temporarily suspended

patients that required hospitalization were over 65 years old (13.2% [5/38] vs. 0% [0/32], $p = 0.05$). In general, admission was associated with comorbidities related to bacterial pneumonia and in patients with stroke sequelae and chronic obstructive pulmonary disease. Four hospitalized patients had an average length of stay of 8 days, with no need for mechanical ventilation,

and one patient died. The patient who died was a 76-year-old man with heart failure as a comorbidity.

At the level of primary health care, the main intervention in the management and treatment of COVID-19, apart from clinical care itself, is the discrimination between cases with comorbidities or with an unfavorable evolution, such as mild pneumonia, that can be managed in an outpatient or home setting versus cases likely to develop severe pneumonia or respiratory dis-

stress. The community use of the pulse oximeter and telemedicine tools could help predict the disease course, with greater possibilities for self-management, than complementary laboratory studies^{9,10}.

In conclusion, the telemedicine, including video consultation and home monitoring of patients from the IPS, was a proper intervention for the management and treatment of COVID-19 in Misiones. This intervention has been accessible and cost/benefit effective.

References

1. Guan W-J, Ni Z-Y, Hu Y, et al. Clinical characteristics of coronavirus disease 2019 in China. *N Engl J Med* 2020; 382:1708-20.
2. Ministerio de Salud de la Nación Argentina. In: <https://www.argentina.gob.ar/salud/coronavirus-COVID-19/definicion-de-caso>; accessed March 2021.
3. Pedretti AS, Grande Ratti MF. El seguimiento con telemedicina de COVID-19 ambulatorio. *Rev Hosp Ital B Aires* 2022; 42:92-4.
4. Cordova E, Mykietiuk A, Sued O, et al. Clinical characteristics and outcomes of hospitalized patients with SARS-CoV-2 infection in a Latin American country: Results from the ECCOVID multicenter prospective study. *PLoS One* 2021; 16: e0258260.
5. Sánchez Doncell J, Sotelo CA, Lagrutta L, Francos JL, González Montaner P. Análisis de los dos primeros años de pandemia COVID-19 en un hospital de enfermedades infecciosas, en Buenos Aires [Analysis of the first two years of the COVID-19 pandemic in an infectious diseases hospital in Buenos Aires]. *Medicina (B Aires)* 2023; 83:233-40
6. Córdoba E, Mykietiuk A, De Vedia L, et al. Análisis comparativo de las características clínicas, evolución y mortalidad de pacientes hospitalizados por COVID-19 durante la primera y segunda ola de la pandemia (Registro ECCOVID) [Comparative analysis of clinical characteristics, evolution and mortality of hospitalized patients with COVID-19 during the first and second wave of the pandemic (ECCOVID Study)]. *Medicina (B Aires)* 2023; 83:551-7.
7. Khoshrounejad F, Hamednia M, Mehrjerd A, et al. Telehealth-Based Services During the COVID-19 Pandemic: A Systematic Review of Features and Challenges. *Front Public Health* 2021; 9:711762.
8. Guía breve de seguimiento médico ambulatorio del paciente Covid-19. In: <https://www.saludneuquen.gob.ar/wp-content/uploads/2021/08/Guia-de-seguimiento-ambulatorio-del-paciente-COVID19.pdf>; accessed March 2023.
9. Moreno-Pérez Ó, Ribes I, Fuertes-Kenneally L, et al. Effective fast-track ambulatory care pathway for patients with COVID-19 at risk for poor outcome: the COVID-A2R model in a hospital emergency department. Modelo asistencial ambulatorio de alta resolución COVID-A2R: una solución efectiva en el servicio de urgencias para pacientes con COVID-19 y riesgo de evolución desfavorable. *Emergencias* 2022; 34:103-10.
10. Llorens P, Moreno-Pérez O, Espinosa B, et al. An integrated emergency department/hospital at home model in mild COVID-19 pneumonia: feasibility and outcomes after discharge from the emergency department. *Intern Emerg Med* 2021; 16:1673-82.