



Persistence of symptoms and return to work after hospitalization for COVID-19

Helena Moraes Jardim de Azevedo^{1,2}, Nataly Winni Fernandes dos Santos^{1,3}, Mariana Lima Lafetá³, André Luis Pereira de Albuquerque⁴, Suzana Erico Tanni⁵, Priscila Abreu Sperandio³, Eloara Vieira Machado Ferreira³

1. Faculdades Metropolitanas Unidas, São Paulo (SP) Brasil.
2. Disciplina de Pneumologia, Escola Paulista de Medicina, Universidade Federal de São Paulo, – EPM/Unifesp – São Paulo (SP) Brasil.
3. Setor de Função Pulmonar e Fisiologia Clínica do Exercício – SEFICE – Disciplina de Pneumologia, Escola Paulista de Medicina, Universidade Federal de São Paulo, – EPM/Unifesp – São Paulo (SP) Brasil.
4. Divisão de Pneumologia, Instituto do Coração, Hospital das Clínicas, Faculdade de Medicina, Universidade de São Paulo, São Paulo (SP) Brasil.
5. Disciplina de Pneumologia, Departamento de Clínica Médica, Faculdade de Medicina de Botucatu, Universidade Estadual Paulista, Botucatu (SP) Brasil.

Submitted: 31 May 2022.

Accepted: 16 October 2022.

Study carried out at the Hospital São Paulo, Escola Paulista de Medicina, Universidade Federal de São Paulo, – EPM/Unifesp – São Paulo (SP) Brasil.

ABSTRACT

Many patients hospitalized with COVID-19 were unable to return to work or their return was delayed due to their health condition. The aim of this observational study was to evaluate the impact of moderate-to-severe and critical COVID-19 infection on persistence of symptoms and return to work after hospital discharge. In this study, two thirds of hospitalized patients with pulmonary involvement reported persistence of symptoms six months after COVID-19 infection, such as memory loss (45.5%), myalgia (43.9%), fatigue (39.4%), and dyspnea (25.8%), and 50% slowly returned to work, with repercussions due to fatigue and/or loss of energy.

Keywords: COVID-19/complications; COVID-19/rehabilitation; Return to work; Hospitalization; Survivors.

The new coronavirus disease (COVID-19) was declared a pandemic by the WHO in March of 2020. Since then, the disease has left millions of victims worldwide, accounting for more than 500 million confirmed cases and a lethality rate around 2% in the 2020-2021 period and 1.2% in 2022.⁽¹⁾ There has been a significant reduction in the number of severe cases and deaths after the start of vaccination; however, COVID-19 survivors may have persistent symptoms related to cardiopulmonary, neurological, and psychological sequelae, among others, for a long time.⁽²⁾ The definition of this condition is still uncertain, but it has been acknowledged that persistence of symptoms longer than 12 weeks after acute infection has been called post-COVID syndrome (or long COVID) and has an important impact on quality of life and health status,⁽³⁻⁵⁾ which may negatively influence activities of daily living and return to work, with consequences for these patients' mental health. Studies have shown that many patients were unable to fully or partially return to work, or their return was delayed due to their health condition.⁽⁴⁻⁷⁾ The aim of this observational study was to evaluate the impact of moderate-to-severe and critical COVID-19 infection, based on the WHO severity classification, on sequelae symptoms and return to work after six months, as well as whether survivors performed any physical activities after hospital discharge, between the first and second waves of the pandemic in Brazil.

Ninety-six patients included in the FENIX study (ReBec no. RBR-8j9kqy) were referred to the post-COVID outpatient clinic of the Respiratory Division of the *Universidade Federal de São Paulo/Escola Paulista de Medicina*, located in the city of São Paulo, Brazil, after having been admitted to the Hospital São Paulo (the University hospital) with COVID-19 between May of 2020 and May of 2021, with a positive RT-PCR, lung impairment confirmed on chest CT scans, and need for oxygen supplementation, were invited to participate in the study. These patients were periodically evaluated at the outpatient clinic, as follows: 15 days after discharge and 3-6 months after the onset of COVID-19 symptoms. After this period, the patients were contacted by telephone 6-9 months after hospitalization and answered questions from a standardized questionnaire elaborated by the researchers to assess persistence of symptoms, time to symptom resolution, return to work, and presence of loss of energy or fatigue during work. The patients were also asked whether they performed any physical activity after discharge (outpatient rehabilitation, home rehabilitation, or independent physical activity). Data were

Correspondence to:

Eloara Vieira Machado Ferreira. Rua Botucatu, 740, 3º andar, Disciplina de Pneumologia, Vila Clementino, CEP 04039-002, São Paulo, SP, Brasil.
Tel.: 55 11 5576 4848 (VOIP 17305). E-mail: eloara.ferreira@unifesp.br
Financial support: None.

collected between the months of October and November of 2021. Of the 96 patients contacted by telephone, 71 completed the questionnaire.

In the sample of 71 patients, 62% were male, with a mean age of 52 years. The patients presented with two or more comorbidities and/or risk factors, mainly systemic hypertension (52%), former smoking (34%), obesity (27%), and diabetes mellitus (26%). More than half of patients had been admitted to the ICU. Prior to hospitalization, most of them had a job/occupation (Table 1).

In the first outpatient visit after hospital discharge, 70% of patients reported symptoms, mainly dyspnea, myalgia, and cough (Table 1). In the assessment carried out by questionnaire, most of the patients still had symptoms, notably memory loss, myalgia, fatigue, and dyspnea. Among the asymptomatic patients, 35% recovered within three months. Regarding work, 96.3% of patients reported that they had returned to work when they were interviewed, half of them had returned to work within the first 30 days. Among these patients, the majority reported feeling “less energy” or fatigue during the workday (Table 2).

During the first visit, patients who reported not to perform rehabilitation were referred to a rehabilitation center or were instructed to perform physical activity.

Most patients (54/71) performed some type of physical activity after discharge and continued to do so (on average, 2-3 times a week) even by the time when they were interviewed (Table 2). Among asymptomatic patients, 90% had performed some type of physical activity in comparison with 45% of the patients that had persistent symptoms.

In our study, two thirds of the hospitalized patients with pulmonary involvement reported persistence of symptoms in the telephone interview, and return to work was slow in 50% of patients (more than 30 days after discharge) with symptoms such as feeling “loss of energy” and/or fatigue, or other complaints throughout the workday. The main symptoms reported by our patients were similar to those described in the literature.⁽⁵⁻⁷⁾ Although the post-COVID syndrome has not fully been understood, the development of long COVID does not have a linear relationship with the severity of the disease during hospitalization or with being part of the elderly population; it may affect different age groups and even people who have had mild COVID-19 and may continue from weeks to years.^(4,6,8,9) Regarding the proportion of survivors after hospitalization with at least one symptom after COVID-19, there was a significant reduction over time: 68% in 6 months and 49% in 12 months (p <

Table 1. Demographics and baseline characteristics of patients during hospitalization for COVID-19.^a

Characteristic	(n = 71/96) ^b
Demographic/anthropometric	
Age, years	52 ± 13
Male gender	44 (62)
BMI, kg/m ²	30.0 ± 4.5
Comorbidities/risk factors^c	
≥ 2	46 (64.8)
Length of stay, days	
Hospital	12 [7-18]
ICU	10 [5-15]
Oxygen supplementation	
Ward (via nasal cannula or mask)	30 (42.3)
ICU (HFNC, NIV, or MV)	41 (57.7)
MV	18 (43.9)
Work status before COVID-19	
Have a job/occupation	54 (76.0)
Homemaker	7 (9.9)
Retired	3 (4.2)
Unemployed	7 (9.9)
Symptoms related after discharge (1st medical appointment)	
Dyspnea	38 (53.5)
Myalgia	15 (21.1)
Cough	12 (16.9)
Fatigue	4 (5.6)
Chest pain	3 (4.2)
Dysgeusia	2 (2.8)

HFNC: high-flow nasal cannula; NIV: noninvasive ventilation; and MV: mechanical ventilation. ^aValues expressed as n (%), mean ± SD, or median [IQR]. ^bNo significant differences were found between the sample of patients who completed the survey questionnaire or not (n = 71 vs. n = 25; data not shown). ^cSystemic hypertension, former smoking, obesity, diabetes, hyperlipidemia, asthma, chronic kidney disease, psychiatric disease, kidney transplant.

Table 2. Results from the research survey questionnaire applied between six and nine months after hospital discharge.^a

Survey Questionnaire		(n = 71)
Part I: Persistence of symptoms		
1. Do you still have symptoms? (YES)		51 (71.8)
2. What symptoms have persisted?		
Memory loss		30 (58.8)
Myalgia/Arthralgia		29 (56.8)
Fatigue		26 (50.9)
Dyspnea		17 (33.3)
Insomnia		14 (27.4)
Depressed mood		12 (23.5)
Headache		12 (23.5)
Sensory deficit		11 (21.5)
Chest pain		10 (19.6)
Cough		8 (15.6)
Other ^b		< 5
3. How long did you become asymptomatic after hospital discharge? ^c		
Up to 3 months		7 (35)
3 to 6 months		5 (25)
More than 6 months		5 (25)
I do not remember		3 (15)
Part II: Return to work^d		
1. Did you return to work after COVID-19? (YES)		52 (96.3)
2. How long after discharge were you able to return to your job?		
Up to 1 month		28 (53.8)
1 to 3 months		12 (23.1)
3 to 6 months		7 (13.5)
More than 6 months		5 (9.6)
3. After returning to work, did you feel less energy or fatigue throughout the day? (YES)		38 (73.0)
Part III: Physical activity after COVID-19		
1. Have you performed any physical activities after discharge? (YES)		43 (60.6)
2. What kind of activities have you performed in post-COVID?		
Outpatient rehabilitation		18 (41.9)
Home rehabilitation		15 (34.9)
Independent physical activity		10 (23.3)
2. How often have you performed the activities?		
Once a week		10 (23.2)
Twice a week		11 (25.5)
Three or more times a week		22 (51.1)
3. Do you still practice any physical activity? (YES)		33 (76.7)

^aValues expressed as n (%). ^bHair/nail loss, sexual dysfunction, dizziness/malaise, dysgeusia, or inappetence. ^cn = 20.

^dn = 54.

0.0001).⁽¹⁰⁾ However, despite the improvement, there is still a high rate of persistence of symptoms in the long term, fatigue and muscle weakness being the most frequent ones. It is worth noting in our study that dyspnea was the most prevalent symptom (53.5%) after discharge, and few patients reported the presence of fatigue (5.6%). In the telephone interview, 50.9% of patients reported fatigue, but dyspnea complaints decreased to 33.3%. This may be due to the improvement of pulmonary sequelae, with recovery of lung function (improved dyspnea); however, a progressive increase in performing activities of daily living might have led to a greater perception of fatigue when compared with the period immediately after discharge.

Regarding the patients with a job/occupation, 96.3% reported having returned to work in the telephone interview, and 53.8% did it within 30 days. However, despite their return to work, most patients reported loss of energy and/or fatigue during the workday. In a study evaluating COVID-19 survivors at three months after hospital discharge, only 1 in 3 patients had returned to unrestricted work duty, more than one third of patients (34%) reported difficulty in performing basic activities of daily living, and most required physical therapy, occupational therapy, or brain rehabilitation.⁽⁷⁾ This difference in the proportion of people who returned to work within the first 30 days may be due to the profile of the population included in that study.⁽⁷⁾ It is important to consider that the

patients in our study came from the public health care system, who, in general, has a lower monthly income when compared with those who have access to the private health care system. This fact could have influenced the time to return to work even with the persistence of symptoms. In a study involving a cohort of COVID-19 survivors in China, 88% had returned to work at the 12-month follow-up visit; however, 24% were unable to return to the pre-COVID-19 level of work.⁽¹⁰⁾ Persistent symptoms after returning to work may result in reduced overall well-being, difficulty in performing tasks that were previously performed, loss of concentration, and loss of work performance, in addition to economic and social impacts, which has been the subject of ongoing observational studies.⁽¹¹⁾ Evaluating the global impact of COVID-19 on life expectancy, as measured in disability-adjusted life-years, in which years of life lost and years of life lost to disability are assessed, economic losses per year of life were shown to be greater in South America than in North America.⁽¹²⁾

It has already been well established that rehabilitation accelerates the recovery of hospitalized patients after COVID-19. Seventy-seven percent of the included patients performed some type of physical activity and maintained training for an average of at least three months after discharge, and most performed exercises outside a rehabilitation center. Among the patients who remained asymptomatic, most performed some physical activity after discharge in comparison with the symptomatic group. A follow-up study of 299 patients hospitalized between March and May of 2020 showed that only 31% were referred for rehabilitation.⁽¹³⁾ This may have been due to the limited availability of rehabilitation centers during the first wave and the lack of implementation, at that time, of home rehabilitation care and/or telerehabilitation by recruitment of health care providers to inpatient care. Among patients who were referred for rehabilitation, there was improvement in quality of life, as assessed with the Medical Outcomes Study 36-item Short-Form Health Survey, when compared with patients who did

not undergo rehabilitation.⁽¹³⁾ The goal of post-COVID rehabilitation is to improve prolonged symptoms and regain functionality, avoiding the complications associated with the disease by prescribing individualized physical training. Early interventions have been related to better disease recovery and quality of life.⁽¹⁴⁾ Home rehabilitation expands the number of patients that can be treated after hospital discharge and, according to the evidence found so far, improvement of persistent symptoms such as fatigue and dyspnea can directly influence the return to activities.⁽¹⁵⁾

As limitations of the study, we can cite the small sample size and the observational follow-up design. Indication of rehabilitation was at the discretion of the patient's health care team. Moreover, no details were collected regarding the patients' job/occupation or their socioeconomic level to assess the impact of restrictions after the return to work and/or absenteeism related to the presence of persistent symptoms.

In summary, after hospital discharge of moderate-to-severe or critical COVID-19 patients, although most patients returned to work, approximately 70% still had symptoms related to long COVID between six and nine months after the infection, which could impact on their daily work performance. More than half of the patients performed some type of physical activity. Future studies are needed to assess the real impact of persistence of symptoms, rehabilitation, and unrestricted return to work.

AUTHOR CONTRIBUTIONS

All authors contributed to all stages of this study, including study conception and design, data acquisition, analysis, and interpretation, preparation and revision of the manuscript, and approval of the final version of the manuscript.

CONFLICTS OF INTEREST

None declared.

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