HOSPITALIZATION FOR POST-COVID-19 MEDICAL REHABILITATION, IN HEALTH FACILITIES IN ROMANIA, DURING APRIL 2020 AND SEPTEMBER 2021 – A DESCRIPTIVE STUDY

Mihaela GALAON[1]
Marius CIUTAN[1]

[1] *National School of Public Health, Management and Professional Development, Bucharest*

Background: *Starting with 2020, in many countries, the medical systems have been on high alert status due to the COVID-19 pandemic. The evolution of the disease was marked by periods of exacerbation and relaxation and an important contribution was made by the natural immunization of a large part of the population and the vaccination of many people so that, in 2022 there were fewer serious hospitalizations and deaths.*

In Romania, SARS CoV-2 was one of the current challenges of the public health system. Society, the entire medical system, as well as many human and material resources were mobilized to detect, treat and monitor people with coronavirus.

Objective: *The aim of this study is to provide valid evidences of hospitalization for medical rehabilitation of patients with COVID-19, who were hospitalized in Romania, and to emphasize the need for multidisciplinary assessement and further treatment of residual pathologies in this category of patients.*

Methodology: *A descriptive, retrospective study was performed using secondary patient-level data for the period April 2020-September 2021. The data used were extracted from the 2021 DRG National database. Only hospitalized cases with a confirmed diagnosis of COVID-19 and which subsequently required a first episode of hospitalization in medical rehabilitation departments were included in the study.*

Results: *There were 567 hospitalized cases for post-COVID-19 rehabilitation. Most of the patients were hospitalized in the respiratory rehabilitation settings in various public hospitals, especially located in the Northwest and Northeast of the country. There were more cases in young people and adults (age group 18-64), respectively in men compared to women. The rehabilitation was mainly aimed at interventions in the respiratory system, but was also used for pathologies of the nervous, cardiovascular or musculoskeletal system. The majority of patients underwent physical therapy for the respiratory system, physical therapy for the whole body, and for the chest and/or abdominal muscles. Also, for more than half of the number of patients, therapeutic massage, respiratory tract drainage, and oxygen therapy were performed. The great majority (about 90%) of patients discharged with an improved condition, while very few were discharged completely cured.*

Conclusions: *For a more in-depth knowledge of this infectious pathology, clinical studies are needed to provide more data on morbidity and mortality hospitalized by COVID-19 in Romania, as well as efficiency studies associated with the measures and interventions implemented. Particular emphasis should also be placed on SARS-CoV2 infection prevention methods, vaccine types, their advantages and disadvantages, as well as the assessment of COVID-19 patient management.*

Keywords: *COVID-19, medical rehabilitation, Romania, hospitalization*

INTRODUCTION

The beginning of 2020 was a challenge for all medical systems in the world, with the appearance of the first cases of disease called COVID-19 (Coronavirus infectious disease-2019). Since then, all countries have mobilized to help limit the transmission of SARS-CoV-2 infection (Severe Acute Respiratory Syndrome Coronavirus 2), and to research and discover the most appropriate treatments and vaccines for this new disease. SARS-CoV-2 is an RNA virus that belongs to the group betacoronaviruses, line 2, subgenus Sarbecovirus. The virus, whose origin is still a topic of discussion among members of the scientific communities, was initially identified in late 2019 in Wuhan, Hubei Province, China. These patients developed pneumonia, but initially no clear cause could be established.

On 30 January 2020, the World Health Organization (WHO) declared COVID-19 an international public health emergency. The infection spread very quickly, and cases were reported in many countries, which led the WHO to declare a pandemic on 11 March 2020 [1].

In Romania, the first cases of COVID-19 disease were registered in February 2020. The disease has evolved "in waves", with periods of reduction and exacerbation of the number of cases and deaths, due to the fact that over 2 years the virus underwent a series of mutations that led to increased contagiousness and severity of the disease. Thus, at the beginning of March 2022, **2.741.945** cases of infection were registered, of which **2.510.046** patients declared cured, and **63.578** people who died [2].

SARS-CoV2 infection is characterized by a predominantly respiratory symptomatology in about 80% of cases (fever, dry cough, breathing difficulties, sore throat) of moderate intensity, but it can also have severe manifestations (bilateral interstitial pneumonia), with progression to respiratory failure. The main cause of mortality is acute respiratory distress syndrome (ARDS). Old age, chronic diseases (high blood pressure, respiratory and cardiovascular diseases, diabetes, etc.), smoking history have been significantly associated with the severity of the disease [3]. Post-COVID-19, patients should be assessed clinically to determine deficiencies and the modalities of rehabilitation (inpatient or outpatient care, interventions, programs). They should also be managed by a multidisciplinary team which includes physical medicine and rehabilitation doctor, physiotherapists, respiratory therapists, psychologists and occupational therapists using pharmacological and non-pharmacological interventions [3].

If patients are hospitalized for several days in intensive care units (ICU), and if they needed mechanical ventilation, in the post-acute phase they will show muscle weakness, reduced joint mobility, difficulty standing, impaired balance and gait, postextubation dysphagia, pain at the level of the neck and shoulders, myopathy, neuropathy, and consequently, a limitation in activities of daily living [4].

Other patients, even those with moderate forms of the disease, may have one or more sequelae after COVID-19, such as:

pulmonary sequelae, such as ventilatory dysfunction, lung fibrosis (in those with pneumonia), dyspnea, hyperventilation, productive cough, etc.;

cardiac sequelae: arrhythmias, heart failure, severe myocarditis with systolic dysfunction, etc.;

neurological sequelae, such as headache, paresthesias, Guillain-Barré Syndrome, increased risk of stroke, anosmia and ageusia, etc.;

musculoskeletal sequelae: severe muscular hypotonia, reduced joint mobility, difficulty standing, impaired balance and gait, critical polyneuropathy or myopathy, etc.;

psychological sequelae: prolonged confusion with mental problems, delirium, anxiety, depression, panic attacks, psychosis, other cognitive dysfunctions [5].

These pathologies can continue after the COVID-19 infection, or can beginning after a longer period of time after overcoming the acute episode and, in the absence of medical rehabilitation treatment, can persist for months, producing disabilities with varying degrees of severity and thus a decrease patients' quality of life.

Because there were no clinical guidelines for the rehabilitation of this category of patients at the beginning of the pandemic, the study Authors conducted a review using the main research databases and included quasi-randomized or prospective controlled clinical trials, recommendations, reports, and guidelines to present as much information as possible about this pathology [4]. The Authors stated that it is quite difficult to formulate recommendations due to the lack of high-quality evidence published in peer-reviewed journals. However, their common opinion was that rehabilitation programs must be developed to suit the specific needs of each patient. For this, patients need to be evaluated, monitored, and included in rehabilitation programs to help them restore their physical, and respiratory function, reduce neurological deficits, anxiety, and depression in order to restore a good quality of life. Especially, it is aimed for people with comorbidities, those living alone or in rural settings [4]. The Chinese Association of Rehabilitation Medicine and the Italian Physical and Rehabilitation Medicine Association have concluded that early respiratory rehabilitation is not recommended because it is not well tolerated, resulting in rapid desaturation. On the other hand, patients who have recovered and tested negative for SARS CoV-2 infection can undergo respiratory rehabilitation, depending on their clinical condition. Respiratory rehabilitation interventions should be personalized, especially for patients with comorbidities, old age, obesity, and complications of single or multiple organs (cardiac injuries, neurological dysfunctions, venous thromboembolism, liver, kidney) [4]. The results of the first randomized controlled trial showed that there were significant improvements in respiratory function, quality of life, and anxiety in a group of older patients who were discharged after the disease and who participated in the following respiratory rehabilitation program: respiratory muscle training, coughing exercises, diaphragmatic training, stretching exercises, and home exercises consisting of two sessions per week, once a day, 10 minutes, for 6 weeks [4].

A retrospective study, conducted in Italian COVID-19 Rehabilitation Unit, involving 41 patients in the post-acute phase, concluded that they could benefit from motor and respiratory rehabilitation treatment. The authors noted that further studies are needed to better understand the long-term sequelae of the disease and the appropriate rehabilitation programs [6]. A clinical study involving a group of Physical Medicine and Rehabilitation specialists from eleven different countries in Europe and North America presented clinical experiences in treating COVID-19 survivors, and how the reorganization of rehabilitation services was managed [7]. The experts point out that patients who have had severe and critical forms of COVID-19 can be potentially unstable and have a low exercise tolerance, irrespective of age; therefore, these patients should be transferred to rehabilitation areas only if Sat O2 and respiratory rate (RR) are stable, and there is no radiological progression of the disease. Patients with moderate COVID -19 forms can frequently have a reduced tolerance to exercise and fatigue, so physical activity should be limited. A common aspect observed by the authors was that some patients had relatively few clinical symptoms, although they have severe radiological abnormalities and very low arterial O2 concentrations [7].

In our country, the Specialized Commission for Physical Medicine and Rehabilitation (PMR) recommends that the rehabilitation program of post-COVID-19 patients be done in certain departments, depending on the remaining pathology and the time period [5]:

early (phase I) in ICU (from infectious disease and respiratory disease hospitals) with multidisciplinary and multiprofessional team;

postacute (phase II) in PMR departments;

chronic (phase III) applies to patients who will be included in outpatient PMR programs or in health resorts.

Using the clinical and functional assessment protocol to initiate post-COVID-19 medical rehabilitation, the patient is evaluated on the basis of clinical signs, paraclinical signs, deficiencies scales, and disability scales, then patient is included in one of six clinical-functional categories [5]. Depending on this patient's inclusion, the appropriate level of rehabilitation will be established.

Thus, in the first phase of early rehabilitation, the program can be done in the intensive care or infectious diseases units and, if the patient is stabilized, it is continued in the PMR departments. Otherwise, patients will receive only basic care. Early medical rehabilitation is especially recommended for patients who have had severe forms of the disease and who have needed to be admitted to the ICU. It can be applied without side effects, even in patients who are mechanically ventilated or in dialysis patients [5]. In patients who have been hospitalized for severe forms of SARS-CoV2 infection, early rehabilitation is especially important to limit the complications that occur due to prolonged post-immobilization deconditioning syndrome, reduced lung capacity, and post-traumatic stress disorder (PTSD). Recovery of cardiorespiratory function, but also of general function, is slow, often over a long

period of time, and is limited by the psychological effects of the disease on patients and their families [5].

For phases II and III, the general disability measurement scale is used, WHO Disability Assessments Schedule 2.0 (WHODAS 2.0) which includes the six important areas of functioning (according to the WHO): cognition, mobility, self-care, interaction (with others), life activities and participation in various aspects of life [5].

The study presents a series of data on patients hospitalized to various rehabilitation wards in several medical units in Romania. Hospitals that provided healthcare to patients tested positive for SARS-CoV-2, in Phase I and Phase II, as well as support hospitals for patients tested positive or suspected of being infected with SARS-CoV-2 were established by Order of the Minister of Health [8]. Some of the patients discharged from these hospitals participated in rehabilitation programs, depending on the degree of functional disability and the type of remaining pathology.

In order to better highlight the impact of the pandemic on the medical and social system in our country, it would be necessary to conduct clinical studies to collect data from hospitals that have hospitalized and treated patients with COVID-19. These data can provide more information about the symptoms, complications, treatments used, the factors that led to the aggravation of the disease and determined the transfer to ICU and the use of mechanical ventilation, healing and death rates. Particular attention should also be paid to methods of prevention against SARS-CoV2 infection, and future studies should present the types of vaccines used in Romania, their importance in immunity, their advantages, and disadvantages.

OBJECTIVE

The main objective of the study is to provide evidence of post-COVID-19 patients who were hospitalized for rehabilitation services between April 2020 and September 2021, and to present an overview of the degree of use of diagnostic and therapeutic interventions in the rehabilitation departments of public and private health units in Romania.

METHODOLOGY

A descriptive, retrospective study was conducted, using data recorded in the National DRG (Diagnostics Related Groups) Database. The study included hospitals, medical centers and institutes that have in their structure rehabilitation departments and clinical rehabilitation hospitals under contract with the National Health Insurance House, and which report monthly data to the National School of Public Health, Management and Professional Development Bucharest (NSPHMPDB).

Only cases with a secondary diagnosis of "COVID-19, virus identified" (code U07.1 according to *ICD-10-WHO Version for 2019-covid-expanded*), and a first episode of hospitalization in medical rehabilitation wards, between April 2020 and September 2021, were included in the study.

Because it is a new medical condition that is not included in the Table List of RO DRG Diseases, the coding could not be unitary and the main diagnostic codes from the following blocks were used: ***J84 Other interstitial pulmonary diseases***, Excl. „Drug-induced interstitial lung disorders" (J70.2-J70.4), „Interstitial emphysema" (J98.2), and „Lung diseases due to external agents" (J60-J70), ***J96 Respiratory failure, not elsewhere classified,*** Excl. „Cardiorespiratory failure" (R09.2), and „Postprocedural respiratory failure" (J95.-), ***J98 Other respiratory disorders***, all from Chapter X „Diseases of the respiratory system", and ***Z50 Care involving use of rehabilitation procedures*** within the Chapter XXI „Factors influencing health status and contact with health services". These codes can be found in *Volume 1 of International Statistical Classification of Diseases and Related Health Problems, overhaul 10 Australian modification (ICD-10-AM)*.

The data from the medical records that had the most frequent main diagnosis were extracted and analyzed: ***J84.1 - Other interstitial pulmonary diseases with fibrosis***, ***J96.1 - Chronic respiratory failure***, ***J96.9 - Respiratory failure, unspecified***, ***J98.8 - Other specified respiratory disorders***, ***Z50.9 - Care involving use of rehabilitation procedure, unspecified***, and ***Z50.1 - Other physical therapy***. Therapeutic and remedial exercises.

The study included a series of diagnostic tests and therapeutic procedures useful in assessing and monitoring the patient, restoring respiratory function, optimizing oxygenation, restoring exercise capacity, combating neurological disabilities, increasing functioning, and quality of life.

For this purpose, the following blocks and codes from Chapter XIX have been taken into account „Non-invasive, cognitive and other interventions, not elsewhere classified": ***S001 Physiological assessment*** - S00102 Neurological assessment, S00104 Swallowing function assessment, S00109 Vascular assessment, S00110 Biomechanical assessment (Balance assessment, Mobility/gait analysis, Musculoskeletal evaluation, Posture assessment and Range of movement/muscle testing, without devices or equipment), S00111 Skin integrity assessment; ***S003 Assessment of personal care and other activities of daily living*** - S00301 Self care/self maintenance assessment; ***[S004] Mental, behavioural or psychosocial assessment*** - S00403 Mental/behavioural assessment (Assessment of cognitive or executive function, Mental competency assessment); ***[S026] Measurement of respiratory muscle strength*** - S02602 Measurement of respiratory muscle strength at multiple lung volumes; ***[S027] Exercise testing to assess respiratory status*** - S02701 Exercise testing to assess respiratory status (Exercise testing using incremental workloads with monitoring of ventilatory and cardiac responses at rest, during exercise and recovery); ***[S028] Other measurement of respiratory function*** - S02816 Other measurement of respiratory function (Respiratory function test FAI, Spirometry FAI); ***[S034] Other electrocardiography [ECG]*** - S03401 Other electrocardiography [ECG], S03404 Signal averaged ECG recording; ***[S049] Interventions involving assistive or adaptive devices, aids or equipment***; ***[S055] Skills training for movement*** - S05505 Exercise therapy, chest or abdominal muscles, S05506 Exercise therapy, back or neck muscles, S05515 Exercise therapy, total body; ***[S056] Skills training in body system functions*** - S05603 Exercise therapy, respiratory system [breathing]. Recruiting lung units (by manual hyperinflation), S05604 Exercise therapy, cardiorespiratory/cardiovascular system. Cardiac

rehabilitation programme; ***[S057] Skills training for personal care and other activities of daily/independent living*** - S05701 Skills training in activities related to self care/self maintenance (ADL); ***[S059] Therapies using agents, not elsewhere classified*** - S05906 Therapeutic ultrasound, Excl. diagnostic ultrasound, S05907 Stimulation therapy, not elsewhere classified, Therapeutic laser treatment FAI, includes electrical neuromuscular nerve stimulation, functional electrical stimulation, interferential therapy, transcutaneous electrical nerve stimulation [TENS]; ***[S068] Other therapeutic interventions on respiratory system*** - S06802 Respiratory medication administered by nebuliser, Mist therapy, S06803 Other oxygen enrichment, Excl. hyperbaric oxygenation, S06805 Nonincisional drainage of respiratory tract, Manual clearance of respiratory secretions (suctioning), Postural drainage, Sputum clearance/ mobilisation (by manual hyperinflation); ***[S087] Other therapeutic interventions*** - S08710 Therapeutic massage or manipulation of connective/soft tissue, not elsewhere classified.

The data was extracted using the SQL Server Management Studio Express 2005 software, and further processing and analysis was performed with Excel and SPSS. The personal identification number of the patients are deleted (according to the provisions of Law no. 190/2018) when they are transmitted monthly to NSPHMPDB, and the identification of patients is based on the personal numerical code that appears encrypted in the DRG database. Some demographic and socio-economic variables included in the minimum data set were analyzed, such as age, gender, developmental region, length of hospital stay, type of discharge, and discharge status.

Limits of the study: one of the study limitations is determined by the way in which hospitals fully report procedures in the database. For the period under review, with few clinical evidence and post-COVID-19 rehabilitation protocols, professionals have used a variety of therapies and interventions, and for some patients only basic care has been used. This could be an explanation for the lack of notification and coding of rehabilitation interventions in the patient's clinical record, respectively. Another important limitation of the study is that it does not provide clinical information on the effectiveness of rehabilitation programs used to reduce disability, but only shows how to resolve the hospitalized case (the general condition of the patient at discharge). Last but not least, it should be noted that the total number of cases in the period under review is much lower than the real actual number, because the study did not take into account patients suspected of COVID-19, hospitalized in support hospitals and who needed more later medical rehabilitation, but only confirmed cases of SARS-CoV-2 virus. The study also looked only at patients discharged from rehabilitation wards, not those discharged from pulmonology departments. In addition, there were many people with specific symptoms of COVID-19 who either did not go to a hospital or refused to be hospitalized.

RESULTS

Data analysis was performed taking into account the number of patients confirmed with COVID-19, who had a first episode of hospitalization in medical rehabilitation wards (respiratory or neurological), and in the rehabilitation, physical medicine and balneology, within the public and private health units in Romania, between April 2020 and September 2021. Data interpretation was based on demographic variables and socio-economic characteristics (gender, age, developmental region, length of hospital stay, discharge status, type of discharge, type of diagnostic, and therapeutic interventions).

For the period under review, a total of 567 patients were hospitalized for rehabilitation post-COVID-19 infection. All patients had a secondary diagnosis of COVID-19 with virus identified, and were hospitalized in different health care units, public or private. Most cases were from public hospitals (528), and only 39 cases from private clinics - Figure 1. The public health units that hospitalized these patients were of the type: district clinical hospital (8), pneumophthisiology hospital (6), rehabilitation clinical hospital (4), clinical institute (2), medical assessment and rehabilitation center for children and adolescents (1), pneumophthisiology sanatorium (1), infectious diseases and pneumophthisiology clinical hospital (1), geriatrics and chronic diseases hospital (1) and university emergency hospital (1).

In both public and private units, three types of rehabilitation departments were found: respiratory, neurological, physical medicine and balneology. More than half of the number of patients (52% of the total) were hospitalized in respiratory recovery units - Figure 2.

The analysis conducted on ***development regions*** showed that most patients were hospitalized in health facilities in the North-West, West and North-East regions (134, 125, respectively 103 patients out of the national total) and the lowest in the Bucharest-Ilfov (27 cases), Central and South -East regions with 26 cases each - Figure 3. In the first year of the pandemic, according to the data transmitted by the Strategic Communication Group, most cases of the disease were registered in localities in the west and north of the country.

The analysis according to the ***main diagnosis at discharge*** revealed two main categories of diagnoses. Thus, in more than half of the number of patients (292), the diagnoses at discharge were: *Other interstitial pulmonary diseases with fibrosis, Chronic respiratory failure, Respiratory failure, unspecified,* and *Other specified respiratory disorders*. For the remaining 275 patients, the main diagnoses specific to the rehabilitation wards were used: *Care involving use of rehabilitation procedure, unspecified*, and *Other physical therapy*. Figure 4 shows that most patients (232) had the main diagnosis at discharge „*Other interstitial pulmonary diseases with fibrosis*", followed by those (180) diagnosed with „*Care involving use of rehabilitation procedure, unspecified*".

Analysis of data by ***age and gender*** shows that most patients hospitalized for rehabilitation were in the age group 60-69 years, both men (99 patients) and women (77 patients), followed by those in the 50-59 age group (74 men and 65 women, respectively), and in the 70-79 age group (64 men and 59 women) - Figure 5. There were few patients in the age groups 0-19 years and 20-29 years, because in the analyzed period there were few cases

Figure 1. Distribution of hospitalized patients for rehabilitation post-COVID-19 infection, by type of health care unit, between April 2020 and September 2021, at national level

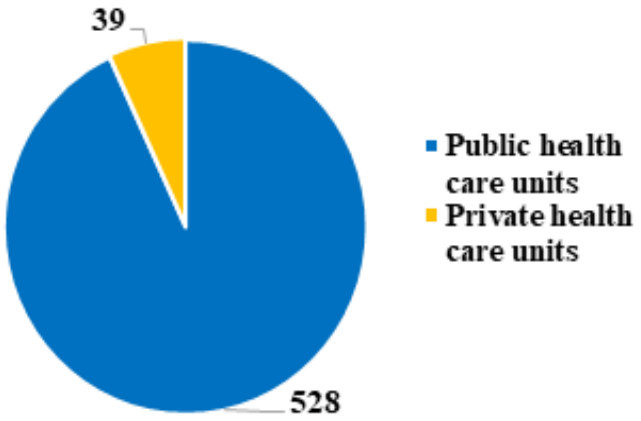


Figure 2. Distribution of hospitalized patients for rehabilitation post-COVID-19 infection, by the discharge wards, between April 2020 and September 2021, at national level

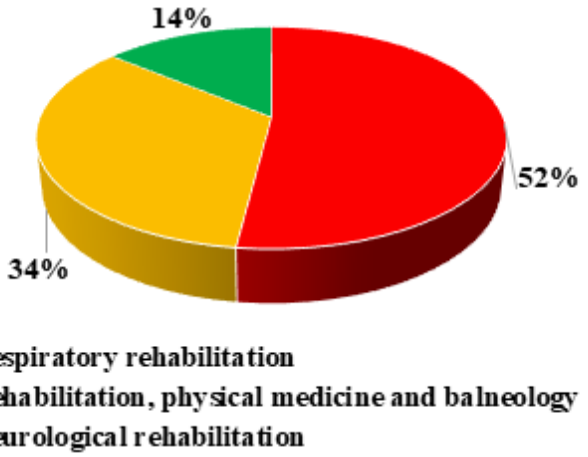
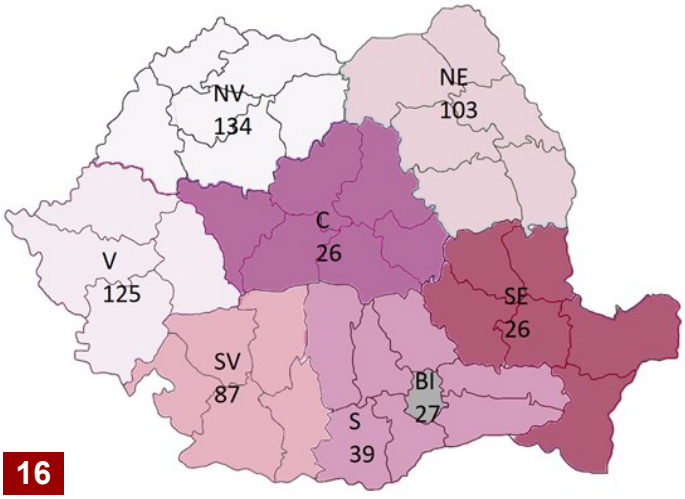


Figure 3. Distribution of hospitalized patients for rehabilitation post-COVID-19 infection, by regions, Romania, between April 2020 and September 2021



were mild forms of disease. Overall, most hospitalized patients were male (312).

The analysis of data on ***gender and discharge status*** showed that the majority of patients (89.8% of the total) were discharged with improved condition, both men and women. About 4% of patients had a stationary condition at discharge (especially men), and about 3% of the total number of patients (mostly women) were discharged as healed. 1.8% of patients died and 1.4% had an aggravated condition at discharge - Figure 6. If we refer to the gender of patients who have worsened or died, most of them were male.

The analysis of data on ***age and discharge status*** showed that the highest percentage of healed patients was among young people (age groups 10-19 years, 20-29 years and 30 -39 years) - Figure 7. As noted in the previous graph, the vast majority of patients were discharged with an improved condition, and they belong to the age groups 60-69 years, 50-59 years, and 70-79 years. All children in the 0-9 age group were discharged in a stationary condition. Most patients who have died are in the age group over 80 years. In the other age groups, the death rates are very low.

Analysis of the ***type of discharge*** showed that the majority of patients (531) were discharged from the rehabilitation wards. There were 3 cases of inter-hospital transfer, after at least 7 days of hospitalization, and 23 cases of discharges on request. There were also 10 deaths (9 from the respiratory rehabilitation ward and one from a neurology rehabilitation ward).

Distribution of patients according to the degree of use of interventions for diagnostic and / or therapeutic purposes

Patients included in the study benefited from one or more diagnostic and/or therapeutic interventions in the rehabilitation program, depending on the pathology, the level of disability and functionality. However, there are 67 patients in the database for whom no intervention is specified, and for them the variable *No specified procedures* was used.

A post-COVID-19 rehabilitation program focuses primarily on: improving respiratory symptoms (cough, expectoration, dyspnea, fatigue), limiting and preventing restrictive ventilatory dysfunction due to pulmonary fibrosis (in those with pneumonia), improving muscle weakness and osteoarticular mobility, improvement of pain symptoms (especially neurogenic pain), increasing effort capacity according to individual tolerance, improving the ability to perform daily activities, improving anxiety, depression, and improving mental status, thus contributing to the improvement of the patient's quality of life.

Physiological assessment was performed to collect, estimate and record information about patients' medical problems, functional status and cognitive abilities. The following assessments were used: neurological, swallowing function (dysphagia), speech, language, vascular, biomechanics (balance assessment, gait analysis, musculoskeletal evaluation, posture assessment, and muscle testing), skin integrity assessment, self care/self maintenance assessment, and mental/behavioural assessment

Figure 4. Distribution of hospitalized patients for rehabilitation post-COVID-19 infection, by main diagnosis at discharge, between April 2020 and September 2021, at national level

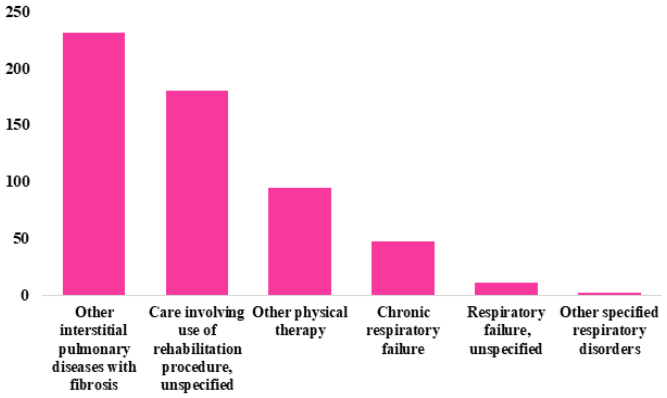


Figure 5. Distribution of hospitalized patients for rehabilitation post-COVID-19 infection, by age and gender, between April 2020 and September 2021, at national level

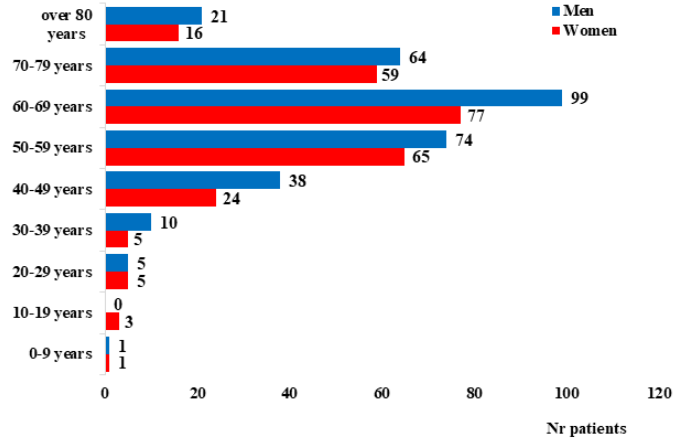


Figure 6. Distribution of hospitalized patients for rehabilitation post-COVID-19 infection, by gender and discharge status, between April 2020 and September 2021

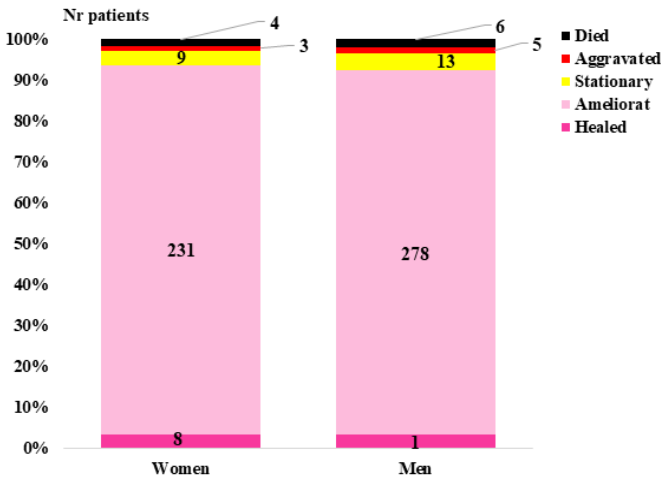


Figure 7. Distribution of hospitalized patients for rehabilitation post-COVID-19 infection, by age and discharge status, between April 2020 and September 2021

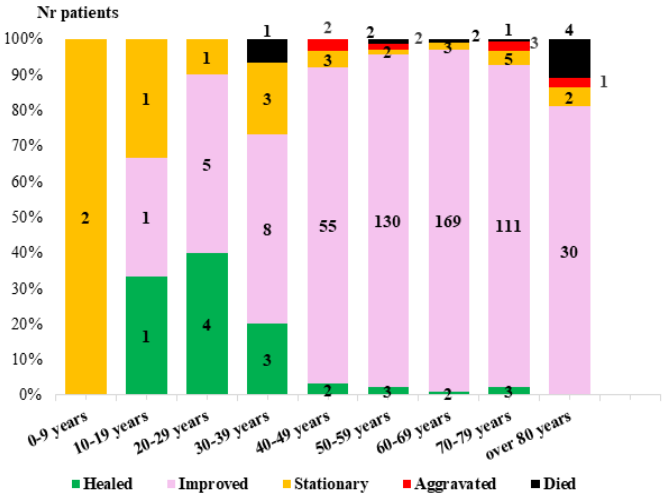


Figure 8. Distribution of hospitalized patients for rehabilitation post-COVID-19 infection, depending on the type of physiological assessment, between April 2020 and September 2021, at national level

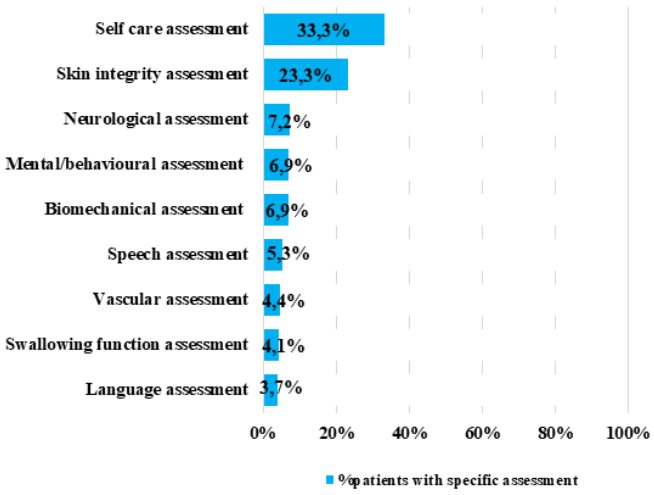


Figure 9. Distribution of hospitalized patients for rehabilitation post-COVID-19 infection, depending on the type of diagnostic test, between April 2020 and September 2021, at national level

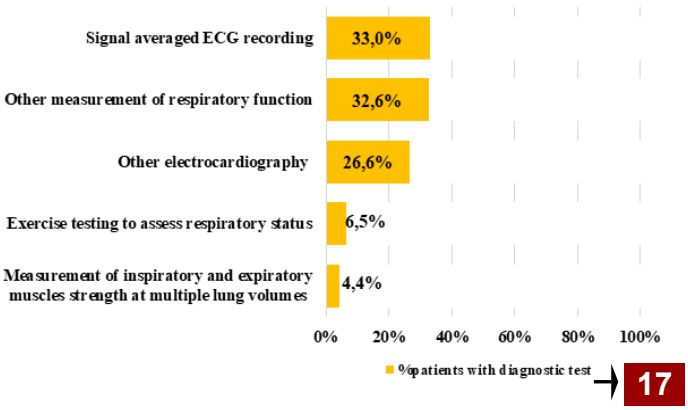


Figure 10. Number of hospitalized patients for rehabilitation post-COVID-19 infection, by type of therapeutic intervention, between April 2020 and September 2021, at national level

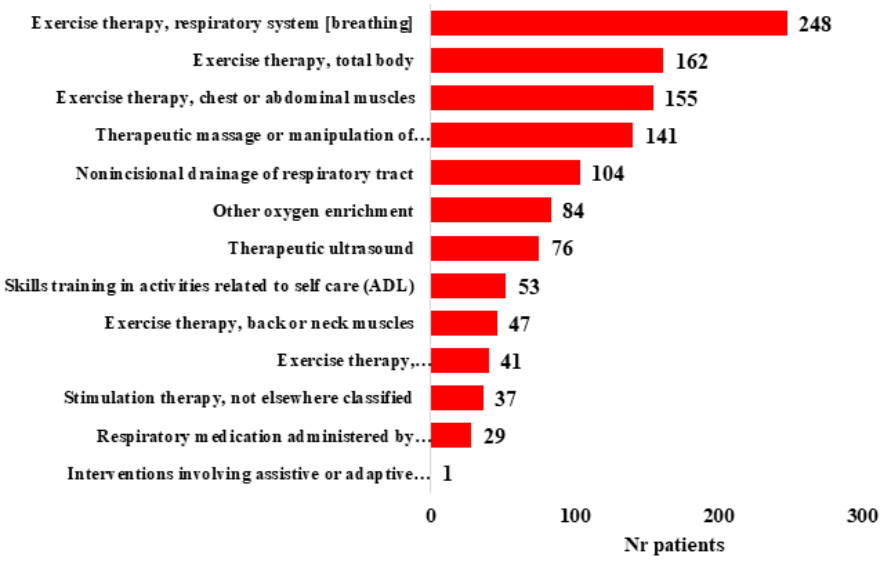
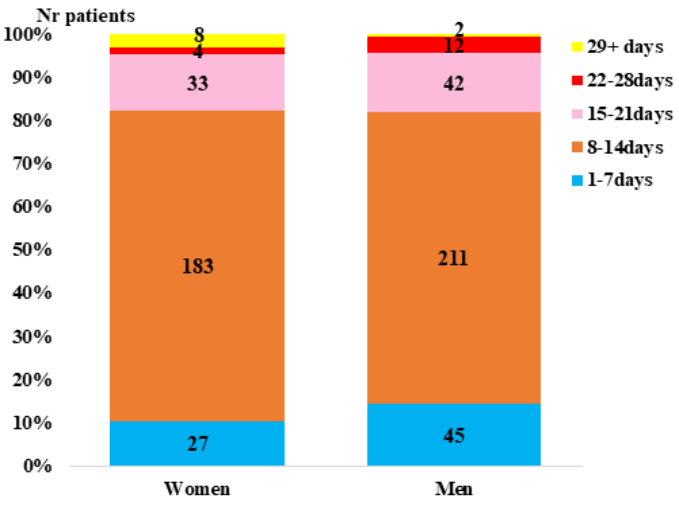


Figure 11. Distribution of hospitalized patients for rehabilitation post-COVID-19 infection, by gender and average length of hospitalization, between April 2020 and September 2021, at national level



(assessment of cognitive or executive function, mental competency assessment).

Figure 8 shows the types of assessments that were performed on most patients. Most patients (56.6% of the total) were assessed for self-care and skin integrity (information on the presence of bedsores in patients who were immobilized for a long time). Also, the neurological, mental/behavioral and biomechanical assessment was performed on a slightly larger number of patients (21% of the total). In contrast, the assessment of swallowing function (dysphagia) and language was performed in a very small number of patients (4.1% and 3.7%, respectively).

From the group of diagnostic, measurements or investigations tests, three tests for the respiratory system were selected - *Measurement of inspiratory and expiratory muscles strength at multiple lung volumes*, *Exercise testing to assess respiratory status*, and *Other measurement of respiratory function*, and two tests for the cardiovascular system - *Other electrocardiography [ECG]*, and *Signal averaged ECG recording*.

ECG and measurements of respiratory function were performed in the vast majority of patients (92%) – Figure 9. For 6.5% of patients, the exercise test was performed to assess respiratory function, and for 4% of them, the respiratory muscle tone was measured.

The following codes were selected from the group of ***therapeutic interventions and rehabilitation procedures***: *Interventions involving assistive or adaptive devices, aids or equipment*; *Skills training for movement*; *Skills training in body system functions*; *Skills training for personal care and other activities of daily/independent living*; *Therapies using agents, not elsewhere classified*; *Other therapeutic interventions on respiratory system*, and *Other therapeutic interventions*.

The main procedure used in the rehabilitation of patients was physical therapy. About half of the number of hospitalized patients (248) underwent respiratory physiotherapy – Figure 10. Other patients underwent physical therapy for the whole body (162 people) or for certain regions (abdomen, chest, cervical area) - 202 people. Other frequently used procedures were: therapeutic massage (141 patients), respiratory tract drainage (104 patients), oxygen enrichment (84 patients). Also, for some of the patients (76) therapeutic ultrasound was used, in another 53 patients the recovery was focused on skills training in activities related to self care, and 41 of them underwent a cardiac rehabilitation program. A total of 37 patients received stimulation therapy, either therapeutic laser, electrical neuromuscular nerve stimulation or functional electrical stimulation. For very few patients, assistive devices and aerosol therapy were used (in one patient and 29 patients, respectively).

The analysis of the ***average length of hospitalization*** shows that about three quarters of patients (394), both men and women, were hospitalized between 8 and 14 days. The average length of hospitalization was up to three weeks for 95% of patients, and for the rest of the patients it was up to one month and over a month – Figure 11. The analysis of the average length of hospitalization by the rehabilitation wards shows that in the respiratory rehabilitation wards, the average length of hospitalization was 11.8 days, with a maximum of 41 days and a minimum of one day. In rehabilitation, physical medicine and balneology wards, hospitalizations lasted an average of 11.6 days (maximum 28 days and a minimum of one day), and in the neurological rehabilitation wards, patients spent an average of 14.6 days (maximum 39 days, and at least one day).

Management in health
XXVI/1/2022; pp. 12-19

CONCLUSIONS

Analysis of data from the literature and those on the rehabilitation of patients after COVID-19 in Romania, between April 2020 and September 2021, emphasizes that for this condition, characterized by a complexity of symptoms and remaining pathologies, individualized rehabilitation programs are needed, both for the respiratory system and for the nervous system, cardiovascular, musculoskeletal, mental functions, etc.

The distribution of patients at the national level was uneven, as they were hospitalized mainly in the northern, western and eastern regions of the country. A much smaller number of patients were hospitalized in the central and southern parts of the country. Most patients were admitted to the respiratory rehabilitation departments of some district clinical hospitals and pneumophthisiology, post-COVID-19 respiratory sequelae being predominant. The distribution according to the main diagnosis at discharge shows that most patients were diagnosed with „Other interstitial pulmonary diseases with fibrosis".

From the point of view of the distribution of cases during the analyzed period, it was found that the men were mostly hospitalized for rehabilitation, especially from the age groups 50-59, and 60-69 years. There was a very small number of hospitalized children and young, because the number of cases of the disease at this age was also reduced in the first year of the pandemic. The number of cases in young children began to increase with the spread of the *Omicron* variant of the virus.

The average length of hospitalization for the rehabilitation of patients was 12.2 days, with only a small proportion of patients being hospitalized in three weeks or a month. Most patients were hospitalized for up to two weeks. On the types of wards that hospitalized such patients, the longest average length of hospitalization (14 days) was recorded at the neurological rehabilitation wards. The maximum duration of hospitalization was 41 days and was recorded in a patient hospitalized in a respiratory rehabilitation ward.

Patients were evaluated, tested, and followed by a rehabilitation program adapted to pathology, comorbidities, and post-COVID-19 sequelae. Most patients were assessed for self-care and skin condition. Also, for the vast majority of patients, ECG was performed and measurements of respiratory function were made (including respiratory function test, and spirometry).

The rehabilitation procedure used for about half of the number of patients was respiratory physiotherapy to restore pulmonary capacity. Many patients have also received other forms of physical therapy (exercises for the whole body, chest muscles or abdominal muscles), therapeutic massage, and non-incisional drainage of the respiratory tract.

Most patients (90%) were discharged with an improved condition. Very small percent of patients had an aggravated condition when they were discharged or died. Most deaths were reported in the 80-year-old age group. No deaths were reported in children, and adolescents. Only 3% of patients were discharged completely cured. Probably for some patients it was necessary to continue the rehabilitation in the outpatient services.

Bibliografie

1. Bioclinica, COVID-19 - transmitere, simptome și diferențe față de gripă, disponibil la link: https://bioclinica.ro/pentru-pacienti/coronavirus-covid-19/covid-19-transmitere-simptome-si-diferente-fata-de-gripa.
2. Grupul de Comunicare Strategică. *Buletin de presa 1 martie 2022*, disponibil la link: https://stirioficiale.ro/informatii/buletin-de-presa-1-martie-2022-ora-13-00.
3. Mouna Asly and Asmaa Hazim, *Rehabilitation of post -COVID-19 patients*. The Pan African Medical Journal, published online 2020 Jul 9. DOI: 10.11604/pamj.2020.36.168.23823.
4. A Demeco, N Marotta, M Barletta, I Pino, C Marinaro, A Petraroli, L Moggio and Antonio Ammendolia, *Rehabilitation of patients post-COVID-19 infection: a literature review*. Journal of International Medical Research. Published online 2020 Aug 25. DOI: 10.1177/0300060520948382.
5. Ministerul Sănătății din România, Comisia de Specialitate Medicină fizică și de Reabilitare. *Protocol de medicină fizică și de reabilitare post-COVID-19*, Publicat în Monitorul Oficial nr. 439 din 26 aprilie 2021, diponibil la link: https://legislatie.just.ro/Public/DetaliiDocumentAfis/241644, accesat în data de 20 ianuarie 2022.
6. C Curci, F Negrini, M Ferrillo, R Bergonzi, E Bonacci, D M Camozzi, C Ceravolo, S de Franceschi, R Guarnieri, P Moro, F Pisano, A de Sire, *Functional outcome after inpatient rehabilitation in postintensive care unit COVID-19 patients: findings and clinical implications from a real-practice retrospective study*. European Journal of Physical and Rehabilitation Medicine 2021 Jun;57(3):443-450. DOI: 10.23736/S1973-9087.20.06660-5. Epub 2021 Jan 4.
7. S Carda, M Invernizzi, G Bavikatte, D Bensmaïl, F Bianchi, T Deltombe, N Draulans, A Esquenazi, G E Francisco, R Gross, L J Jacinto, S Moraleda Pérez, M W O'dell, R Reebye, M Verduzco-Gutierrez, J Wissel, F Molteni, *COVID-19 pandemic. What should Physical and Rehabilitation Medicine specialists do? A clinician's perspective*. European Journal of Physical and Rehabilitation Medicine. 2020 Aug;56(4):515-524. DOI: 10.23736/S1973-9087.20.06317-0. Epub 2020 May 19.
8. ORDIN nr. 555 din 3 aprilie 2020, privind aprobarea Planului de măsuri pentru pregătirea spitalelor în contextul epidemiei de coronavirus COVID-19, a Listei spitalelor care asigură asistența medicală pacienților testați pozitiv cu virusul SARS-CoV-2 în faza I și în faza a II-a și a Listei cu spitalele de suport pentru pacienții testați pozitiv sau suspecți cu virusul SARS-CoV-2. Publicat în Monitorul Oficial nr. 290 din 7 aprilie 2020.