

Experience report on the recovery of a person infected with covid-19 with admission to the Intensive Care Unit (ICU): physical education and return to activities of daily living

Relatório de experiência sobre a recuperação de uma pessoa infectada pela covid-19 com admissão na Unidade de Terapia Intensiva (UTI): educação física e retorno às atividades da vida diária

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ABSTRACT

Faced with the challenge to global health experience with the respiratory disease called Coronavirus Disease 2019 (Covid-19) - discovered in December 2019 and declared a pandemic in March 2020 -, the recovery process of a hospitalized person with severe symptoms of COVID-19 is reported, who had physical limitations, and returned to activities of daily living after the immediate rehabilitation process. The text organization is in the form of an experience report. The investigated subject had the covid-19 infection confirmed by a nasal swab exam collected on February 25, 2021. The onset of symptoms reported was four days earlier, presenting dyspnea, dry cough, headache, and fever after

being hospitalized after laboratory, imaging, and clinical examinations. After medical discharge (held on March 19, 2021), he was released with the recommendation of respiratory physiotherapy activities. After four weeks of intervention with a physical education professional in resistance activities, stretching, and aerobic exercises, the individual was able to perform the activities of daily living that he did before the infection. His only current complaint is related to intense activities, in which he still feels uncomfortable, requiring longitudinal monitoring for the security of his full recovery.

Keywords: Pandemic, Virus; PE; Physical rehabilitation.

RESUMO

Diante do desafio à experiência de saúde global com a doença respiratória chamada Coronavirus Disease 2019 (Covid-19) - descoberta em dezembro de 2019 e declarada pandêmica em março de 2020 -, é relatado o processo de recuperação de uma pessoa hospitalizada com sintomas graves da COVID-19, que tinha limitações físicas e retornou às atividades da vida diária após o processo de reabilitação imediata. A organização do texto está na forma de um relatório de experiência. O sujeito investigado teve a infecção pela covid-19 confirmada por um exame de swab nasal coletado em 25 de fevereiro de 2021. O início dos sintomas relatados foi quatro dias antes, apresentando dispnéia, tosse seca, dor de cabeça e febre após ser hospitalizado após exames laboratoriais, de imagem e clínicos. Após a alta médica (realizada em 19 de março de 2021), ele foi liberado com a recomendação de atividades de fisioterapia respiratória. Após quatro semanas de intervenção com um profissional de educação física em atividades de resistência, alongamento e exercícios aeróbicos, o indivíduo foi capaz de realizar as atividades da vida diária que ele fazia antes da infecção. Sua única reclamação atual está relacionada a atividades intensas, nas quais ele ainda se sente desconfortável, exigindo um monitoramento longitudinal para a segurança de sua plena recuperação.

Palavras-chave: Pandemia, Vírus; PE; Reabilitação física.

1 INTRODUCTION

We are experiencing a global health challenge with the respiratory disease pandemic called Coronavirus Disease 2019 (Covid-19) in December 2019 (FAUCI; LANE; REDFIELD, 2020). The virus that causes the disease is called SARS-Cov-2, the same subgenus as the one that caused severe acute respiratory failure syndrome (SARS) in China in 2003 and the Middle East respiratory syndrome (MERS) East. In 2012 (STRABELLI; UIP, 2020). The epicenter of the current viral pandemic was the province of Hubei, in the People's Republic of China, spreading across the globe, and demanding from the World Health Organization (WHO) a global health emergency declaration in January 2020 and a pandemic. In March 2020. This situation was monitored, almost in real-time, by Johns Hopkins University (VELAVAN; MEYER, 2020).

After the manifestation of the main characteristic of the disease, which is significant inflammations in the respiratory system, patients who require intensive care can develop syndromes. Even non-serious ones can develop syndromes such as limitations in the musculoskeletal system, and reduced cardiorespiratory capacity, with primary attention to the damage to the heart that can occur at the peak of the disease (MAINARDI et al., 2021). The limitations in the musculoskeletal system present a high rate of weakening and reduction of the maximum voluntary contraction, both of lower and upper muscles, even in individuals who did not have any previous comorbidity. The prevalence of this physical impairment is high, as an indication of the need for physical rehabilitation programs to return to activities of daily living. (PANERONI et al., 2021).

Regarding the limitation of cardiorespiratory capacity, it manifests itself differently between each person. They range from those who did not have any symptoms during the disease to those who were affected by viral pneumonia spread through the pulmonary interstitium, in an excessive healing process, associated with the acute respiratory syndrome, and which can lead to high mortality rates (FROTA et al., 2021).

In this sense, this article aims to report the process of recovering from the physical limitations of an inpatient with severe symptoms of COVID-19 and his physical rehabilitation on returning to activities of daily living. This experience report is justified by the multidisciplinary performance, given that several professionals attended the person since their admission to the Intensive Care Units (ICUs), even in the ward, respiratory physiotherapy, and final physical recovery with a physical education professional after medical discharge.

2 METHODOLOGY

The textual organization in the form of an experience report details the process in which the physical limitations of a 41-year-old (± 100 kg of body weight, 188 cm in height) severely infected by Covid-19 were alleviated. He had no comorbidities and was physically active before contamination. The total rehabilitation period lasted one month, conceived through multidisciplinary work, to be completed by a physical education professional.

3 EXPERIENCE REPORT

3.1 CHARACTERIZATION OF THE DAILY LIFE ACTIVITIES OF THE PRE-COVID-19 PERSON

Before being affected by the disease, the subject practiced all the measures recommended by WHO in the face of the pandemic, such as social isolation, the current use of masks, and the return to work. After easing the contamination curve and government authorization, he started to work seated and isolated. During this period, the subject in question found alternatives to remain physically active, including the execution of strength training and stretching in the morning, followed by cycling outdoors, for 10 km until work. Upon returning from work, he practiced basketball alone on the court. All exercises, respectively, had a weekly frequency of 5 sessions, with a volume of 30 minutes in duration, constituting predominantly anaerobic exercises of high intensity and aerobic exercises of moderate intensity. All exercises totaled 10 hours a week.

3.2 CHARACTERIZATION OF THE HOSPITALIZATION PROCESS DUE TO THE COVID-19

Table 1 - Monitoring of symptoms

Pre Hospitalization Symptoms	
Between 2/21 and 3/2/2021	
Dyspnea	yes
Dry cough	yes
Headache	yes
Fever	yes
Blood saturation*	94%

Caption: * = saturation collected in oximeter. Source: Research data (2021).

On February 21, 2021, the first symptoms were reported, such as dyspnea, dry cough, headache, and fever after this date (Table 1). Upon examination, the infection was confirmed by a nasal swab exam collected on February 25, 2021. On day two (02) of the following month, the individual worsened with respiratory distress, with saturation (SaO₂) in a 94% oximeter, gasometry, and x-ray examinations were requested.

Arterial blood gases revealed blood pH at 7.39 (normal), partial oxygen pressure (PO₂) of 68.1mmHg (low), partial pressure of carbon dioxide (PCO₂) of 36.2mmHg (normal), bicarbonate (HCO₃⁻) at 21.7mmol / L (normal), total carbon dioxide (TCO₂) at 22.8mmol / L (low) and oxygen saturation (SaO₂) at 93.1% (low). The x-ray indicated

opacities compatible with viral infection (Chart 2). The results of the laboratory, imaging, and clinical examinations led to an indication for hospitalization.

Table 2 - Result of Gasometry and Image Examination

Clinical Examinations		
TYPES	Value/reference	Classification
blood pH	7,39	Normal
Oxygen partial pressure (PO ₂)	68,1mmHg	Low
Carbon dioxide partial pressure (PCO ₂)	36,2mmHg	Normal
Bicarbonate (HCO ₃)	21,7mmol/L	Normal
Total carbon dioxide (TCO ₂)	22,8mmol/L	Low
Oxygen saturation (SaO ₂)	93,1%	Low
Raio-x	Opacidades	infecção viral

Source: Exams carried out in the Emergency Care Unit of Carapina Grande - Serra - ES (2021).

The first night of hospitalization took place in an Emergency Care Unit (UPA). On March 3, 2021, at the end of the afternoon, the subject was transferred to a vacancy in a private hospital ward, being admitted to the ICU of the same hospital on the morning of the following day due to the worsening of the condition. It worsened in the ICU, with oscillating and increased heart rate (HR) oscillating and increased (close to 100 bpm), high ventilatory rate (40 breaths per minute), and oscillating saturation, dropping to less than 90% even with oxygen therapy in mask exceeding 15L / min-1. He was transferred to the ICU of a reference hospital for treatment of covid-19 on 10/03/2021 with the use of non-invasive ventilation of 13L / min-1.

At this location, chest computed tomography indicated opacities associated with sparse consolidation foci in the lungs, showing bilateral alterations with an acute inflammatory aspect, affecting more than 50% of the lung parenchyma, compatible with viral pneumonia. In 24 hours of treatment with a multidisciplinary team (doctors, nurses, and physiotherapists), the treatment of oxygen therapy by nasal catheter was reduced to 1L / min-1. The physiotherapy exercises were promptly started, which consisted of, in three days, respectively: getting out of bed with assistance (4 series with five repetitions), getting up from the sofa with assistance (4 series with five repetitions), and walking for a short period (120 seconds) without the aid of oxygen (2 series with three repetitions). In three days, these exercises totaled 90 minutes in duration. After his condition improved, he was transferred to a private hospital ward.

After a week in the infirmary, his clinical condition improved. He was discharged on March 19, 2021, with a physical examination indicating a regulated, hydrated, pale-colored, anicteric, cyanotic, without anasarca, afebrile, lucid and oriented, active, cooperative, stable hemodynamically, oxygen saturation of 95% in room air after 48 hours, with blood pressure (BP) of 130 / 70mmHg and resting heart rate (HR_{rest}) of 87 bpm.

Figure 1 - Computed tomography of the chest and x-ray



Source: Imaging exams carried out inside the Jayme Santos Neves State Hospital

3.3 POST-COVID-19: FROM RECOVERY TO ACTIVITIES OF DAILY LIVING

After medical discharge, the person was released on the recommendation of respiratory physical therapy activities (Chart 3). The recommended exercises with a deep inspiration each time, two times, and three times, with ten insufflations every 3 hours, using the Respirom® inspiratory device. Inspiratory motivators generate a higher pulmonary tidal volume, which can assist in the recovery of the muscles involved in breathing (CASTRO; FERNANDES; FELTRIM, 2012). Deep inspiration with a frontal elevation of the upper limbs and walking according to professional guidance (2 sets of 15 minutes) were also recommended. This exercise took place as a progression strategy for the normalization of mechanical ventilatory effort, required to return to activities of daily living before the onset.

Subsequently, the subject was subjected to an approach carried out by a physical education professional. At this point, a physical rehabilitation protocol was periodized over four weeks of intervention. This approach consisted of three different steps per week,

respectively, controlled by HR, Subjective Perception of Effort (BORG SCALE - CR-10), and Speech Control (Talk Test).

In the first week, he performed, in the first stage, a strengthening for 15 minutes in the semi-supine position in the bed to contemplate: 4 exercises for lower limbs, 4 for upper limbs without dumbbells, and 2 of core training. Each exercise consisted of 3 sets with ten repetitions except for the last exercise, which included three sets of 30 seconds in duration. In the next stage, the subject performed 12 sets of various stretches of 30 seconds each and, finally, performed two sets of 15 minutes of highly light walking. All of these exercises took place in 5 weekly sessions, totaling 300 min/wk^{-1} in duration.

It is important to note that HR_{rest} continued at $\sim 87 \text{ bpm}$, and in exercise, it was limited between 110-120 bpm. The breathing exercises described above were maintained throughout the intervention in a complementary way.

In the second week, the load progressed for the individual. The strengthening activities consisted of performing, for 15 minutes, exercises in the sitting position in the chair using only body weight. Subsequent activities consisted of 3 sets with ten repetitions in 10 minutes of various stretches and 30 minutes of light walking. In this evolution in training, HR_{rest} dropped to 74 bpm, with PSE still of light intensity (2/3 on the scale) and managing to speak, perceiving the exercises as light. These exercises took place in 5 sessions per week, totaling 300 min/wk^{-1} in duration, and the breathing exercises continued as performed in the previous week.

In the third week, there was a new progression of the load. The strengthening activities consisted of performing exercises in a standing position for 15 minutes using 3 kg dumbbells. Subsequent activities consisted of 3 sets with ten repetitions in 10 minutes of various stretches and 30 minutes of light walking. In this evolution in training, HR_{rest} dropped to 70 bpm, with PSE rising to moderate. These exercises took place in 5 weekly sessions, totaling 300 min/wk^{-1} in duration, and the breathing exercises continued as performed in the previous week.

In the fourth week, there was another progression to resistance training with weights. The strengthening activities consisted of performing exercises in a standing position for 30 minutes using weight training equipment. Subsequent activities consisted of 3 sets with ten repetitions in 10 minutes of various stretches; external runs of 15 to 30 minutes; and playing basketball alone at light to moderate intensity for 15 minutes. In this evolution in training, HR_{rest} dropped to 67 bpm, with PSE rising to moderate. These

exercises took place in 5 weekly sessions, totaling 450 min/wk⁻¹ in duration, and the breathing exercises continued as performed in the previous week.

On April 17, 2021, the subject cycled outdoors for 20km in 1h28min. After a month of medical discharge (on April 19, 2021) and controlled professional intervention, he cycled to the workplace and completed the route by covering 20km in 1h22. On April 21, 2021, he traveled 46km in 3h23min of activity, managing to carry out the activities of daily living that he did before the covid-19. His only complaint is concerning intense activities in which he still feels uncomfortable, requiring monitoring for the safety of his full recovery.

Figure 2 - X-ray performed on May 7, 2021



Source: Image exams performed at Multimage Diagnostics

4 CONCLUSIONS

Given the experience report presented, it is considered that after four weeks of intervention by a physical education professional, in resistance activities including global strengthening, stretching, and aerobic activities, with an average volume of 300-450 minutes of activities per week, the person had a substantial improvement in his physical condition. After this intervention, substantiated by multidisciplinary work and started early in the hospital, the subject returned to the activities of daily living that he did before the infection.

The results obtained reveal the relevance of early treatment, still in the hospital, because of the physical recovery of individuals undergoing Covid-19 treatment. It is also worth noting the need for a multidisciplinary and scaled approach in hierarchical stages (medicine, nursing, physiotherapists, and physical educators), with prior solid planning,

to obey the recommendations of each area, respectively, the fight against this viral infection. In the context of physical reconditioning, obedience to the principles of sports training guided by cautious progressions was decisive for the consolidation of the individual's recovery. However, the subject did not come out of the infection completely unharmed, since, until the end of the present report, he had complaints such as difficulties (discomfort) in carrying out intense activities and needs for constant longitudinal monitoring (lack of confidence/security about his recovery complete) in carrying out daily activities, which calls for continuity in the physical reconditioning approach despite the significant improvement.

Figure 3 - Comparison of image examination on 03/12/2021 with that on 05/07/2021



Sources: Image examinations performed at Hospital Jayme Santos Neves and Multimage Diagnostics

However, scientists have studied pandemics for more than a century, and current research points to prevention and harm reduction proposals. For more than a year, measures such as social distance, closing schools, remote work, and searching for the vaccine have been disseminated by competent institutions and based on the most current scientific knowledge available (FAUCI; LANE; REDFIELD, 2020). It is known that this is a severe disease, which can lead to respiratory arrest, myocardial damage, and cardiac arrest, being different and more severe than other known respiratory diseases (STRABELLI; UIP, 2020). Until April 7, 2021, Brazil led the deaths in 24 hours, with 4211 deaths being responsible for 47% of world deaths. With only 2.8% of the world population, it accounted for half of the deaths In the whole world. Currently (on April 23, 2021), we have a total of more than three million deaths worldwide, with Brazil bitterly

suffering a tragic second place, with more than 380 thousand deaths, according to data from the Coronavirus Resource Center of Johns Hopkins University.

Several sequelae are identified among those who go through this experience alive, which affects humanity more and more each day. Even asymptomatic patients can present losses that are not identifiable at first sight. It is necessary to identify these damages and deal with the help of health professionals responsible for each part of their recovery. According to this experience report, it can be seen that the work was done in a controlled manner reestablished in about a month for the return to activities of daily living. This person had been hospitalized in the ICU with severe symptoms.

As a society, there is a need to follow the procedures of countries that are successfully eliminating their cases, with measures of isolation and mass vaccination, preventing the emergence of new variants, in addition to the continuous investment in science and education for the prevention and preparation against new ones—possible pandemics.

Finally, some proposals for future investigations and approaches are selected, such as: developing a physical exercise protocol aimed at Covid-19, which essentially consists of individualizing the training of each patient. Still, the insertion of other professionals from the health and social areas composing the multidisciplinary team such as neurologists, psychiatrists, psychologists, speech therapists, speech therapists, social workers, and others can support coping with this infection that has taken a large contingent of human lives.

REFERENCES

CASTRO, A. A. M. DE; FERNANDES, M.; FELTRIM, M. I. Z. Análise do padrão respiratório durante o uso dos incentivadores inspiratórios em indivíduos saudáveis. **Revista Neurociências**, v. 20, n. 1, p. 26-33, 31 mar. 2012.

FAUCI, A. S.; LANE, H. C.; REDFIELD, R. R. Covid-19 - navigating the uncharted. **N. Engl. J. Med.** n. 382, p. 1-2, 2020.

FROTA, Aline Xavier *et al.* Functional capacity and rehabilitation strategies in Covid-19 patients: current knowledge and challenges. **Rev. Soc. Bras. Med. Trop.**, Uberaba, v. 54, e07892020, 2021.

MAINARDI, E. M.; LIMA, A. C. C.; PEREIRA, C. V.; VIVEIROS, M. C.; SILVA, P. K. E.; BRAGA, S. A. S. Protocolo de reabilitação cardiorrespiratória no paciente pós-covid: relato de experiência. **Brazilian Journal of Health Review**, v. 4, n. 1, 2021.

STRABELLI, T. M. V.; UIP, D. E. Covid-19 e o coração. **Arq. Bras. Cardiol.**, São Paulo, v. 114, n. 4, p. 598-600, abr. 2020.

PANERAI, M.; SIMONELLI, C.; SALIERI, M.; BERTACCHINI, L.; VENTURELLI, M.; TROOSTERS, T.; AMBROSINO, N.; VITACCA, M. Muscle strength and physical performance in patients without previous disabilities recovering from Covid-19 pneumonia. **American Journal of Physical Medicine & Rehabilitation**, v. 100, n. 2, p. 105-109, Feb. 2021.

VELAVAN, T. P.; MEYER, C.G. The COVID-19 epidemic. *Trop Med Int Health*. 2020.