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REVIEW ARTICLE

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EVIDENCE OF THE PERFORMANCE OF PHYSIOTHERAPY IN COVID19 IN THE EMERGENCY ROOM: AN INTEGRATIVE REVIEW

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ABSTRACT

The first records of the Severe Acute Respiratory Syndrome Virus (SARS-COV-2), known worldwide as Covid-19 occurred in the city of Wuhan, China, in December 2018 and in February 2020 the first case was registered in Brazil, in the city from Sao Paulo. On March 11, 2020, WHO characterized Covid-19 as a pandemic, due to its rapid proliferation throughout the world and its high transmissibility, and currently has a high number of deaths. Covid-19 is a disease that can cause acute respiratory infection, transmitted by the coronavirus, which is a beta-coronavirus, and has recently been called SARS-CoV-2. The aim of this integrative review was to carry out an expanded search in the national and international literature on the role of physical therapy at Covid 19 in urgency and emergency units. This study is an integrative review, integration of opinions, analysis of decision-making, whose method pays attention to the evidence-based health focus. Publications indexed in the Scopus, Medline Pubmed and Web Of Science databases were searched and we used Covid-19, emergency department and physiotherapy as descriptors. The study exclusion criteria were: abstracts, theses, dissertations, opinion articles, comments, course conclusion work (TCC), experience reports and conference proceedings. A total of 1620 studies were identified, of which 4 studies were included. With the entry of more critically ill patients, confirmed with thoracic image changes suggestive of Covid-19, there was an indication for the use of low or high flow oxygen and the suggestion for the use of invasive mechanical ventilation (IMV) or not (NIV) in these environments and also in the intensive care unit (ICU). However, the use of NIV in routine use was not recommended, as the current experience with Covid's 19 hypoxemic respiratory failure had a high associated failure rate. It is suggested that the topic be expanded with the presentation of more robust studies, which generate an impact on the scientific community and better conduct of treatment during the acute phase of the disease.

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INTRODUCTION

The first records of the Severe Acute Respiratory Syndrome Virus (SARS-COV-2), known worldwide as Covid 19, occurred in the city of Wuhan, China, in December 2019, and in February 2020 the first case was recorded in Brazil, in the city from Sao Paulo. On March 11, 2020, the World Health Organization (WHO) characterized the

Covid-19 as a pandemic, due to its rapid proliferation throughout the world and its high transmissibility. It has currently caused a high number of deaths (Santos et al., 2021). Covid-19 is a disease that can cause an acute respiratory infection, transmitted by the coronavirus that is a betacoronavirus and recently became known as SARS-CoV-2 (Severe Acute Respiratory Syndrome). The diagnosis of Covid-19 can be done clinically through the signs and symptoms that the patient

presents or in a laboratory way, done through molecular biology tests, serology or rapid tests (Brasil, 2021). The symptoms of Covid-19 are very similar to the flu, however, the most common are: fever, dry cough, fatigue, some people may also experience discomfort and body aches, sore throat, headache and loss of taste and smell or your case may worsen, having dyspnea and progress to Severe Acute Respiratory Syndrome (SARS) (Brasil, 2020). Its clinical presentation is very similar to the mild symptoms of pneumonia, thus there is a mild form that affects most patients, moderate and severe (Brasil, 2020). Initially, for critically ill patients, it is recommended to request the following investigations: Pulse oximetry, arterial blood gases (assess the presence of hypoxemia, low PaO₂ or acidosis), computed tomography (CT) of the chest, rapid test for influenza, RT-PCR-SARS-CoV2, D-dimer, inflammatory markers (C-reactive protein) (Brasil, 2020). Its pathophysiology presents itself as a clinical form of viral pneumonia with fever, cough, dyspnea, excessive inflammatory response with the presence of circulating cytokines, lymphopenia, cellular infiltrate present in the spleen, heart, lungs, kidneys and lymph nodes; Increase in inflammatory markers (C-Reactive Protein; D-dimer and Ferritin), associated with disease severity (Shi *et al.*, 2020). In severe forms of Covid-19, the resulting inflammatory cascade can lead to a cytokine storm, as has been analyzed in recent studies, where they have shown increased serum cytokine levels. And this event includes an increase in IL-2, IL-7, IL-10, granulocyte colony stimulating factor (G-CSF), monocyte chemoattractant protein (MCP) and TNF- α , a cytokine that has the role of promoting the immune and inflammatory response through the recruitment of neutrophils and monocytes to the site of infection. And in this sense, the cytokine storm is believed to be of great importance in the progression of SARS-CoV-2 in Covid 19 (Mendes *et al.*, 2020). SARS-CoV-2 causes exudation of fluid, rich in cells and plasma proteins, causing an increase in permeability between the alveoli and the capillaries that surround them. This process induces a local inflammatory response with the presence of leukocytes, platelets and fibrin. In which it aids in hyaline membrane formation and subsequent alveolar fibrosis. So, SARS-CoV-2 results from a massive acute inflammatory response in the alveoli, blocking the physiological gas exchange of oxygen and carbon dioxide. In these cases, the characteristic symptoms occur: intense dyspnea and low blood O₂ saturation (Mendes *et al.*, 2020).

Since the development and advancement of respiratory dysfunction, the result is associated with heart failure of the right chambers of the heart. And this is due to cardiac overload, identified as a decrease in the right heart's ability to function properly due to pulmonary hypertension, which is caused by parenchymal fibrosis. In this way, there is a parameter to assess the risk of mortality, by measuring the levels of D-dimer and fibrin degradation products (DPF). In addition, similar to what was analyzed in response to SARS-CoV-2, immune-mediated injury may play a critical role in the pathogenesis of Covid 19, especially among those who are severely affected by the disease (Mendes *et al.*, 2020). Covid-19 affects many systems, among them the main ones are cardiovascular and pulmonary (Shi *et al.*, 2020). The Covid-19 disease, caused by the SARS-CoV-2 coronavirus, in addition to causing alveolar lung injury and acute respiratory failure, has a high prevalence of cardiovascular diseases, especially venous thromboembolism (VTE). This increased risk is associated with exacerbated inflammatory reaction and exaggerated release of cytokines, especially interleukin 6. Coagulopathy is verified by increased levels of fibrinogen, D-dimer (DD), factor VIII and prolongation of prothrombin time (PT) and of activated partial thromboplastin time (APTT), factors associated with poor clinical outcome and death (Rossi, 2020). These disorders can occur in patients with risk factors such as advanced age, obesity, systemic arterial hypertension, diabetes mellitus, heart disease, lung disease, cancer, thrombophilia, previous history of VTE and other comorbidities, but also in children and younger individuals, indicating that there is a genetic component involved. In addition, immobilization, dehydration and the need for mechanical ventilation are factors that can add to the high prevalence of VTE in Covid-19. Although this prevalence is not defined in the different stages of the disease, it has been noted that, in the most severe forms and mainly in

patients admitted to the intensive care unit (ICU), there is a high risk of pulmonary thromboembolism (PTE) (Rossi, 2020). Although diffuse alveolar damage and acute respiratory failure are the hallmarks of Covid-19, other organs are involved, including the kidneys. Acute renal failure (ARF) is an important complication of Covid-19 and the potential mechanisms of renal involvement in these patients can be didactically divided into three aspects: cytokine-stimulated damage, organ crosstalk and systemic effects. These mechanisms are deeply interconnected and have important implications for therapy (Poloni *et al.*, 2020).

It remains unclear whether ARI in Covid-19 is caused by cytopathic effects induced by SARS-CoV-2 or by a systemic inflammatory response due to a cytokine storm. In patients with cytokine storm, AKI can occur as a result of intrarenal inflammation, increased vascular permeability, volume depletion, and cardiomyopathy, which can lead to type 1 cardiorenal syndrome. Cytokine release syndrome includes systemic endothelial injury, clinically presenting as pleural effusions, edema, abdominal hypertension, intravascular fluid depletion, and hypotension. Recent findings have confirmed the close relationship between alveolar damage and tubular, lung-kidney axis in acute respiratory syndrome (Poloni *et al.*, 2020). Recent data from the Covid-19 pandemic describe that the virus can compromise the cardiovascular system with diverse manifestations such as myocardial injury, heart failure (HF), Takotsubo syndrome (TS), arrhythmias, myocarditis and shock. The damage to the cardiovascular system is probably multifactorial and can occur either from an imbalance between high metabolic demand and low cardiac reserve or from systemic inflammation and thrombogenesis, and it can also occur from direct cardiac injury by the virus. This damage to the cardiovascular system resulting from Covid-19 occurs mainly in patients with cardiovascular risk factors (advanced age, hypertension and diabetes) or with previous cardiovascular disease (CVD) (Costa *et al.*, 2020). In the systemic inflammatory response caused by Covid-19, higher concentrations of cytokines are observed, which are related to injury to the cardiovascular system. The increase in troponin is accompanied by an increase in other inflammatory markers, such as D-dimer, ferritin, interleukin-6 (IL-6), lactic dehydrogenase (DHL), C-reactive protein, procalcitonin, and leukocyte count. D-dimer at admission greater than 1 μ g/ml was an independent predictor of mortality in this population. In addition to the elevation of inflammatory markers, in patients with Covid-19 there is also an increase in the levels of BNP or NT-proBNP, markers of myocardial dysfunction. Patients with myocardial injury had higher levels of NT-proBNP, with a positive linear correlation. This finding reinforces that those who have myocardial injury are more likely to develop impaired cardiac function (Costa *et al.*, 2020). The imaging exam that can be requested is computed tomography of the chest as an auxiliary diagnostic method (Brasil, 2021). The exudate exposed in the air spaces allows the manifestation of a typical finding, which is seen on the chest CT of patients with Covid-19, known as ground glass. It is possible to observe early lesions, being single or multiple, indicated as irregular shadows limited with structural changes, and they are located in the periphery of the lung fields. These lesions may progress when opacities are seen diffusely, with or without minimal pleural effusion.

In severe or critical cases, the presence of infiltrates or diffuse multilobular condensations can be located, which can rapidly progress to complete consolidation of the lung (Mendes *et al.*, 2020). The insertion of the physical therapist in the emergency room of some Brazilian hospitals is recent and has brought resolution with the multidisciplinary team, preventing the worsening of the patient's clinical condition in the emergency sector, with the main objective of providing fast and efficient support in cardiorespiratory dysfunctions (Oliveira Junior *et al.*, 2017). The role of the physiotherapist in the Emergency Room in Brazil was recently approved by resolution COFFITO 509, published in 2019, where the Federal Council of Occupational Therapy recognizes the role of this professional in this environment considering that the physiotherapist is a member of teams in the area of Health in several hospital sectors such as: intensive care units (ICUs), emergencies, emergency care and other

sectors working in the use of invasive mechanical ventilation (IMV), oxygen therapy and non-invasive mechanical ventilation (NIV) (Conselho Federal de Fisioterapia e Terapia Ocupacional, 2019). Despite the recognition of the role of the physical therapist in urgency and emergency, understanding the professional role of the physical therapist in this scenario still needs discussion. Health care generally focuses on services with a high technological density to the detriment of the development of human resources and interprofessional dialogues. This research was justified by the advent of the emergence of Covid-19 and the importance of physiotherapy in urgent and emergency units, in the face of the pandemic, preventing and treating all major complications related to the worsening of the disease. The objective of this integrative review was to carry out an expanded search in the national and international literature on the role of physiotherapy in Covid-19 in urgency and emergency units.

METHODOLOGY

This study was an integrative review, integration of opinions, analysis of decision-making, whose method pays attention to the focus of evidence-based health (Cunha *et al.*, 2014). The integrative review incorporates other searches for the area of knowledge, generating capacity, systematization and scientific knowledge of the researcher, in the area he wants to explore (Cunha *et al.*, 2014). Through these questions, a research question arose: is there evidence of the performance of physiotherapy in urgency and emergency units in the assistance to Covid-19?. The finding of the guiding question is the moment that identifies the review, as it exemplifies which studies will be included or excluded and the means adopted to identify them (Souza *et al.*, 2010).

Steps of the integrative review

1st Step

Identification of the topic and selection of the research question:

The first stage served to base the construction of the integrative review. The construction that provided the foundation for a theoretical reasoning and included definitions previously learned by the researchers. Thus, the first stage of the integrative review elaboration process began with the definition of a questioning and the construction of a research question. With the research question defined, the next step was to implement the descriptors or keywords, the search strategy, as well as the databases that were used (Souza *et al.*, 2010). To answer the question presented, a search was performed for publications indexed in the following Scopus, Medline Pubmed and Web Of Science databases. Covid-19, emergency department and physiotherapy were used as descriptors. For a better selection in the search for results, the Boolean operators OR and AND were used, which, with these tools, reached a greater number of publications.

2nd Step

Establishment of inclusion and exclusion criteria: After selecting the topic by the researchers and formulating the research question, the search began in the databases to verify the studies that were included in the review. This step was linked to the design carried out in the previous step, as a widely presented problem could make the sample extremely varied, requiring greater criteria during the analysis (Souza *et al.*, 2010). The inclusion criteria for the study were: original research, literature reviews (systematic, integrative or narrative), original articles, published between 2020 and 2021, in English or Spanish, in the major areas of medicine and nursing that deal with the theme of physiotherapy assistance in Covid-19, works with free access, in humans of both genders, aged over 45 years. The study exclusion criteria were: abstracts, theses, dissertations, opinion articles, comments, course conclusion work (TCC), experience reports and conference proceedings. A base was built for data recording, ensuring the scope of information and results contemplated in the following order: titles, database, authors, year, type of publication, objective, methods and interventions carried out.

3rd Step: In order to identify this study, a careful reading of the titles, abstracts, keywords and references of all publications located by the search strategy was carried out, so that soon after we adequately defined the inclusion criteria in the study. From then on, in cases where the title, abstract and keywords were not enough to define the selection, the search for the publication of the article in full was expanded. Upon completion of this step, a table was developed with the pre-selected studies for analysis.

4th Step: This summarized and documented the information obtained from the publications found in the previous steps.

5th Step: This stage brought the discussion of the results related to the texts presented in the reviews, where guided by the data found, their interpretation was carried out.

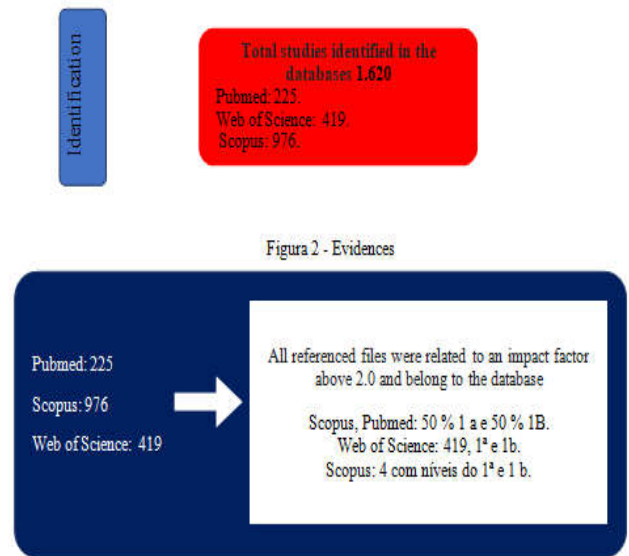


Figure 1. Identification

RESULTS

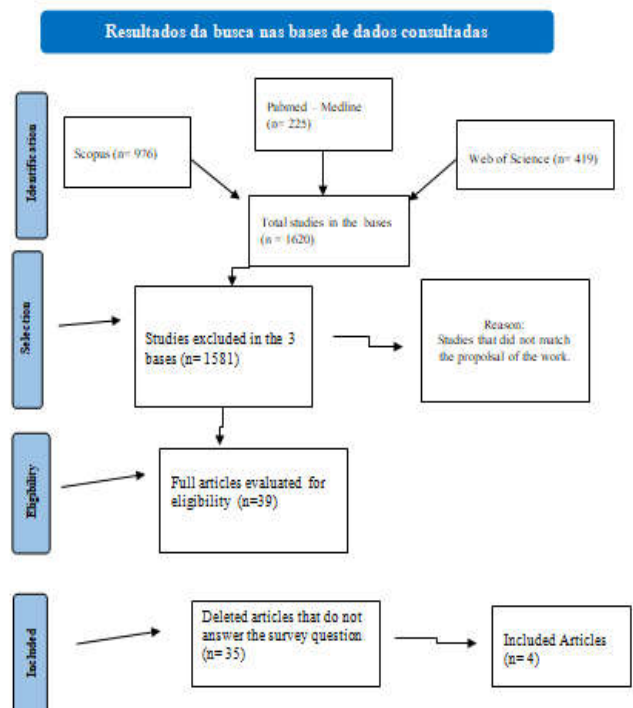


Figure 3. Prism Flowchart

Chart 1. Presentation of the search strategy/equation

Descritores MeshPud Med/ Med Line
Covid-19 AND, Physiotherapy AND, emergencydepartment, OR Covid-19, OR Physiotherapy, OR emergencydepartment.
Descritores Web Of Science
Covid-19 AND, emergency, OR Covid-19, OR emergency.
Descritores Scopus
covid-19 AND, emergency AND, physiotherapy, OR covid-19, OR emergency, OR physiotherapy.

Char 2. Table with the characteristics of the included studies

Título	Base de dados	Autores	Ano	Tipo de publicação	Objetivo	Método	Intervenções realizadas
Physiotherapy management for Covid-19 in the acute hospital setting: clinical practice recommendations	Medline Pubmed	Thomas <i>et al.</i>	2020	Review	Provide information to physical therapists and acute health care centers about the potential role of physical therapy in treating hospitalized patients with confirmed or suspected Covid-19.	Systematic review studies were included.	Describes management of physiotherapy actions for Covid-19 in the hospital environment in acute patients.
Joint statement on the role of respiratory rehabilitation in the Covid-19 crisis: the Italian position paper	Medline Pubmed	Vitacca <i>et al.</i>	2020	Review	Formulate guidelines and propose a common management algorithm to apply in the treatment of Covid-19 in a hospital environment.	Randomized clinical trials were included.	Consensus statement on respiratory rehabilitation in patients with Covid-19.
Respiratory physiotherapy in patients with Covid-19 infection in acute setting: a Position Paper of the Italian Association of Respiratory Physiotherapists (ARIR)	Scopus	Lazzeri <i>et al.</i>	2020	Consenso	Present a consensus among specialist Italian physiotherapists with expertise in respiratory care	Descriptive study with experience reports	Best practice recommendations in patients with respiratory failure, with indication of non-invasive ventilatory support or invasive mechanical ventilation.
Comprehensive physiotherapy management in Covid-19 – a narrative review	Scopus	Kalirathinam <i>et al.</i>	2020	Review	To describe the recent progress of physical therapy intervention in patients with Covid-19, preventing the reduction of adverse consequences of prolonged bed rest.	Descriptive studies based on experience reports were included.	Respiratory physiotherapy in the acute and post-acute phase and community rehabilitation.

DISCUSSION

The present research brought publications with the presence of physiotherapy in the emergency during the pandemic, and they discussed evidence in the literature according to the management of patients who presented Covid-19. In the description of, Almiron *et al.* (2021) the physical therapist during the pandemic was the professional responsible for techniques of functional mobilization, lung expansion and bronchial hygiene, aiming at the maintenance and increase of pulmonary ventilation and also regarding the evaluation, indication and assistance in performing the prone position in awake or awake patients using invasive mechanical ventilation, which was aimed at improving oxygenation and gas exchange. During the pandemic, it was essential that Physiotherapists were trained to efficiently manage the supply of oxygen in the emergency room to patients and to know that there were risks, in order to avoid the spread of the virus, through the use of adequate resources and with the use of PPE. In this sense, it was essential to know which interfaces should be used and titrate the supply of oxygen, reducing the negative outcomes so frequent in this disease (Silva *et al.*, 2021). Accordingly, Thomas *et al.* (2020) in his research, he describes the management of physiotherapy actions for Covid-19 in the hospital environment in acute patients, reporting that they were carried out at the entrance of patients through the emergency door, conducts such as: stimuli for bronchial clearance enabling the best ability to cleaning of the mucociliary mat in the patient with already confirmed presence of mild symptoms. The same also reports that with the entry of more serious patients, confirmed with changes in the chest image suggestive of Covid-19, there was an indication of the use of low or high flow oxygen and the suggestion for the use of invasive mechanical ventilation was also indicated. (IMV) or non-invasive (NIV) in these environments and also in the intensive care unit (ICU). However, the use of NIV, in routine use, was not recommended, as the current experience with hypoxemic respiratory failure of viral origin in Covid-19 had a high failure rate associated with the worsening of this patient during the administration of invasive mechanical ventilation if he was elected to the procedure (Thomas *et al.*, 2020).

Vitacca *et al.* (2020), elaborated a consensus on ventilatory interventions in patients with Covid-19 during the acute phase, which corroborate the previous author, where the indication of the conducts were related to the reduction of dyspnea and improvement of tracheobronchial clearance. Kalirathinam *et al.* (2020) described that during the acute and initial phase of the disease, the indication of the use of non-invasive ventilation and prolonged oxygen therapy were not suggestive, because from the use of such conduits, the presence of respiratory rate can be considered. above 30 incursions per minute, use of accessory muscles for breathing, evidencing the increase in ventilatory effort, thus considering the suggestion of orotracheal intubation and invasive mechanical ventilation. Lazzeri *et al.* (2020) developed recommendations for ventilatory care, where prolonged NIV use in hypoxemic acute respiratory failure associated with viral pneumonia, which promotes delayed orotracheal intubation, was associated with higher mortality in patients with Covid-19.

Corroborating with previous authors, Guimarães *et al.* (2020) the physical therapist was present performing numerous procedures in the ICU or Covid Emergency, thus justifying the importance of his performance, among these procedures stood out: assistance with orotracheal intubation, pronation and supination in critically ill patients, adjustment of mechanical ventilation, monitoring of ventilatory mechanics, alveolar recruitment, positive end-expiratory pressure titration (peep) and weaning from ventilation. Robba *et al.* (2020) does not report in their experience that physiotherapeutic interventions that could be related to the improvement of the ventilatory condition of patients with Covid-19, unlike the works presented here, where they agreed with each other on the benefits of physiotherapy during the initial and acute phase. of the disease.

CONCLUSION

The epidemic caused by the new Coronavirus highlighted the importance of physiotherapists in the emergency, promoting the social recognition of professionals by health managers, but the limitation of scientific evidence in the bases of studies that deal with the ventilatory treatment for the disease is still perceptible. In this way, it becomes necessary and evident that the physical therapist is present in the interdisciplinary health teams in the fight against the virus, also highlighting their performance at the primary, secondary and tertiary levels. It is suggested to expand on the topic with the presentation of more robust studies, which generate an impact on the scientific community and better conduct of treatment during the acute phase of the disease.

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