

Physiotherapy performance and management in hospital during SARS-CoV-2 (Covid-19) pandemic: The importance and challenges of rehabilitation**Desempenho e gestão da fisioterapia no hospital durante a pandemia do SARS-CoV-2 (Covid-19): A importância e os desafios da reabilitação**

DOI:10.34117/bjdv6n9-226

Recebimento dos originais: 14/08/2020

Aceitação para publicação: 10/09/2020

Angélica Yumi Sambe

Physiotherapy student at State University of Northern Paraná – UENP – Jacarezinho.

Institution: Health Sciences Center - Physiotherapy, State University of Northern Paraná – UENP, Jacarezinho, PR, Brasil.

Address: Street Alameda Padre Magno, n° 841 - Neighborhood: Nova Jacarezinho, Jacarezinho - PR, Brazil.

E-mail: angelicasambe@gmail.com - Corresponding author.

Thays Helena Moysés dos Santos

Physiotherapy student at State University of Northern Paraná – UENP – Jacarezinho.

Institution: Health Sciences Center - Physiotherapy, State University of Northern Paraná – UENP, Jacarezinho, PR, Brasil.

Address: Street Alameda Padre Magno, n° 841 - Neighborhood: Nova Jacarezinho, Jacarezinho - PR, Brazil.

E-mail: thayshelena1369@gmail.com

Vagner Pires Campos Júnior

Physiotherapist by State University of Northern Paraná – UENP – Jacarezinho. Resident in Intensive Care / Urgency and Emergency at Irmandade Santa Casa de Londrina (ISCAL).

Institution: Health Sciences Center - Physiotherapy, State University of Northern Paraná – UENP, Jacarezinho, PR, Brasil.

Address: Street Alameda Padre Magno, n° 841 - Neighborhood: Nova Jacarezinho, Jacarezinho - PR, Brazil.

E-mail: vagnerpcamposjr@gmail.com

Mahara-Daian Garcia Lemes Proença

PhD in Health Sciences by State University of Londrina – UEL – Londrina.

Institution: Health Sciences Center - Physiotherapy, State University of Northern Paraná – UENP, Jacarezinho, PR, Brasil.

Address: Street Alameda Padre Magno, n° 841 - Neighborhood: Nova Jacarezinho, Jacarezinho - PR, Brazil.

E-mail: mahara.proenca@gmail.com

Douglas Fernandes da Silva

PhD in Applied Microbiology by Paulista State University – UNESP – Rio Claro.

Institution: Health Sciences Center - Physiotherapy, State University of Northern Paraná – UENP, Jacarezinho, PR, Brasil.

Address: Street Alameda Padre Magno, n° 841 - Neighborhood: Nova Jacarezinho, Jacarezinho - PR, Brazil.

E-mail:douglas.fernandes@uenp.edu.br

ABSTRACT

Human society is experiencing intense social changes caused by the new Coronavirus (SARS-CoV-2) pandemic. The disease caused by the new Coronavirus (COVID-19) and facing a scenario of fear and high mortality rates, adaptations were necessary in several sectors, especially in health. COVID-19 causes acute respiratory distress syndrome (ARDS). The consequence for infected individuals is the search for medical services, and for more serious cases, it is admitted to an Intensive Care Unit (ICU), given the seriousness and compromise of the case. Based on all the signs and symptoms and evolution of COVID-19, strategies are necessary to alleviate and treat the individual's clinical condition. Thus, physiotherapy is able to significantly minimize the consequences of all sequelae resulting from the hospitalization process, promoting faster functional recovery and, if necessary, providing care to reverse the pulmonary impairment that the infected individual may have.

Keywords: Physiotherapy; SARS-CoV-2 (Covid-19); Intensive Care Unit (ICU).

RESUMO

Nos últimos meses, uma crise de saúde mundial, provocada pelo surto e disseminação do novo Coronavírus (SARS-COV-2), assolou diversos países. O também denominado COVID-19, é pertencente a uma família de vírus zoonóticos capaz de causar a Síndrome do Desconforto Respiratório Agudo (SDRA). A consequência para os indivíduos infectados é a procura de serviços médicos, e para casos mais graves, é serem admitidos em uma Unidade de Terapia Intensiva (UTI), visto a gravidade e o comprometimento do caso. Com base em todos os sinais e sintomas e evolução do COVID-19, estratégias são necessárias para amenizar e tratar o quadro clínico do indivíduo. Dessa forma, a fisioterapia se faz capaz de minimizar significativamente as consequências de todas as sequelas decorrentes do processo de internação, promovendo uma recuperação funcional mais rápida e, caso necessário, prestando atendimento para reverter o comprometimento pulmonar que o indivíduo infectado pode vir apresentar.

Palavras-chave: Fisioterapia; SARS-CoV-2 (Covid-19); Unidade de Tratamento Intensivo (UTI).

1 INTRODUCTION

In recent months, a global health crisis, caused by the outbreak and spread of the new Coronavirus (SARS-CoV-2), has plagued several countries (LAI et al., 2020). Coronavirus, or also called COVID-19, belongs to a family of zoonotic viruses capable of causing the Acute Respiratory Discomfort Syndrome (ARDS) (OLIVEIRA; MORAIS, 2020). The consequence for infected individuals is the search for medical services, and for more serious cases, they are admitted to an Intensive Care Unit (ICU), given the severity and the compromise of the case (LAZZERI et al., 2020).

According to Anvisa (ANVISA, 2010), which provides for the functioning of ICUs in Brazil, it is necessary in this physical space for the presence of a physiotherapist for 10 beds for at least 18 hours. This professional is responsible for preserving the patient's ventilatory functionality and care, ranging from functional positions to the management of mechanical ventilation (ROTTA et al., 2018). At the initial moment, the physiotherapist is one of the team responsible for maintaining the patient's lung function. Many of these patients require an oxygen supply to maintain arterial oxygen saturation. Some patients still progress with worsening condition to a severe acute respiratory syndrome, requiring that the patient be kept on mechanical ventilation. In this case, the physiotherapist is one of the team responsible for the ventilatory strategy, choosing the most appropriate mode and parameters for each case (COFFITO, 2020). Thus, it can be said that the presence of the physiotherapist as a front-line professional against the Covid-19 pandemic is of paramount importance for the whole of society. Because, these professionals, promote health, prevention and rehabilitation of the consequences caused by the virus, reducing limitations and injuries (SALES et al., 2020).

The present work seeks to highlight the challenges and functions that the hospital physiotherapist faces in the face of the new coronavirus pandemic. Which led to new challenges for physiotherapists, such as greater care in the face of endeavors for patients, with this, a need to update knowledge and procedures within the hospital environment.

2 SARS-COV-2 ORIGIN: HISTORICAL CONTEXT OF THE VIRUS

On December 31, 2019, the World Health Organization (WHO) was alerted to several cases of pneumonia in the city of Wuhan, province of Hubei, in the People's Republic of China, it was a type of coronavirus that had not been identified before in humans. Weeks later, Chinese authorities confirmed the identification of a new type of coronavirus (OPAS, 2020).

Coronaviruses are everywhere, they are the second leading cause of the common cold (after rhinovirus) and, until the last decades, they hardly caused more serious diseases in humans than the common cold (OPAS, 2020). Seven human coronaviruses (HCoV) have already been identified: HCoV-229E, HCoV-OC43, HCoV-NL63, HCoV-HKU1, SARS-COV (which causes severe acute respiratory syndrome), MERS-COV (which causes Middle East respiratory syndrome) and the most recent new coronavirus (which at first was temporarily named 2019-nCoV and, on February 11, 2020, received the name SARS-CoV-2) (CAVALCANTE; ABREU, 2020). This new coronavirus is responsible for causing disease COVID-19 (SOUTO, 2020).

3 PATHOPHYSIOLOGY, ETIOLOGY AND EPIDEMIOLOGY OF SARS-COV-2

Covid-19 has the protein S (Spike), which is a spike of glycoproteins, allowing the binding to the membrane of a host cell, specifically in the angiotensin converting enzyme (ACE2), type I membrane protein expressed in the lung, heart, kidney and intestine (LIMA; SOUSA; LIMA, 2020). The primary physiological mechanism of ACE2 consists of the maturation of a peptide hormone that regulates vasoconstriction and blood pressure, angiotensin (YAN et al., 2020). However, binding to Sars-Cov-2 allows an increase in its virulent capacity and, therefore, viral replication within the host cell (CHOWDHURY; MARANAS, 2020).

Thus, SARS-CoV-2 (COVID-19) when the peak glycoprotein, which is on the surface of the lipid bilayer, connects to the ACE2 receptor (ECA2), forms a complex that is the target of an enzyme that is of the transmembrane serine protease 2 (TMPRSS2). This protease cleaves the complex at the level of the ACE2 receptor, which leaves protein S activated and, once initial adhesion is complete, the virus fuses with the cell membrane and then the viral genome manages to enter the human cell, initiating the infection process (LIMA; SOUSA; LIMA, 2020).

When infecting most hair cells in the alveoli, these cells stop performing their normal activities, causing the progressive accumulation of pus, dead cells and liquids in the lungs and the acute respiratory distress syndrome (ARDS) (CESPEDES; SOUZA, 2020). The lung injury caused by Covid-19 presents the destruction of the lung parenchyma, with extensive consolidation and interstitial inflammation, although some patients do not have a consistent picture of hypoxemia or respiratory distress during the course of the disease (SALES et al., 2020).

SARS-CoV-2 can be incubated for 2 to 14 days, and the first symptoms and development of ARDS are 8 days (LIMA, 2020). This rapid and severe deterioration may be due to an overproduction of immune cells and cytokines, cytokine release syndrome (CRS), which quickly

causes the failure of the multiple organ system and fatal damage to the tissues of the lungs, kidneys and heart (CESPEDES; SOUZA, 2020).

4 CLINICAL PICTURE AND FUNCTIONAL DECLINE

Initially, the patient has mild signs and symptoms, such as fever, dry cough and fatigue, due to the inflammatory response that occurs in the respiratory system (WANG et al., 2020). As the disease worsens, it causes a reduction in the oxygenation index, causing dyspnea with increased respiratory distress. How changes in the lung pattern interfere with the clinical severity of the disease, putting the function of the respiratory muscles and intolerance to physical exercise at risk (SALES et al., 2020). According to Dantas *et al.* (DANTAS et al., 2020), on average half of the patients after one week have dyspnea and, in severe cases, can progress rapidly to acute respiratory distress syndrome and septic shock. Thus, with the current global outbreak of COVID-19 and, given the aggressiveness that the virus acts on the human body, there is a huge demand for the resources and support of the Intensive Care Units (ICU), generating a saturation of health systems in the region with relatively short time (NORONHA et al., 2020). In addition, only a stay in the ICU causes negative consequences, such as the occurrence of long-term disability and potential functional decline, leading to a weakness, which appears in a diffuse and symmetrical way, affecting the appendicular and axial skeletal striated muscles (FERREIRA; VANDERLEI; VALENTI, 2014). Immobilization causes cardiovascular, joint, gastrointestinal and renal complications. Many of the disorders are reversible, but the longer the immobilization period, the more difficult the rehabilitation (GUEDES; OLIVEIRA; CARVALHO, 2018).

Based on all the signs and symptoms and the evolution of SARSs, mobilization strategies and therapeutic exercises are part of the routine of hospitals in Brazil and in the world treatment for Covid-19 (THOMAS et al., 2020). Thus, the physical therapy can reduce the consequences of all sequels of the hospitalization process and promote a faster recovery (SILVA; SOUSA, 2020).

5 PHYSIOTHERAPEUTIC MANAGEMENT

5.1. BASIC CARE, INFIRMARY AND GUIDANCE

Facing the situation, the role of physiotherapists is essential for both the prevention and treatment of patients with Covid-19. Thus, these professionals are inserted in Primary Care, to develop preventive and educational actions in this context. Through health education services with the community, surveillance of risk factors and matrix support favors containment and early treatment of possible cases in the community (PEGADO et al., 2020).

They provide information and guidance on ways to prevent the spread of viruses, in addition to preparing materials to expand the dissemination of information, in order to raise the population's awareness, promote collective planning strategies, enabling prevention and health promotion.

5.2. RESPIRATORY MANAGEMENT - MECHANICAL VENTILATION AGAINST SARS-COV-2

The physiotherapists, health professionals working in intensive care units, encounter and treat fragile and critical patients with fatigue, with disorientation and psychomotor agitation and/or with motor coordination problems or tremors with prolonged medication. In patients with COVID-19, physical therapy may be indicated if it has abundant secretions in the airways that have not been removed independently. The patient's condition is assessed on a case-by-case basis and, from there, interventions are elaborated and applied based on clinical indicators (FREITAS; NAPIMOGA; DONALISIO, 2020). High-risk patients, such as those with existing comorbidities (for example, neuromuscular disease, respiratory disease and fibrosis), may be to present hypersecretive or cough ineffective (THOMAS et al., 2020). In this way, a physiotherapeutic action becomes essential, because it provides airway clearance techniques for ventilated patients that show inadequate release signs. The physiotherapist also can also work on the positioning of patients with severe respiratory failure associated with COVID-19, including the use of the appropriate position to optimize oxygenation (THOMAS et al., 2020).

If pulmonary function is affected, the physiotherapist is responsible for dealing with the management of mechanical ventilation (MUSUMECI et al., 2020). Thus, to limit the severity of the sequelae resulting from the hospitalization process, it is essential that the physiotherapist acts in the initial phase of the disease in a hospital environment, which can provide a faster functional recovery and accelerates the discharge process. In some cases, where the infection promotes productive cough, the physiotherapist performs bronchial hygiene techniques that allow the removal of secretions and help to reduce respiratory distress. In other situations where there is a dry cough and is not productive, which is more common with COVID-19, respiratory physiotherapy may not be necessary. However, considering that the physiotherapist's role in the acute phase of the disease is not restricted to the respiratory system, this professional remains indispensable in this phase, conducting exercises and mobilizations that minimize the damage caused by musculoskeletal deficits caused by the prolonged immobilization (SILVA; SOUSA, 2020).

In addition, during physiotherapeutic procedures, special attention should be given to procedures that expose the risk of contamination, as a result of the dispersion of droplets in the air (spraying of aerosols, maneuvers that favor coughing and expectoration, non-invasive ventilation with systems that use masks with holes or other loss systems) and by direct contact (THOMAS et al., 2020). In Dutra's work (CAVALCANTE; DUTRA, 2020), it was demonstrated that the correct execution of procedures and with appropriate precautions can reduce the chances of cross contamination.

5.3. PHYSIOTHERAPY MANAGEMENT IN FRONT OF SARS-COV-2

Patients with SARS-CoV-2 (COVID-19) due to their critical clinical condition, remain in the ICU (SILVA; SOUSA, 2020), for a long time; consequently, they are exposed to prolonged protective pulmonary ventilation, sedation, use of blocked neuromuscular agents, inactivity, malnutrition, comorbidities and medications (MARTINEZ; ANDRADE, 2020). And, according to the same authors, this practice can cause the development of weakness, which leads to a progressive loss of mobility, directly impacting your quality of life after the ICU and increasing your risk of death in the first year after hospital discharge. Thus, it is essential to start an early rehabilitation after an acute phase of respiratory distress, in which patients have cardiorespiratory and metabolic capacity, in order to limit the severity of weakness acquired in the ICU and promote a quick functional recovery (THOMAS et al., 2020). The therapeutic plan developed by physiotherapists shows great importance to protect the functional state. And, consequently, start the rehabilitation process with a focus on gain, according to the existing diagnosis and prognosis (MARTINEZ; ANDRADE, 2020). For this, it is necessary to carry out exercise, mobilization and rehabilitation for patients with diseases associated with COVID-19, in order to allowing this functional return (THOMAS et al., 2020).

The application of these interventions makes it possible to minimize these losses during hospitalization, so that, at the time of hospital discharge, the individual's level of functionality is as close as possible to the prehospital condition (MARTINEZ; ANDRADE, 2020).

6 BIOSAFETY AND THE PHYSICAL THERAPY ACTION IN THE FIGHTING PANDEMIC

In view of the available information, it is possible to know that SARS-CoV-2 (COVID-19) spreads through respiratory droplets (expelled during one speech, cough or sneeze) and also by direct contact with infected people, or indirect, through contaminated hands, objects or surfaces

(OPAS, 2020). The prevention and control measures must be implemented before contact with the patient at the service, on arrival, at the screening, at the waiting, at the attendance and throughout the assistance provided (COFFITO, 2020). Therefore, considering that the new coronavirus has a high rate of transmissibility, it is essential that the health service guarantees internal policies and practices that minimize exposure and the respiratory pathogen.

According to the authors HUANG et al. (HUANG et al., 2020), it is essential that professionals and the health team in general, use personal protective equipment (PPE), including cloak, gloves, mask with high filtering capacity (N95 or PFF2), and glasses or face protector. Such equipment brings discomfort to professionals and can include skin lesions, such as the case of a face mask, but its use is essential, as it serves as a barrier for the transmission and contagion of viruses (GUIMARÃES, 2020).

7 CONCLUSION

This study exposes the notorious work done by the physiotherapist in the hospital environment. Its actions and techniques in the treatment and management of patients infected with the new coronavirus, save and provide a better quality of life.

In addition, the importance of the performance of a multidisciplinary team, especially the physiotherapist, in the care of individuals with COVID-19, who have limitations and impaired lung function, is perceived. It is also possible to verify the effectiveness in the provision of health services by this professional, from the population's awareness process to avoid contamination, to individual outpatient care and the Intensive Care Unit (ICU), to relieve the symptoms resulting from COVID-19.

REFERENCES

- ANVISA. **RDC nº 7 de 24 de fevereiro de 2010** *Diário Oficial da União*, 2010.
- CAVALCANTE, V. S. P.; DUTRA, L. M. A. Protocolo para Intubação Orotraqueal (IOT) segura na pandemia da COVID-19, no cenário do Sistema Único de Saúde. **Health Residencies Journal - HRJ**, 2020.
- CESPEDES, M. DA S.; SOUZA, J. C. R. P. Sars-CoV-2: A clinical update - II. **Revista da Associação Médica Brasileira**, v. 66, n. 4, p. 547–557, 1 abr. 2020.
- CHOWDHURY, R.; MARANAS, C. D. Biophysical characterization of the SARS-CoV2 spike protein binding with the ACE2 receptor explains increased COVID-19 pathogenesis. **bioRxiv**, 31 mar. 2020.
- COFFITO. **COFFITO-CORONAVÍRUS**. Disponível em: <<https://coffito.gov.br/campanha/coronavirus/>>. Acesso em: 1 ago. 2020a.
- COFFITO. **RECOMENDAÇÕES DO COFFITO QUANTO AO USO DE EQUIPAMENTOS DE PROTEÇÃO INDIVIDUAL (EPIs)**. [s.l.: s.n.]. Disponível em: <https://www.coffito.gov.br/nsite/wp-content/uploads/2020/05/cartilha-2_compressed-5-1.pdf>. Acesso em: 1 ago. 2020b.
- DANTAS, M. et al. **Contribuições das áreas: Farmácia, Fisioterapia e Psicologia aos pacientes internados em UTIs por COVID-19** *Health Residencies Journal - HRJ*. [s.l.: s.n.]. Disponível em: <<https://escsresidencias.emnuvens.com.br/hrj/article/view/81>>. Acesso em: 1 ago. 2020.
- FERREIRA, L. L.; VANDERLEI, L. C. M.; VALENTI, V. E. Estimulação elétrica neuromuscular em pacientes graves em unidade de terapia intensiva: revisão sistemática Neuromuscular electrical stimulation in critically ill patients in the intensive care unit: a systematic review. **Einstein**, v. 12, n. 3, p. 361–366, 2014.
- FREITAS, A. R. R.; NAPIMOGA, M.; DONALISIO, M. R. Análise da gravidade da pandemia de Covid-19. **Epidemiol. Serv. Saude, Brasília**, v. 29, n. 2, 2020.
- GUEDES, L. P. C. M.; OLIVEIRA, M. L. C.; CARVALHO, G. DE A. Efeitos deletérios do tempo prolongado no leito nos sistemas corporais dos idosos-uma revisão Deleterious effects of prolonged bed rest on the body systems of the elderly-a review. **Rev. Bras. Geriatr. Gerontol.**, p. 516–523, 2018.
- GUIMARÃES, F. Atuação do fisioterapeuta em unidades de terapia intensiva no contexto da pandemia de COVID-19. **FISIOTERAPIA MOTORA**, p. 1–3, 2020.
- HUANG, C. et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. **The Lancet**, v. 395, n. 10223, p. 497–506, 15 fev. 2020.
- LAI, J. et al. Factors Associated With Mental Health Outcomes Among Health Care Workers Exposed to Coronavirus Disease 2019. **JAMA network open**, v. 3, n. 3, p. e203976, 2 mar. 2020.
- LAZZERI, M. et al. **Respiratory physiotherapy in patients with COVID-19 infection in acute setting: A Position Paper of the Italian Association of Respiratory Physiotherapists (ARIR)** *Monaldi Archives for Chest Disease* PAGE Press Publications, , 21 jan. 2020. Disponível em: <<https://www.monaldi-archives.org/index.php/macd/article/view/1285>>. Acesso em: 1 ago. 2020
- LIMA, C. M. A. DE O. **Information about the new coronavirus disease (COVID-19)** *Radiologia Brasileira* Colegio Brasileiro de Radiologia, , 1 mar. 2020. Disponível em: <<http://dx.doi.org/10.1590/0100-3984.2020.53.2e1>>. Acesso em: 1 ago. 2020
- LIMA, L. N. G. C.; SOUSA, M. S. DE; LIMA, K. V. B. As descobertas genômicas do SARS-CoV-2 e suas implicações na pandemia de COVID-19. **J. Health Biol. Sci. (Online)**, 2020.
- MARTINEZ, B. P.; ANDRADE, F. M. D. **ESTRATÉGIAS DE MOBILIZAÇÃO E EXERCÍCIOS TERAPÊUTICOS PRECOCES PARA PACIENTES EM VENTILAÇÃO MECÂNICA POR INSUFICIÊNCIA RESPIRATÓRIA AGUDA SECUNDÁRIA À**

COVID-19. [s.l: s.n.]. Disponível em: <https://assobrafir.com.br/wp-content/uploads/2020/04/ASSOBRAFIR_COVID-19_Mobilização_2020.04.01-1.pdf>. Acesso em: 1 ago. 2020.

MUSUMECI, M. M. et al. **RECURSOS FISIOTERAPÊUTICOS UTILIZADOS EM UNIDADES DE TERAPIA INTENSIVA PARA AVALIAÇÃO E TRATAMENTO DAS DISFUNÇÕES RESPIRATÓRIAS DE PACIENTES COM COVID-19.** [s.l: s.n.]. Disponível em: <https://assobrafir.com.br/wp-content/uploads/2020/06/ASSOBRAFIR_COVID-19_RECURSOS_EM_UTI_2020.05.30.pdf>. Acesso em: 3 ago. 2020.

NORONHA, K. V. M. DE S. et al. Pandemia por COVID-19 no Brasil: análise da demanda e da oferta de leitos hospitalares e equipamentos de ventilação assistida segundo diferentes cenários. **Caderno de Saúde Pública**, 2020.

OLIVEIRA, E. D. S.; MORAIS, A. C. L. N. DE. COVID-19: UMA PANDEMIA QUE ALERTA À POPULAÇÃO. **InterAmerican Journal of Medicine and Health**, 2020.

OPAS. **Folha informativa – COVID-19 (doença causada pelo novo coronavírus).** Disponível em: <https://www.paho.org/bra/index.php?option=com_content&view=article&id=6101:covid19&Itemid=875>. Acesso em: 1 ago. 2020.

PEGADO, R. et al. Coronavirus disease 2019 (COVID-19) in Brasil: Information to physical therapists. **Revista da Associação Médica Brasileira**, v. 66, n. 4, p. 498–501, 1 abr. 2020.

ROTTA, B. P. et al. Relação entre a disponibilidade de serviços de fisioterapia e custos de UTI Endereço para correspondência. **Bras Pneumol**, p. 184–189, 2018.

SALES, E. M. P. et al. FISIOTERAPIA, FUNCIONALIDADE E COVID-19: REVISÃO INTEGRATIVA. **Cadernos ESP-Revista Científica da Escola de Saúde Pública do Ceará**, p. 68–73, 2020.

SILVA, R. M. V. DA; SOUSA, A. V. C. DE. Fase crônica da COVID-19: desafios do fisioterapeuta diante das disfunções musculoesqueléticas. **Fisioterapia em Movimento**, v. 33, 29 maio 2020.

SOUTO, X. M. COVID-19: ASPECTOS GERAIS E IMPLICAÇÕES GLOBAIS. **Recital-Revista de Educação, Ciência e Tecnologia de Almenara/MG.**, 2020.

THOMAS, P. et al. **Physiotherapy management for COVID-19 in the acute hospital setting: Recommendations to guide clinical practice** *Pneumon Technogramma*, , 1 jan. 2020.

WANG, D. et al. Clinical Characteristics of 138 Hospitalized Patients with 2019 Novel Coronavirus-Infected Pneumonia in Wuhan, China. **JAMA - Journal of the American Medical Association**, v. 323, n. 11, p. 1061–1069, 17 mar. 2020.