

Ventilatory modalities for patients with SARS-COV-2: A literature review



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ABSTRACT

Ventilatory modes are different ways of interacting the device in the patient's respiratory cycle, and some variants can change, such as frequency, pressure, volume, support if the device does all the stimulation of the drive or not, and if the patient will do it spontaneously or totally dependent on the mechanical ventilator to survive. The objective of the study was to describe the most appropriate ventilatory modes for patients diagnosed with SARS-CoV-2 (Severe Acute Respiratory Syndrome Coronavirus) with the best response to the condition. In addition, recognizing the patient's pulmonary plasticity and evaluating the most appropriate Positive Expiratory Pressure (PEEP) for an improvement in the clinical condition. The method used was a literature review using scientific research, published in databases on the Scientific Electronic Library Online (Scielo) and National Library of Medicine (NLM) platforms. The result of the research showed that patients with SARS-CoV-2 are not intubated early, because if there is no evidence for this, the patient may have permanent and irreversible lesions. Thus, it is concluded that each patient has his or her own individuality, and should be taken into account his or her previous comorbidities, requiring an evaluation of the patient's respiratory drive and pulmonary plasticity, as well as the application of mini PEEP titration.

Keywords: SARS-CoV-2, Ventilatory, Plasticity, Lung.

1 INTRODUCTION

Ventilatory modes are different ways of interacting with the device in the patient's respiratory cycle, and some variants may change, such as frequency, pressure, volume, support if the device does all the stimulation of the drive or not, and if the patient will do it spontaneously or totally dependent on the mechanical ventilator to survive (PADUA; MARTINEZ, 2001).

In SARS-CoV-2, the use of invasive mechanical ventilation (ventilatory modes) is necessary, so it is important to understand that the therapeutic prognosis depends on a good choice for the



treatment of these patients, with an intervention appropriate to their individual needs. The choice of ventilatory mode may be decisive for the improvement or worsening of this patient's condition (GRASSELLI *et al.*, 2021).

Within the ventilatory modes, it is noted that several factors are important for a correct and effective choice, as many patients suffer from the wrong choice, causing a low prognosis, which, consequently, can lead to death. Emphysematous patients, for example, do not support a PEEP of more than 5L, but it is common to find patients affected by SARS-CoV-2, with PEEP of 10L to 14L (NOBRE; SILVA; PEREYRA, 2020).

Thus, what is left of the lung will be destroyed due to the increase in internal pressure, which makes it impossible for areas that are still useful to perform a good gas exchange, due to the increase in PEEP. Consequently, the patient will have respiratory failure due to the non-adequacy of his ventilatory parameters. Thus, hypersecretive patients, such as asthmatic patients, are more likely not to require fully controlled ventilation, and may have assisted ventilation that allows them to travel the drive autonomously and safely (NOBRE *et al.*, 2020).

It is important to emphasize the importance of advising physicians and health professionals that the main factor in the involvement of patients in the severe form of SARS-CoV-2 is not only due to the disease itself, but also to their previous pathologies. The factors raised in this study contribute to the establishment of methods combined with maneuvers, for better use of ventilation, and a better therapeutic prognosis of patients, thus saving human lives (NOBRE *et al.*, 2020).

The guiding question of the study was to investigate which is the most appropriate ventilatory mode for the patient with SARS-CoV-2, considering the best response to the condition installed at the time?

From this doubt, the relevance related to the subject can be observed, since many patients obtained an unfavorable prognosis due to the poor choice of their ventilation.

Thus, the objective of this study was to identify the most appropriate ventilatory mode for the patient with SARS-CoV-2 with the best response to the clinical picture. The specific objectives are: To analyze the most appropriate choice among ventilatory modes. To understand the impact of pronation on the patient's respiratory improvement. Recognize the best Alveolar Pressure at the end of each breath (PEEP) appropriate for the different types of comorbidities of the patient on mechanical ventilation.

2 METHODOLOGY

For the study developed here, scientific research, published in public databases, was used, giving direction on the theme addressed in the researches, having a bibliographic base to facilitate understanding. To carry out this study, a narrative bibliographic review of the scientific literature was carried out based on publications available in the online databases on the *Scientific Electronic Library*



Online (Scielo), U. S. National Library of Medicine (NLM) platforms, being a Pubmed database, in which the following keywords were used: ventilatory modalities; SARS-CoV 2; plasticity; and lung.

The present study does not require a review of the Research Ethics Committee (REC).

3 RESULTS AND DISCUSSIONS

Regarding patient positioning, those who are affected by the severe form of SARS-CoV-2 should not be in the prone position, as this makes it impossible to rescue the patient's respiratory rescue. In addition, there is no scientific evidence stating that this modality results in a decrease in hospitalization (CHEN; ZHANG; READ; SONG; LIN; PAN, 2022).

The condition of a patient duly intubated on mechanical ventilation, affected by low saturation due to the severe form of SARSCoV-2 disease, aims at better oxygenation of the disease. According to IOTA (*Mortality and morbidity in acutely ill adults treated with liberal versus conservative oxygen therapy*), which is a systematic study of 25 RCTs (16,000 patients) who used O₂ support, it was proven that liberal oxygenation targets in patients who had ventilation support maintained at saturation above 96%, the risk of relative death was 1-21 out of 100% (CHU *et al.*, 2018).

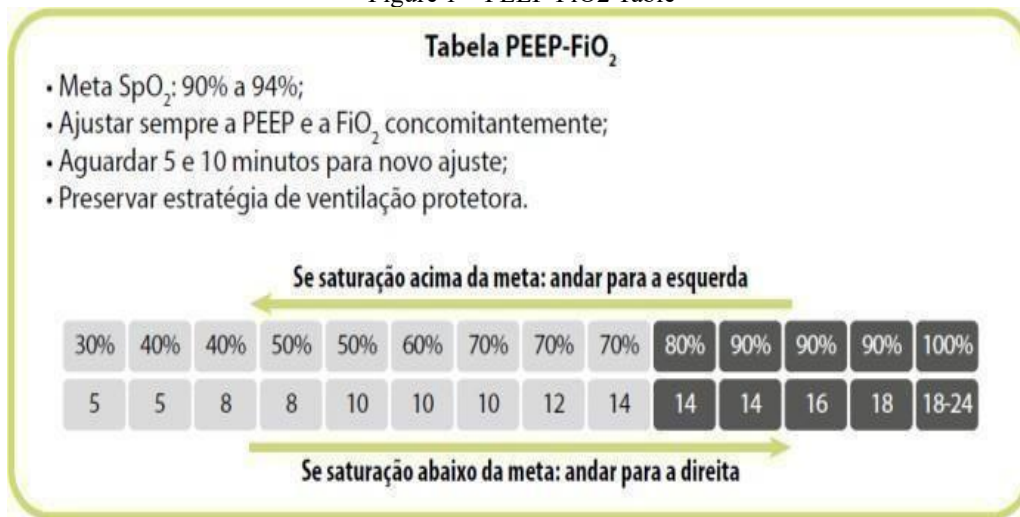
Since a saturation floor of 92% is required, taking into account that the use of conservative oxygenation methods within 90 days is required, the study proves that these patients forced with high doses of oxygenation at some point suffered from respiratory hypoxemia, compared to patients who had an SpO₂ <92% to 96% had a better prognosis within the elapsed time (BARROT *et al.*, 2020).

Through this study, it was recognized that it is of fundamental importance to know the values of lung compliance and the value of inspiratory flow resistance in order to arrive at the best PEEP value. Always having an individualized perspective for each patient, thus respecting their previous comorbidities, understanding that even patients affected by the acute form of SARSCoV 2 disease do not necessarily need high PEEP volumes to remain oxygenated, which can lead to respiratory hypoxemia.

According to the Brazilian Guidelines for Hospital Treatment of Patients with Covid-19 – the use of Oxygen, Orotracheal Intubation and Mechanical Ventilation, reveals that contrary to what is thought about SpO₂ cases, which are below 90%, the table below should be to the right, up to close to 70% PEEP for patients with 14 cmH₂O, If the patient maintains a high saturation, there may be an impairment of gas exchange observed in the blood gas analysis. Some relationships can, even without proof, help in the ventilation/perfusion ratio, and a milliter of PEEP, as shown in figure 1 below (BRASIL, 2021).



Figure 1 – PEEP-FiO₂ Table



Source: Brazil (2021).

The Mini PEEP titration aims to recruit alveoli for ventilation without causing pulmonary hyperdistension, thus improving the Ventilation/Perfusion ratio and oxygenation of the patient, causing minimal damage. The term used for mini PEEP titration refers to a maneuver reference to use the maximum PEEP level, which will be 20 cmh₂o (25 cmho in patients with BMI weight above 30 kg/m²) (BRASIL, 2021).

According to the NIH on the subject "*Positive end-expiratory pressure*" (PEEP), it is necessary to maintain the expanded alveoli and the functional residual capacity, thus providing a better compliance of the respiratory part, and this patient is pressurized to avoid an Atelectrauma, an injury that occurs by opening and closing the alveoli several times, causing the inflammatory process, and causing hypoxemia of the patient (CARPIO; MORA, 2022).

4 FINAL THOUGHTS

Through the data collected in the reviews of articles, it was noticed that it is possible to collect information about the coping with severe cases of SARS-CoV-2, among its respiratory therapeutic modalities, there are pronation maneuvers, and there is no scientific evidence for this procedure.

In addition, the study demonstrated that patients with SARSCoV-2 should not be intubated early, without there being evidence for this, and that prior oxygenation with an oxygen mask should not be skipped directly to intubation, even if there is no evidence to demonstrate the effectiveness of oxygenation of patients with chronic disease. However, even if there is no correlation with the decrease in intubation cases, oxygenation with a mask should be performed.

The present study included a review of protocols and articles collected prior to the pandemic, considering the previous individualized comorbidities of patients, and updated reviews regarding SARS-CoV-2.



Therefore, it is necessary to encourage the permanent review and updating of professionals who work in intensive care units (ICU), reinforcing the importance of hypoxemia prevention, through updates of plasticity and

Mini titration of PEEP, bringing more safety and comfort to the patient, reducing damage and risks, improving, as demonstrated in the studies, its clinical evolution until discharge from the respirator.



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