

## VENTILATORY SUPPORT IN BRONCHIOLITIS: LESS INVASIVE ALTERNATIVES FOR BETTER RESULTS

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**Abstract:** Bronchiolitis is a pneumopathy resulting from acute inflammation of the terminal bronchioles of viral etiology. The high-flow nasal catheter (HFNC) is a non-invasive resource that has the physiological effect of reducing respiratory work, reducing dead space, and promoting efficient gas exchange. The objective of the study was to analyze the outcome of children diagnosed with bronchiolitis on ventilator support and the relationship with the etiological agent. A retrospective survey was carried out on the medical records from January to December 2023 of the pediatric ICU. The inclusion criteria in the analysis were a diagnosis of viral bronchiolitis requiring ventilatory support. The types of support needed were analyzed, as well as their progression to invasive support, totaling 518 children in this criterion. All children included in the analysis (518) started using HFNC and 28 (5.4%) of them progressed to needing non-invasive ventilation. Of these, 7 developed the need for invasive ventilatory support, and 5 of these children already had comorbidities and associated antecedents. We therefore conclude that the use of HFNC proved to be an effective alternative for the treatment of bronchiolitis, in addition to being a comfortable therapy that allows the child to communicate, eat, among other benefits.

**Keywords:** Acute viral bronchiolitis; Physiotherapy; Non-invasive ventilation

## INTRODUCTION

Acute viral bronchiolitis (AVB) is a frequent diagnosis of hospital admission in pediatrics, caused mainly by the respiratory syncytial virus (RSV). It occurs epidemically in the autumn and winter months. Some populations of children (preterm newborns, congenital heart disease, chronic lung disease, immunocompromised, malnourished, among others) present a higher risk of morbidity and mortality.

Children under the age of six months are at risk of serious illness from AVB. The disease is seasonal and coincides with epidemics of infections secondary to viral respiratory pathogens. It causes inflammation and obstruction of the bronchioles. The most common etiological agent is RSV, but AVB can also be caused by parainfluenza, adenovirus, influenza, *Mycoplasma pneumoniae*, rhinovirus, *Chlamydia pneumoniae*, human metapneumovirus and coronavirus.

AVB caused by RSV is the result of infection and inflammation of the respiratory mucosa. Clinical symptoms of inferior SV obstruction are consequences of partial occlusion of the distal airways (VA).

The peculiarities of the respiratory system of infants and younger children include the smaller diameter of the airways, which predisposes to obstructions; immaturity of the diaphragmatic and intercostal muscles; Lambert's canals and Pores of Kohn are poorly developed, with collateral ventilation not occurring; thoraco-abdominal incoordination, rib cage more compliant; less elastic lungs with decreased lung compliance; greater vulnerability to infections, due to the immaturity of the still developing immune system. Due to these peculiarities, children are more susceptible to experiencing airway obstruction, muscle fatigue, difficulty with bronchial hygiene and the formation of atelectasis (INAFUKO EM, 2019 apud PIVA JP, et al., 1997)

The initial characteristics of the disease are abundant rhinorrhea and cough, associated with inadequate food acceptance (four to six days after the onset of symptoms). The presence of fever varies depending on the pathogen.

The treatment of bronchiolitis is predominantly through physiotherapeutic support, with the aim of mobilizing secretion, promoting lung re-expansion, helping to improve lung

oxygenation, and when necessary, oxygen therapy support, in order to avoid secondary complications. (Santana *et al.*, 2020).

Scientific evidence shows that the beneficial effects of high flow therapy (HFNC) related to adequate heating and humidification of the airways enable the maintenance of airway defenses and mucociliary transport, promoting efficient gas exchange, reduced inspiratory resistance, the elimination of anatomical dead space nasopharyngeal, a metabolic work related to reduced gas conditioning, better airway conductance and mucociliary transport, reducing the patient's respiratory effort, enabling energy conservation (SLAIN KN, et al., 2017).



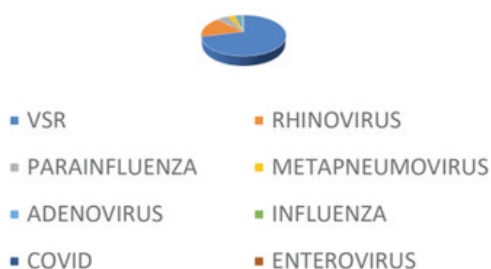
The main physiological effects are increased lung compliance, decreased respiratory work, reduces dead space, and promotes efficient gas exchange. In the treatment of hypoxemic respiratory failure, when used early, HFNC can avoid the need for invasive ventilatory support. (Silva *et al.*, 2022).

From January 2023 to December 2023, the outcomes of 518 children in the Pediatric Intensive Care Unit with a diagnosis of bronchiolitis on ventilatory support in high-flow therapy (HFNC) were analyzed.

All children included in the analysis (518) started ventilatory support using a high-flow nasal catheter, 28 progressed to needing non-invasive ventilation (NIV), and of these, 7 children needed invasive ventilatory support.

We observed that of these, 5 children had associated comorbidities. The prevalence of the etiological agent was respiratory syncytial virus in 260 children, of those who developed the need for non-invasive ventilatory support, 50% also had this agent; and of those that progressed to invasive support, the prevalence was 71% positive for RSV, followed by the prevalence of rhinovirus with 16%, parainfluenza 5.7%, adenovirus 3%, metapneumovirus 3% and influenza 0.7%.

Etiological Agent



In children who required non-invasive support, despite the risk of complications such as pneumothorax, none of them were observed. Given the data presented, with the success of high flow therapy (HFNC) in the largest number of children who used it, it shows it is important to use the resource in a systematic and updated way.

Based on the data observed, we conclude that the use of high flow therapy within the pediatric ICU proved to be an effective alternative for the treatment of cases of acute viral bronchiolitis, its application objectively reduces respiratory work and the need to use other resources, escalation of therapy, reducing the number of intubations and their possible complications, in addition to being a comfortable therapy for the patient and giving the child the opportunity to communicate, eat, among other benefits.

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