Revista ARACÊ
ISSN: 2358-2472

USE OF HIGH-FLOW NASAL CANNULA IN THE MANAGEMENT OF ATTACKS IN CHILDREN WITH ASTHMA

https://doi.org/10.56238/arev6n4-088

Submitted on: 06/11/2024 **Publication date:** 06/12/2024

Lara Ananias da Silva Rocha[1], Xisto Sena Passos[2], Daniela Rosana Pedro Fonseca[3] and Natasha Yumi Matsunaga[4]

ABSTRACT

Objective- To evaluate the protocols and benefits associated with the use of high-flow nasal cannula (HFNC) in periods of asthma attacks in children. Methods- This is a systematic review based on the Preferred Reporting Items for Systematic Reviews and Meta Analysis (PRISMA) methodology. This study included original articles that studied the effects of the use of HFNC in the management of asthma attacks in the pediatric population and written in Portuguese, English, and Spanish, published on the Virtual Health Library (VHL) website, in the Scientific Electronic Library Online (SciELO), Physiotherapy Evidence Database (PEDro), and in the PubMed database. using the descriptors "Asthma", "children", "pediatrics" and "high flow nasal cannula". Results- Initially, 140 published articles were identified and, according to the inclusion, exclusion and eligibility criteria, in the end 8 were selected for qualitative analysis. Of the selected articles, only one evaluated the benefits associated with the use of HFNC, presenting satisfactory results in improving the oxygenation of patients. When compared to oxygen therapy, HFNC presented similar results in most studies. In comparison with BiPAP, in one study, HFNC presented lower results than NIV. Conclusion- Despite the physiological benefits related to the use of HFNC in the management of asthma attacks, studies are still needed to better describe the protocols and main outcomes in the pediatric age group.

Keywords: Asthma, Pediatrics, Children, Nasal Cannula.

[1] Graduated in Physiotherapy
Universidade Paulista - UNIP
E-mail: larasrch@hotmail.com
ORCID: https://orcid.org/0009-0000-8530-6305
LATTES: http://lattes.cnpq.br/4826515177383972
[2] Dr. in Tropical Medicine
Universidade Paulista - UNIP
E-mail: xisto.sena@gmail.com
ORCID: https://orcid.org/0000-0001-5718-5323
LATTES: http://lattes.cnpq.br/5252826173695562
[3] Master in Physical Education
Universidade Paulista - UNIP
E-mail: Fonseca.dandri@gmail.com
ORCID: https://orcid.org/0000-0001-8976-3562
LATTES: http://lattes.cnpq.br/9554762099485395
[4] Dr. in Sciences
Federal University of Goiás - UFG
E-mail: natasha_matsunaga@ufg.br
ORCID: https://orcid.org/0000-0002-5467-6482
LATTES: http://lattes.cnpq.br/7009489840566561

Revista ARACÊ
ISSN: 2358-2472

INTRODUCTION

Asthma is a chronic inflammatory disease of the respiratory system that is associated with recurrent episodes of wheezing, dyspnea, chest tightness, and cough (SBPT, 2012). These episodes are triggered by inflammation of the pulmonary bronchi, with consequent bronchial hyperresponsiveness, airway obstruction, mucosal hypersecretion, and edema (MASLAN; MIMS, 2014; SBPT, 2020). With a high incidence in the pediatric age group, asthma is a disease resulting from the interaction of genetic predisposition and environmental factors (NEVES et al., 2021).

The pharmacological management of asthma is performed through the use of bronchodilators, antileukotrienes, and/or inhaled and oral corticosteroids to control symptoms (SBPT, 2012). In turn, non-drug treatment can be carried out through environmental control, treatment adherence, adequate inhalation technique, and physical therapy (GINA, 2019). The main objectives of physical therapy in cases of asthma are to minimize respiratory distress and dyspnea, improve respiratory mechanics, increase muscle strength in cases of respiratory muscle weakness, increase cardiorespiratory conditioning and, consequently, improve quality of life (BOTT et al., 2009).

Regarding the devices used in physical therapy, the high-flow nasal cannula (HFNC) stands out, which is a type of non-invasive respiratory support capable of delivering humidified and heated gases through a nasal cannula to the airways of individuals, in addition to providing associated continuous positive pressure (SLAIN; SHEIN; ROTTA, 2017). Respiratory support performed by HFNC is increasingly being used in children and adults for oxygen supplementation in situations of respiratory distress and hypoxemia, and in pediatrics this system has been used in situations that could require intubation or the use of Continuous Airway Pressure (CPAP) (DYSART et al., 2009).

Thus, studies indicate that in the management of the crisis, asthmatic children can benefit from the use of HFNC due to the reduction of dead space, increased carbon dioxide clearance, provision of a certain level of Positive End-Expiratory Pressure (PEEP), in addition to the reduction of bronchoconstriction and stimulation of the elimination of secretion by heated and humidified air (BAUDIN et al., 2017). However, studies are still needed to identify the parameters, protocols, and benefits of its use in the pediatric population. Therefore, the objective of this study was to evaluate the protocols and benefits associated with the use of high-flow nasal cannula in periods of asthma attacks in children.

Revista ARACÊ
ISSN: 2358-2472

METHODOLOGY

This article is a systematic review of the literature based on the Preferred Reporting Items for Systematic Reviews and Meta Analysis (PRISMA) methodology. For this, information was collected on the Virtual Health Library (VHL) website, in the Scientific Electronic Library Online (SciELO), Physiotherapy Evidence Database (PEDro) and in the PubMed database, using keywords with the following terms selected in the Health Sciences Descriptors (DeCS): asthma, pediatrics, children, nasal cannula, and in the Medical Subject Headings (MeSH). The descriptors: Asthma, Children, Pediatrics, High Flow Nasal Cannula. To facilitate the search, the keywords were associated with the following Boolean operators (asthma AND (child* OR pediatric*) AND high flow nasal cannula).

This study included original articles that studied the effects of the use of high-flow nasal cannula in the management of asthma attacks in the pediatric population, and were written in Portuguese, English, and Spanish. In addition, during data collection, bibliographic reviews, monographs, books, course completion papers, articles not found in full, research that did not address the pediatric population or that did not contribute to the theme of the study were excluded.

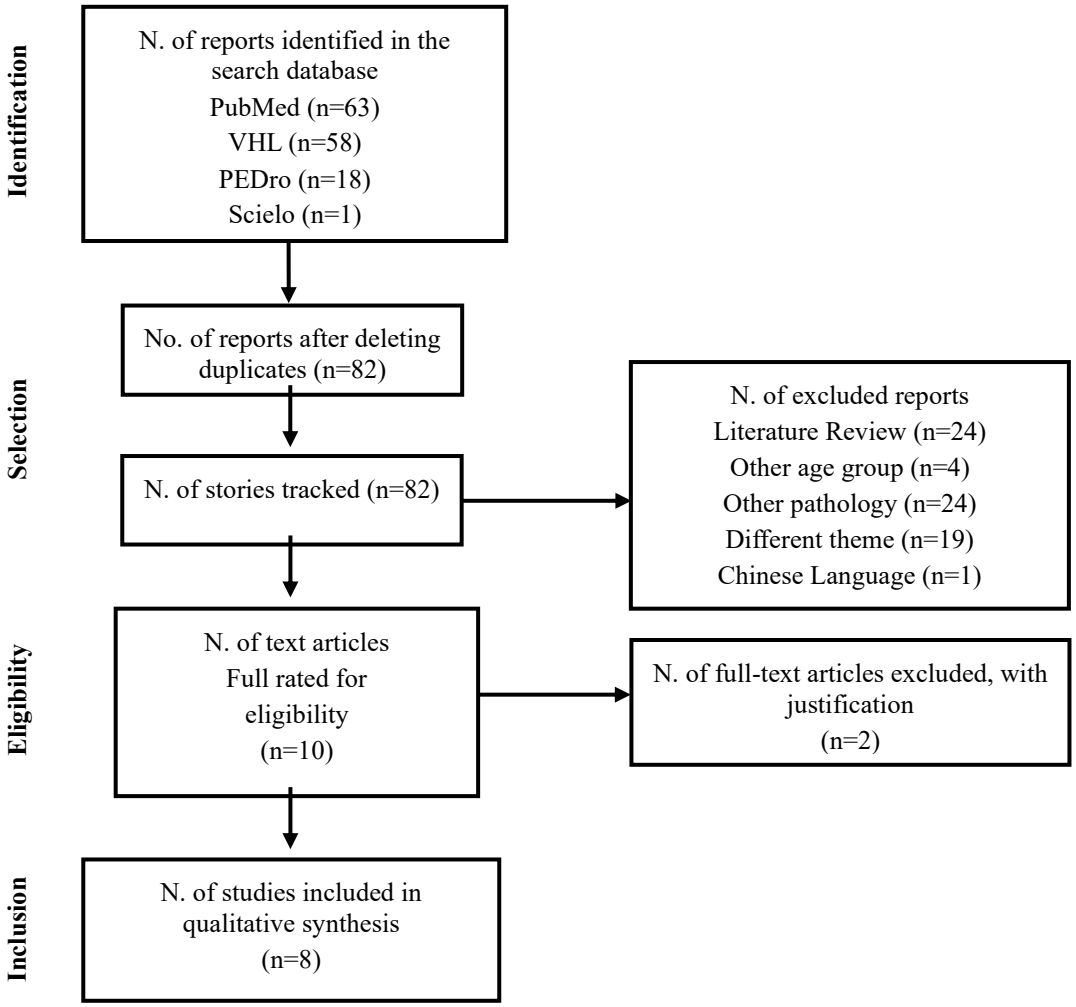
To select the final studies, we initially read by title, followed by abstracts, and finally read in full, to select those that fit the inclusion criteria, and thus evaluate the protocols and benefits associated with the use of the High Flow Nasal Cannula in periods of asthma attack in children.

RESULTS

According to the established research strategies, initially 140 published articles were identified and, according to the inclusion, exclusion and eligibility criteria, in the end 8 were selected for qualitative analysis (Figure 1):

Revista ARACÊ
ISSN: 2358-2472

Figure 1: Description of inclusion in qualitative synthesis.



Source: Based on the PRISMA method and completed by the authors (2024).

In the eight articles selected for qualitative analysis, 1062 children with asthma aged 1 to 18 years were evaluated. Chart 1 shows the characterization of the type of study and devices used, and the following Chart 2 describes the information regarding the author, year of publication, objective, population, parameters evaluated, protocol, and main results.

Only one study evaluated the use of HFNC in isolation in asthmatic children during the crisis period. Two other articles evaluated the use of HFNC compared to BiPAP NIV, and in the study by Russi et al. (2021) no differences were observed in relation to duration of use, mortality, or MV rates between the two devices. In the study by Pilar et al. (2017), the results point to a delay in NIV support and the potential need for longer periods of hospitalization and respiratory support.

Subsequently, the last five articles evaluated the use of HFNC compared to oxygen therapy, and in one of them the differences prevented precise conclusions regarding the

Revista ARACÊ
ISSN: 2358-2472

superiority of one technique over the other. In the following study, HFNC was shown to be superior to oxygen therapy in reducing the pulmonary score. In the third article, 20% of the patients in the HFNC group required ICU admission, however, the results were inconsistent, since the patients in this group were initially more severe. Finally, the last two studies found similar efficacy among the devices.

Chart 1: Characterization of the type of study and devices used.

Author/Year	Type of study	Devices used
Morosini *et al*., 2017	Prospective observational study	HFNC
Russi *et al*., 2022	Retrospective cohort study	CNAF x VNI (BiPAP)
Pilar *et al*., 2017	Observational cohort study	CNAF x VNI (BIPAP)
Baudin *et al*., 2017	Retrospective observational study	HFNC vs O2
Ballestero *et al*., 2018	Prospective randomized pilot study	HFNC vs O2
Martínez *et al*., 2019	Retrospective study	HFNC vs O2
Benítez *et al*., 2019	Open-label randomized controlled trial	HFNC vs O2
Gates *et al*., 2021	Retrospective review	CNAF x Nebulizer Mask with O2 and BD

LEGEND**:** HFNC: High Flow Nasal Cannula; NIV: Non-invasive ventilation; O2: Oxygen; BD: Bronchodilator.
Source: Completed by the authors (2024).

Table 2: Description of the selected articles.

Author/Year	Objective	Population	Parameters evaluated	Protocol	Main results
Morosini *et al.,* 2017	To report the experience of HFNC use in children over 2 years of age with moderate to severe asthma attacks in the pediatric emergency room.	78 children over 2 years of age with moderate (n=34) or severe (n=44) asthma attacks were seen at the pediatric emergency department from 03/01/13 to 08/31/16.	Gender, age, severity of the attack (Pediatric Asthma Score), maximum flow used during the stay in the pediatric emergency room and duration of the technique, complications, respiratory support used throughout the course and deaths.	For the administration of HFNC, equipment with a flowmeter of up to 70 L/min, a mixer (between 0.21 and 1 of oxygen and air) and nasal catheters appropriate to the flow supplied was used. The initial flow stipulated was 2 L/kg/min, initial inspired fraction of oxygen 0.6 and maximum flow rate: mean 30 L/m (12-60). The use of HFNC in the PICU lasted an average of 15 hours (1-46).	42 children used HFNC as their only respiratory support. Of this group, 3 patients with severe asthma exacerbations (4%) had to migrate to MV. The remaining 33 children used NIV as their only respiratory support. In this study, there were no lesions of the nasal mucosa or intolerance to the flow used. In addition, no deaths were recorded.

Revista ARACÊ
ISSN: 2358-2472

Russi *et al*., 2022	To describe patient characteristics and clinical outcomes of hospitalized children with asthma attacks receiving noninvasive respiratory support through HFNC or NIV with bilevel positive airway pressure (BiPAP).	39 children admitted due to asthma attacks in a PICU, aged between 5 and 17 years, from January 2016 to May 2019. 13 children were placed on HFNC (33%) and 26 on BiPAP (67%).	Demographic and anthropometric data, presence of comorbidities, asthma severity indices (*National Heart Lung and Blood Institute* –NHLBI) and *Pediatric Asthma Severity Score* (PASS), clinical history of asthma, duration of NIV methods, and clinical outcomes (length of hospital stay, rates of mechanical ventilation, exposure to sedatives, and use of adjuvant therapy).	Children on BiPAP had EPAP of 6.6 ± 1.6 cm H2O, IPAP of 15.4 ± 3.8 cm H2O. Those on HFNC had a mean peak flow rate of 12.2 ± 4.4 L/min (weight-adjusted mean peak flow rate of 0.4 ± 0.1 L/kg/min).	No differences were observed in relation to duration of use, mortality, MV rates or length of stay between the two groups (HFNC and NIV). In general, NIV was initiated on average 2.4 (0.2,2.8) hours after admission to the PICU and no differences were observed in SpO2 and PaCO2 pre-NIV. The median duration of BiPAP (0.9[0.6,1.3] days) was not different from the median duration of HFNC exposure (0.6[0.4,1.4] days, p= 0.51).
Pilar *et al*., 2017	To compare the results of HFNC versus NIV in children with severe asthma attacks.	42 children admitted due to asthma attacks in a PICU, aged between 1.5 and 14 years, were admitted between January 2012 and December 2014. 20 children were placed on HFNC (47.6%) and 22 on NIV (52.3%).	Age, sex, weight, Prism III, Wood-Downes score, HR, RR, pCO2, FiO2, SpO2, time in the emergency department, and percentage of HFNC use in the PICU.	In NIV, BiPAP mode, full face masks or oronasal masks with IPAP of 8 cmH2O and EPAP of 4-5 cmH2O were used to achieve a tidal volume of 6-9ml/kg. Inspiratory and expiratory pressure were titrated in increments of 2 cmH2O based on tidal volume, continuous pulse oximetry, work of breathing, respiratory rate, and subject-ventilator synchrony. FIO2 has also been titrated to maintain SpO2> 92%. In subjects who	There were no treatment failures in the NIV group. However, 8 children (40%) in the HFNC group required switching to NIV. The length of stay in the PICU was similar in both groups (NIV and HFNC). However, when considering the failure subgroup of HFNC, the mean duration of respiratory support was 3 times longer (63 hours), as was the length of stay in the PICU compared to the rest of the individuals who were successful in treatment.

Revista ARACÊ
ISSN: 2358-2472

				received HFNC, cannula size and circuit were selected according to the patient's weight. Flow rates were also adjusted for body weight: 2 L/kg/min for the first 10 kg + 0.5 L/kg/min for each kg above that (maximum flow 50 L/min). In the event of failure of respiratory support, the patient was transferred to a higher level of respiratory support. Subjects who received HFNC would be switched to NIV and those who would receive NIV would be switched to invasive MV.	
Baudin *et al*., 2017	To evaluate HFNC therapy for children admitted to our PICU with asthma attacks.	69 children aged between 1 and 18 years, without severe comorbidities, admitted between November 2009 and January 2014 to the PICU and diagnosed with asthma attack or AKI. The children were admitted to the PICU after at least 1 hour in the emergency department during which they did not respond to standard therapy with three successive nebulizations of beta-	Baseline characteristics of the population (age, weight, associated comorbidities, clinical history of asthma, vital data (RR, HR, SpO2), FiO2, data on the medication used before and during the PICU stay, duration of HFNC and supplemental oxygen therapy use, and length of stay in the PICU.	All children in both groups received nebulized salbutamol and corticosteroids. The median HFNC flow was initially set at 0.9 L/kg/min [0.75–1] with a median [IQR] FiO2 of 45% [31–55]. The median duration [IQR] of HFNC treatment was 28 hours [21–47], and the median duration of PICU stay was 3 days [2.5–5].	Of the 39 patients treated with HFNC, 10 had severe acidosis at admission (pH < 7.30). The 34 children treated with oxygen therapy had less severe clinical conditions. For one child, HFNC failed and was then switched to non-invasive ventilation. HFNC was discontinued in another patient due to the occurrence of pneumothorax after 31 hours with HFNC, the patient was then transferred to standard oxygen therapy. The differences prevent any reliable conclusions regarding the superiority of one technique over the other, which is consistent with the nature of this study (observational

Revista ARACÊ
ISSN: 2358-2472

		agonists, supplemental oxygen, and oral or intravenous corticosteroids at 2mg/kg. 39 (53%) were treated with HFNC and 30 (41%) only standard supplemental oxygen therapy.			retrospective). No patient was intubated.
Ballestero *et al*., 2018	To evaluate the efficacy and safety of HFNC administered to children with asthma and moderate respiratory failure in a pediatric emergency department, assessing the improvement in the patient's clinical condition and the reduction of ward or PICU admissions.	Children 1 to 14 years of age who presented to a pediatric emergency department with moderate to severe asthma exacerbations with a Pulmonary Score (PS)≥6 or SpO2 <94% between September 2012 and December 2015. 62 children were randomly selected to receive HFNC (n=30) or standard oxygen therapy (n=32).	SpO2, FR, CF. The Pulmonary Score was assessed every 30 minutes for the first 2 hours and then every 2 hours. The children were also monitored until hospital discharge for possible side effects of HFNC therapy, including nasal or facial trauma, bloating, air leakage, and infection.	The patients were allocated into two treatment groups, with the experimental group receiving HFNC and the control group receiving conventional oxygen therapy. In the HFNC group, oxygen therapy was provided with a flow range of 2-25L/min for infants and young children and a flow range of 5-60L/min for adults. In the control group, conventional oxygen delivery systems were used, depending on the patient's level of discomfort and oxygen requirement.	The baseline characteristics of the patients were similar in the 2 groups. Two hours after initiation of therapy, the Pulmonary Score (PS) had decreased by ≥2 points in 16 patients in the HFNC group (53%) compared to 9 controls (28%) (P= .01). The differences between the groups in disposition, length of hospital stay, and need for additional therapies were not significant. No side effects were reported.
Martínez *et al*., 2019	To analyze the experience in the treatment of asthma exacerbations in children admitted to the pediatric ward using HFNC or Oxygen Therapy, in addition to analyzing the clinical results	536 children aged 4 to 15 years with asthma attacks were admitted to a pediatric ward between 2012 and 2016. The inclusion criteria for the initiation of HFNC were: progression of	Age, gender, body weight, personal history, lung score, RR, HR, at the time of admission to the ward, at the start of HFNC, and at 3-6 h of treatment.	Two groups of patients were compared: Group 1: patients treated with HFNC (n=40) and Group 2: patients treated with conventional oxygen therapy (n=496). The initial flow rate ranged between 10 and 15L/min. In patients who did not show clinical	Compared to group 2, children in group 1 had more severe initial clinical signs. With the initiation of HFNC use in group 1, HR, RR and Pulmonary Score decreased significantly in 3-6 hours. However, patients treated with HFNC had a longer hospital stay (6 days

Revista ARACÊ
ISSN: 2358-2472

	of the use of HFNC according to the initial oxygen flow (15L/min or <15L/min).	respiratory distress (Pulmonary Score) or SpO2 <91% despite the administration of supplemental oxygen.		improvement with initial flows <15L/min, the flow was progressively increased to a maximum of 15L/min. the FiO2 has been adjusted to the value required to maintain an oxygen saturation of 91% or higher. An additional analysis was performed in patients treated with HFNC: Patients were divided into 2 groups based on initial flow rate (15L/min and <15L/min). The dependent variable in this secondary analysis was the need for hospitalization in the PICU due to failure of HFNC oxygen therapy.	[4-7] vs. 3 days [3-5], P <.01) and required more days on oxygen support and steroid therapy. In addition, a higher proportion of patients treated with HFNC were readmitted after discharge (4/40 [10%] vs. 16/496 [3.2%]; P = .04). Of the 40 patients treated with HFNC, 8 (20%) required admission to the PICU, compared with 1 of 496 patients treated with standard oxygen therapy (0.2%) (P<0.01). Patients treated with a baseline flow of 15 L/min were admitted to the PICU less frequently than those with a baseline flow of less than 15 L/min (13% vs. 47%, P=0.05).
Benítez *et al.*, 2019	To determine the efficacy of HFNC in children over 2 years of age who presented with severe and moderate asthma attacks that did not respond to initial treatment.	65 children older than 2 years admitted for asthma attacks to an emergency department between April 1 and November 30, 2017. 32 patients were randomly included in the HFNC Group and 33 patients in the Control Group.	Demographic variables, nutritional status, history of previous crises, treatment for intercrisis periods, PIS score, RR, SpO2, inspiration-expiration ratio, presence or absence of wheezing, use of accessory muscles, and presence of adverse effects.	In Group 1 (HFNC), an initial flow of 1L/kg was administered, with a gradual increase to 2L/kg until a saturation between 93% and 98% was obtained. Group 2 (Control) received oxygen therapy via simple nasal cannula, simple face mask, or mask without rebreathing as needed to achieve 93% saturation.	There were no significant differences in the comparison of the groups between 2 and 6 hours after the start of treatment or in the proportion of individuals with a drop of more than two points in the PIS score after 2 hours of the start of treatment. The proportion of individuals with a drop of more than two points in the SIP after two hours of treatment in Group 1 was 43.7%, 95% CI (28-60) vs. Group 2 48.4%; 95% CI (32-64), p 0.447. There were no differences in PIS Score, Respiratory Effort Score, RR, and SpO2 in measures recorded from admission every 2 hours to discharge or within the first 24

Revista ARACÊ
ISSN: 2358-2472

					hours. None of the patients were admitted to intensive care or had associated complications.
Gates *et al*., 2021	To assess whether there would be a difference in the length of hospital stay for those treated with HFNC compared to those treated with the aerosol mask.	171 children with critical asthma aged 2 to 17 years with a Modified Pulmonary Index Score (MPIS) ≥ 8 admitted to the PICU between June 2014 and March 2020. 67 patients were included in the Aerosol Mask Group and 104 patients in the HFNC Group.	Age, weight, gender, medications, medical history, route of admission, initial respiratory support in the PICU, initial vital signs, MPIS over time, and use of NIV or Heliox.	Data on flow were available for 103 of the 104 individuals in the HFNC group; the median initial flow (IQR) of HFNC was 10 (IQR 10–15) L/min or 0.5 (IQR 0.3–0.7) L/kg/min. The median (IQR) of the maximum flow during HFNC was 15 (IQR 10–20) L/min or 0.6 (IQR 0.4–0.9) L/kg/min.	Baseline MPIS was similar between the HFNC and aerosol mask groups (11 [IQR 9–12] vs 10 [IQR 9–12], P5.15). There were no significant differences in length of hospital stay (2.9 [IQR 2.1–3.9] vs 3.0 [IQR 2.3–4.4] d, P5 .47), length of stay in PICU (1.9 [IQR 1.4–2.8] vs 1.8 [IQR 1.5–3.0] d, P5 .92), or time to MPIS < 6 (1.0 [IQR 0.6–1.6] vs 1.3 [IQR 0.8–1.9) d, P5 .09) between the HFNC group and the Aerosol Mask group, respectively. Of note, 16 (24%) subjects in the aerosol mask group were eventually treated with HFNC. The use of a mixture of helium-oxygen and noninvasive ventilation was similar between the groups.

LEGEND: HFNC: High Flow Nasal Cannula; NIV: Non-invasive ventilation; PICU: Pediatric Intensive Care Unit; HR: Heart Rate; RR: Respiratory Rate; pCO2: Partial pressure of CO2; Fio2: Fraction of Inspired Oxygen; SpO2: Oxygen Saturation; EPAP: Positive Airway Pressure at two levels; IPAP: Mean Positive Inspiratory Airway Pressure; VM: Mechanical Ventilation; PaCO2: Partial pressure of CO2 from arterial blood; MPIS: Modified lung index score. **Source: Completed by the authors (2024).**

DISCUSSION

In general, the use of HFNC in asthma attacks in children has shown satisfactory results, often being similar to other respiratory devices such as BiPAP and oxygen therapy.

Physiologically, HFNC has benefits to patients, since heated air helps eliminate secretions, reduces bronchoconstriction, and decreases upper airway dead space (KWON, 2020; MÖLLER et al., 2017). In addition, the equipment used generates a decrease in the percentage of ambient air intake, so there is a reduction in the dilution of the oxygen administered and, consequently, an improvement in the oxygenation of patients (GOLIGHER; SLUTSKY, 2017).

Revista ARACÊ
ISSN: 2358-2472

Despite its beneficial potential, according to Mauri et al. (2017), the effect and efficacy of HFNC can vary considerably among patients, and more studies are needed to analyze the determinants involved, since for those who are more predisposed to this therapy, HFNC may be started early in the clinical course for better results. Likewise, identifying patients who are likely to not respond well to HFNC is equally necessary, as cases of treatment failure are directly associated with mortality and longer hospital stay (KANG et al., 2015).

In our research, five studies compared the effects of HFNC and oxygen therapy and found that the effects between the devices were mostly similar. Oxygen therapy in pediatrics is often used when there is a need to provide supplemental oxygen, or associated with the inhalation of corticosteroids and bronchodilators (Rehder, 2017). Even though it is a commonly used therapy, Walsh and Smallwood (2017) emphasize the importance of correct oxygen administration in order to avoid excessive or inappropriate dosages, thus avoiding an increase in hospitalization time.

In the study by Pilar et al. (2017), bilevel positive pressure (BiPAP) showed superior results to the use of HFNC. Physiologically, the use of BiPAP reduces inspiratory work and allows the patient to reach their total lung capacity more quickly (ABRAMO et al., 2017). In a later study, Kang et al. (2020) report that in asthma, despite increasing studies, the evidence on NIV use is insufficient. However, NIV therapy has been shown to be superior to HFNC in more severe patients, since it allows the delivery of positive inspiratory and expiratory pressure in the airways, in addition to reducing the levels of partial pressure of carbon dioxide (PaCO2) and improving ventilatory capacity (LIMA et al., 2021).

As a limitation of the study, it is noteworthy that despite the positive effects of HFNC presented, it was not possible to determine its real efficacy in the management of the crisis, nor which would be the most appropriate protocol, because the studies did not present standardization of the parameters and description of the protocol, in addition, relevant data such as the number of days of hospitalization and mortality were not evidenced in all studies. Therefore, the need for further cohort studies on the application of HFNC in childhood asthma attacks is emphasized, with better description of protocols and outcomes such as length of hospital stay, including to enable meta-analyses to be performed.

Revista ARACÊ
ISSN: 2358-2472

CONCLUSION

Based on the results presented, it is concluded that the use of the High Flow Nasal Cannula can be beneficial in controlling the symptoms of asthma attacks in children. However, even so, it is necessary to carry out more detailed and standardized studies, for a better understanding of the benefits, determining factors involved, and recommended protocols.

Revista ARACÊ
ISSN: 2358-2472

REFERENCES

1. ABRAMO, T. et al. (2017). Paediatric ED BiPAP continuous quality improvement programme with patient analysis: 2005-2013. BMJ Open, 7(1), 1-13. https://doi.org/10.1136/bmjopen-2016-012108

2. BALLESTERO, Y. et al. (2018). Pilot Clinical Trial of High-Flow Oxygen Therapy in Children with Asthma in the Emergency Service. J Pediatr, 194, 204-210. https://doi.org/10.1016/j.jpeds.2017.10.061

3. BAUDIN, F. et al. (2017). Nasal high flow in management of children with status asthmaticus: a retrospective observational study. Ann Intensive Care, 7(1), 1-9. https://doi.org/10.1186/s13613-017-0305-4

4. BENÍTEZ, R. G. et al. (2019). High flow nasal cannula oxygen therapy in patients with asthmatic crisis in the pediatric emergency department. Rev Chil Pediatr, 90(6), 642-648. https://doi.org/10.4067/S0370-41062019000600642

5. BOTT, J. et al. (2009). Guidelines for the physiotherapy management of the adult, medical, spontaneously breathing patient. Thorax, 64(Suppl. 1), 1-51. https://doi.org/10.1136/thx.2008.105709

6. DYSART, K. et al. (2009). Research in high flow therapy: Mechanisms of action. Respiratory Medicine, 103(10), 1000-1009. https://doi.org/10.1016/j.rmed.2009.01.027

7. GATES, R. M. et al. (2021). High-flow nasal cannula in pediatric critical asthma. Respir Care, 66(8), 1240-1246. https://doi.org/10.4187/respcare.07874

8. Global Initiative for Asthma. (2024). Global Strategy for Asthma Management and Prevention. Disponível em: www.ginasthma.org. Acesso em: 14 nov. 2024.

9. GOLIGHER, E. C., & SLUTSKY, A. S. (2017). Not Just Oxygen? Mechanisms of Benefit from High-Flow Nasal Cannula in Hypoxemic Respiratory Failure. Am J Respir Crit Care Med, 195(9), 1128-1131. https://doi.org/10.1164/rccm.201701-0169OC

10. KANG, B. J. et al. (2015). Failure of high-flow nasal cannula therapy may delay intubation and increase mortality. Intensive Care Med, 41(4), 623-632. https://doi.org/10.1007/s00134-015-3720-4

11. KANG, C.-M. et al. (2020). Bilevel Positive Airway Pressure ventilation efficiently improves respiratory distress in initial hours treating children with severe asthma exacerbation. Journal of the Formosan Medical Association, 119(9), 1415-1421. https://doi.org/10.1016/j.jfma.2020.01.012

12. KWON, J.-W. (2020). High-flow nasal cannula oxygen therapy in children: a clinical review. Clin Exp Pediatr, 63(1), 3-7. https://doi.org/10.3345/cep.2019.00484

Revista ARACÊ
ISSN: 2358-2472

13. LIMA, M. de S. et al. (2021). Terapia de alto fluxo versus ventilação mecânica não-invasiva em pós-operatório de cirurgia cardíaca pediátrica: revisão integrativa. Cadernos ESP, 15(1), 99-109. https://doi.org/10.36439/cesp.v15i1.625

14. MARTÍNEZ, F. G. et al. (2019). Treatment with high-flow oxygen therapy in asthma exacerbations in a paediatric hospital ward: Experience from 2012 to 2016. An Pediatr, 90(2), 72-78. https://doi.org/10.1016/j.anpedi.2018.07.004

15. MASLAN, J., & MIMS, J. W. (2014). What is asthma? Pathophysiology, demographics, and health care costs. Otolaryngologic Clinics of North America, 47(1), 13-22. https://doi.org/10.1016/j.otc.2013.10.001

16. MAURI, T. et al. (2017). Physiologic effects of high-flow nasal cannula in acute hypoxemic respiratory failure. Am J Respir Crit Care Med, 195(9), 1207-1215. https://doi.org/10.1164/rccm.201612-2466OC

17. MÖLLER, W. et al. (2017). Nasal high flow reduces dead space. J Appl Physiol, 122(1), 191-197. https://doi.org/10.1152/japplphysiol.00514.2016

18. MOROSINI, F. et al. (2017). Cánula nasal de alto flujo en niños con crisis asmática en un servicio de urgencias pediátrico. Arch Pediatr Urug, 88(3), 142-148. https://doi.org/10.29158/ae2020-06-15

19. NEVES, V. C. et al. (2021). Cânula nasal de alto fluxo em crianças asmáticas com suspeita de COVID-19. Fisioterapia em Movimento, 34, 1-6. https://doi.org/10.1590/1980-5918.034.034.013

20. PILAR, J. et al. (2017). High-flow nasal cannula therapy versus non-invasive ventilation in children with severe acute asthma exacerbation: An observational cohort study. Med Intensiva, 41(7), 418-424. https://doi.org/10.1016/j.medin.2017.02.004

21. REHDER, K. J. (2017). Adjunct therapies for refractory status asthmaticus in children. Respiratory Care, 62(6), 849-865. https://doi.org/10.4187/respcare.05394

22. RUSSI, B. W. et al. (2022). High-flow nasal cannula and bilevel positive airway pressure for pediatric status asthmaticus: a single center, retrospective descriptive and comparative cohort study. Journal of Asthma, 59(4), 757-764. https://doi.org/10.1080/02770903.2021.1930079

23. SLAIN, K. N., SHEIN, S. L., & ROTTA, A. T. (2017). Uso de cânula nasal de alto fluxo no departamento de emergência pediátrica. Jornal de Pediatria, 93(Suppl 1), 36-45. https://doi.org/10.1016/j.jped.2017.02.001

24. Sociedade Brasileira de Pneumologia e Tisiologia. (2012). Diretrizes da Sociedade Brasileira de Pneumologia e Tisiologia para o Manejo da Asma. Jornal Brasileiro de Pneumologia, 38(Suppl 1), 1-46. https://doi.org/10.1590/S1806-37132012000010001

25. Sociedade Brasileira de Pneumologia e Tisiologia. (2020). Recomendações para o manejo da asma da Sociedade Brasileira de Pneumologia e Tisiologia. Jornal Brasileiro

Revista ARACÊ
ISSN: 2358-2472

de Pneumologia, 46(Suppl 1), 1-16. https://doi.org/10.1590/S1806-37132020000010001

26. WALSH, B. K., & SMALLWOOD, C. D. (2017). Pediatric oxygen therapy: A review and update. Respiratory Care, 62(6), 645-661. https://doi.org/10.4187/respcare.05373