EFFECTS OF HIGH-FLOW NASAL CANNULA IN THE POSTOPERATIVE PERIOD OF PEDIATRIC CARDIAC SURGERY: SCOPING REVIEW

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Abstract: INTRODUCTION: The use of High Flow Nasal Cannula (HFNC) in children after cardiac surgery may offer benefits that are observed based on blood gas analysis, vital signs and a reduction in the reintubation rate. The use begins with a clinical picture of acute respiratory failure culminating in the presence of some symptoms. The use of HFNC improves the respiratory condition after extubation and mainly by preventing extubation failures, reducing reintubation rates and preventing atelectasis. OBJECTIVE: To map the hemodynamic and clinical effects of High Flow Nasal Cannula in the postoperative period of pediatric cardiac surgery. METHODS: Scoping review that followed the PRISMA-ScR recommendations, using the PubMed, SciELO, Virtual Health Library, Lilacs, PEDro, Embase and Cochrane Library databases. Articles that evaluated the hemodynamic and clinical effects of HFNC in the postoperative period of cardiac surgeries were included and articles in which children had comorbidities associated with heart disease, reviews, case reports, opinion articles and articles that were not available in full were excluded. RESULTS: six articles addressed and analyzed relevant hemodynamic and clinical outcomes, such as PaO2, PCO2, SpO2, PaO2/FiO2, BP, HR, RR, CEC, treatment failure, extubation failure, reintubation rate, length of hospital stay or ICU stay, and atelectasis rate. CONCLUSION: The findings of this study indicate a tendency for the

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therapy analyzed to contribute to the improvement of PaO_2, PCO_2, reintubation rate and reduction of hospital stay in the postoperative period of pediatric cardiac surgery.

Keywords: cardiac surgery. Postoperative period. Pediatrics. Respiratory physiotherapy.

INTRODUCTION

Cardiac surgeries (CCs) are complex procedures that generate major changes in the body's physiological mechanism (Araújo et al., 2020; Original et al., 2011) . In Brazil, the prevalence is about 28 thousand cases per year of congenital heart disease (CHD), which are an abnormality in the structure of the heart that have functional repercussions. It affects approximately 8 to 10 children per 1000 live births, with higher rates in the North and Northeast regions and lower rates in the South and Southeast regions. (Borges et al., 2010; Pinto Júnior et al., 2004; Silva et al., 2021)

Among the most relevant repercussions in the postoperative context of cardiac surgeries (POCC), respiratory complications stand out, which may be related to several factors such as the use of cardiopulmonary bypass (CPB), effects of anesthesia, surgical incision, intensity of surgical manipulation, thoracic trauma, number of drains, hypoxemia, atelectasis, and ischemia time. In addition, the extubation procedure occurs 6 hours after surgery, making most of these patients require non-invasive ventilatory support. Thus, the high-flow nasal cannula (HFNC), a non-invasive support, emerges as a way to contribute to the extubation process by helping in the clinical condition of these patients. (Araújo et al., 2020; Borges et al., 2010; Silva et al., 2021)

HFNC is a non-invasive high-flow system that delivers a mixture of air and oxygen through a circuit of humidified gases heated at high speeds through a nasal cannula ranging from 2 to 50 L/min according to the child's age group and weight. The HFNC mechanism allows the elimination of dead space by generating a reservoir of fresh gas in the nasopharynx and reducing the rebreathing of carbon dioxide, with a reduction in respiratory rate (RR) and respiratory effort due to inspiratory resistance; It improves airway conduction, mucociliary transport, and lung compliance by preventing airway dryness (Bocchile et al., 2018; Dysart et al., 2009; Slain ; Shein ; Rotta, 2017) .

Therefore, the use of HFNC in children in the postoperative period of cardiac surgery may offer benefits when compared with NIV and treatment with conventional oxygen therapy, and can be observed based on parameters such as blood gas analysis, vital signs, and reduction in the reintubation rate. Its use is indicated based on a clinical picture of acute respiratory failure with the presence of symptoms such as tachypnea, hypoxemia, hypercapnia, and increased work of breathing using the post-extubation accessory muscles. Studies have shown that HFNC improves the respiratory condition after extubation in pediatric cardiac surgery, with wide acceptance and popularity mainly because it prevents extubation failures, decreases reintubation rates, prevents atelectasis, and is a simple and (Araújo et al., 2020; Shioji et al., 2019; Silva et al., 2021; Testa et al., 2014) (Araújo et al., 2020) safe resource. (Bocchile et al., 2018; Shioji et al., 2017, 2019; Silva et al., 2021; Testa et al., 2014)

Due to the respiratory complications in the postoperative period of pediatric cardiac surgeries and the need for interventions that favor a safe and effective recovery, a study is needed to verify the postoperative effects of HFNC in this population, hemodynamically and clinically evaluating the impacts. Considering that HFNC has promising physiological mechanisms, its use may represent a significant advance in post-extubation respiratory management. In addition, it can contribute to support more effective, safe, and targeted therapeutic protocols for the pediatric reality. Therefore, the objective of this study was to map the hemodynamic and clinical effects of HFNC in the postoperative period of pediatric cardiac surgery.

MATERIAL AND METHODS

This is a scoping review following the recommendations of the extension for Scoping Reviews of the Preferred Reporting Items for Systemtic Reviews and Meta-Analyses Protocols

(PRISMA-ScR). We included studies that evaluated the hemodynamic and clinical effects of HFNC in the postoperative period of pediatric cardiac surgeries or that described the length of hospital stay and reintubation rate, with no time limit and no language restriction. On the other hand, articles in which the children had comorbidities associated with heart disease, narrative or systematic reviews, opinion articles, case reports, as well as publications whose full text was not available were excluded. (Knitting et al., 2018)

The databases used to select the studies were PubMed, SciELO, Virtual Health Library, Lilacs, PEDro, Cochrane Library and Embase. The descriptors in Portuguese were: high-flow nasal cannula, HFNC, postoperative, postoperative period, cardiac surgery, and children. Respectively reproduced for the English language high flow nasal cannula, HFNC, postoperative, postoperative period, Heart surgery/ Cardiac surgery and pediatrics/children.

The selection of descriptors was made through the MeSh (Medical Subject Headings) using the PICO strategy: Population: children in the postoperative period of cardiac surgery; Intervention:CNAF; Control: Control; Outcome: hemodynamic and clinical picture, and Boolean operators "OR" and "AND". The search strategy was carried out in the period from September to October 2024 (Chart 1), followed by the collection of articles from December 2024 to March 2025.

Chart 1 – Search Strategy

Database	Search strategy
PubMed SciELO Virtual Health Library	((high flow nasal cannula) or (High-flow nasal cannula) or (High Flow Nasal Cannula) or (HFNC) AND (Postoperative) or (Postoperative Period) AND (Heart Surgery) OR (Surgery, Heart) OR (Cardiac Surgery) OR (Cardiac Surgical Procedure) OR (Heart Surgical Procedure) AND (Pediatrics) OR (Children) OR (Child))
VHL/Lilacs (filter)	((high flow nasal cannula) or (High-flow nasal cannula) or (High Flow Nasal Cannula) or (HFNC) AND (Postoperative) or (Postoperative Period) AND (Heart Surgery) OR (Surgery, Heart) OR (Cardiac Surgery) OR (Cardiac Surgical Procedure) OR (Heart Surgical Procedure) AND (Pediatrics) OR (Children) OR (Child))
Peter	((High Flow Nasal Cannula Postoperative Heart surgery Pediatrics)) ((High Flow Nasal Cannula Heart surgery Pediatrics))

Cochrane Library	(high flow nasal cannula) AND ("postoperative") AND ("cardiac surgery") AND ("Child")
Embase	('High Flow Nasal Cannula Therapy') AND ('postoperative period') AND ('heart surgery') AND ('pediatrics')

Source: Authorship.

The team responsible for selecting the scientific evidence consisted of two researchers, with the inclusion of a more experienced reviewer, in charge of resolving disagreements. The selection of scientific evidence consisted of three phases, the first included the definition of keywords, the second was the screening of the titles and abstracts identified in the databases, and the last phase was carried out a complete reading of potentially eligible articles. To organize the records and ensure greater transparency, blinding was carried out between the pairs.

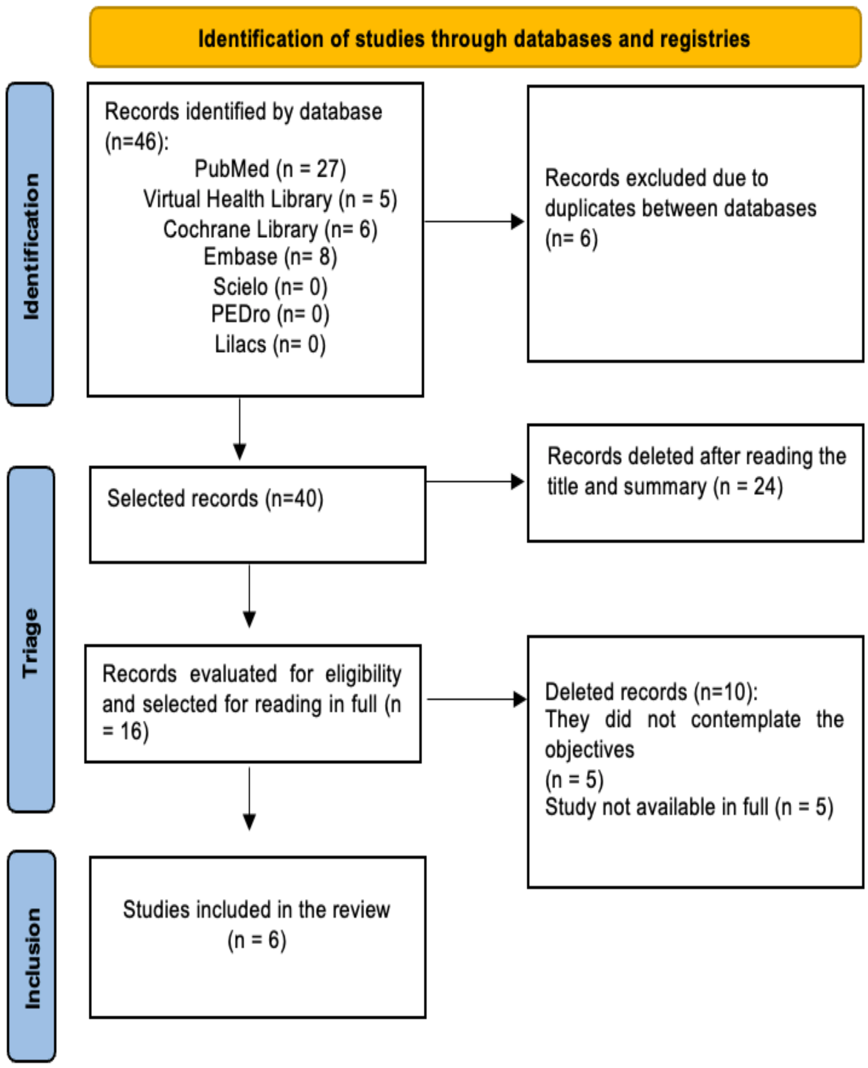
The two reviewers independently filled out a database prepared in Excel®, which had the following variables: authors, year of publication, title, selected database, study design, objectives, population, methods, and results.

Finally, the results were expressed in tables, charts and figures, where categorical variables (such as treatment failure, extubation failure and reintubation rate) and numerical variables (partial pressure of oxygen, partial pressure of carbon dioxide, blood pressure, ratio of partial pressure of oxygen in arterial blood and fraction of inspired oxygen, heart rate, respiratory rate, peripheral oxygen saturation, length of hospital stay or ICU stay, atelectasis rate, cardiopulmonary bypass).

FINDINGS

A total of 46 articles were found in the databases, of which 16 were eligible for reading in full. In the end, 6 articles were included because they met the eligibility criteria (Figure 1).

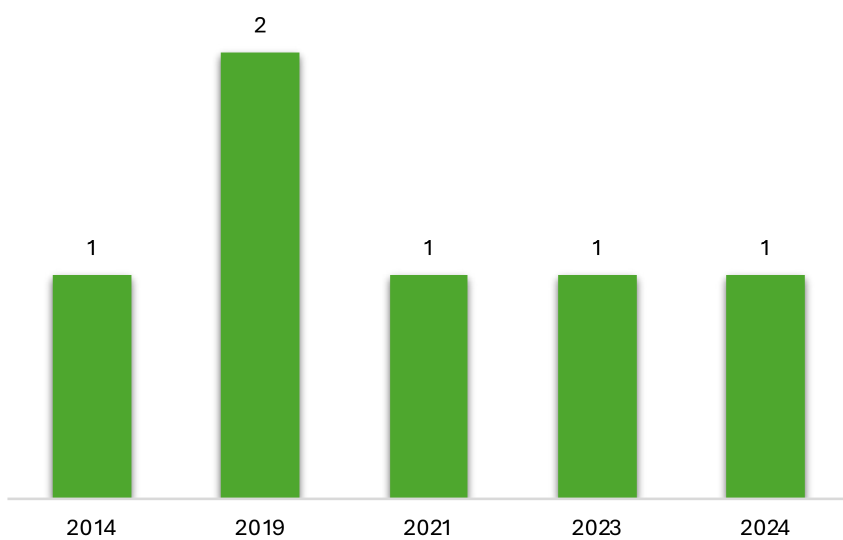
Figure 1: Flowchart selection of studies for new reviews that included searches in databases, registries and other sources.



The characterization of the studies, together with the description of the objective, sample, and clinical outcomes are described in Table 1. The relationship between the year of publication of the included articles and the perspective quantity per year is shown in Graph 1, with the retrospective observational study being the most predominant, with 3 articles included in Graph 2. The hemodynamic effects such as partial pressure of arterial blood oxygen (PaO2), partial pressure of arterial blood carbon dioxide (PCO2), ratio between partial pressure of arterial blood oxygen and fraction of inspired oxygen (PaO2/FiO2), blood oxygen saturation (SpO2), respiratory rate (RR), heart rate (HR), mean arterial pressure (BP), (Graph 3). (Testa et al., 2014; Zheng; Chen; Zhou, 2023) (Enayati et al., 2021; Itagaki et al., 2019; Testa et al., 2014; Zheng; Chen; Zhou, 2023) (Enayati et al., 2021; Testa et al., 2014) (Zheng; Chen; Zhou, 2023) (Zheng; Chen; Zhou, 2023)

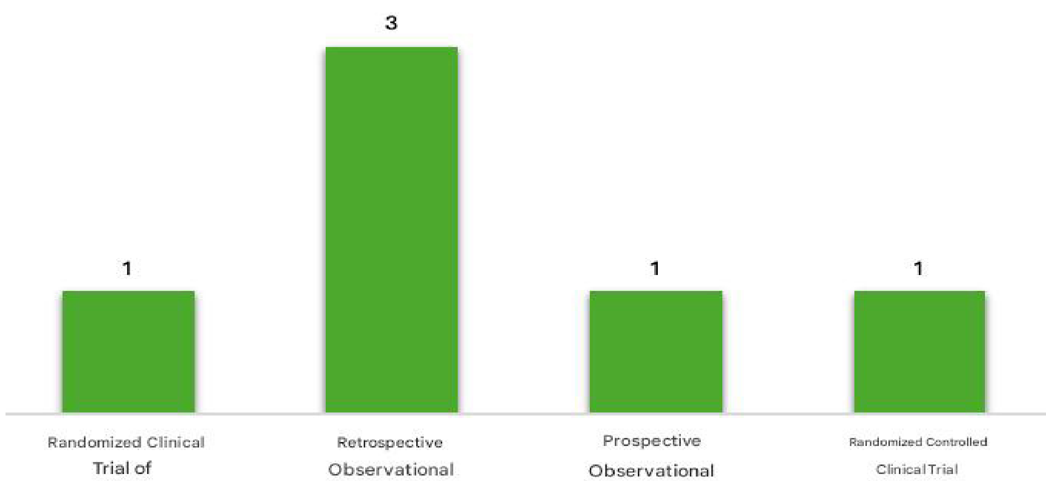
The remaining studies analyzed outcomes such as reintubation rate, atelectasis rate, and length of hospital stay at different times after HFNC use. In addition, one study addresses treatment failure compared to other therapies, another on cardiopulmonary bypass, treatment failure, and extubation failure (Graph 3). (Enayati et al., 2021; Öztürk et al., 2024; Testa et al., 2014) (Öztürk et al., 2024) (Enayati et al., 2021; Richter et al., 2019; Testa et al., 2014) (Testa et al., 2014) (Enayati et al., 2021) (Testa et al., 2014) (Richter et al., 2019)

Graph 1: Distribution of the year of publication in the included studies.



Source: Prepared by the authors.

Graph 2: Distribution of the study design evaluated in the included studies.



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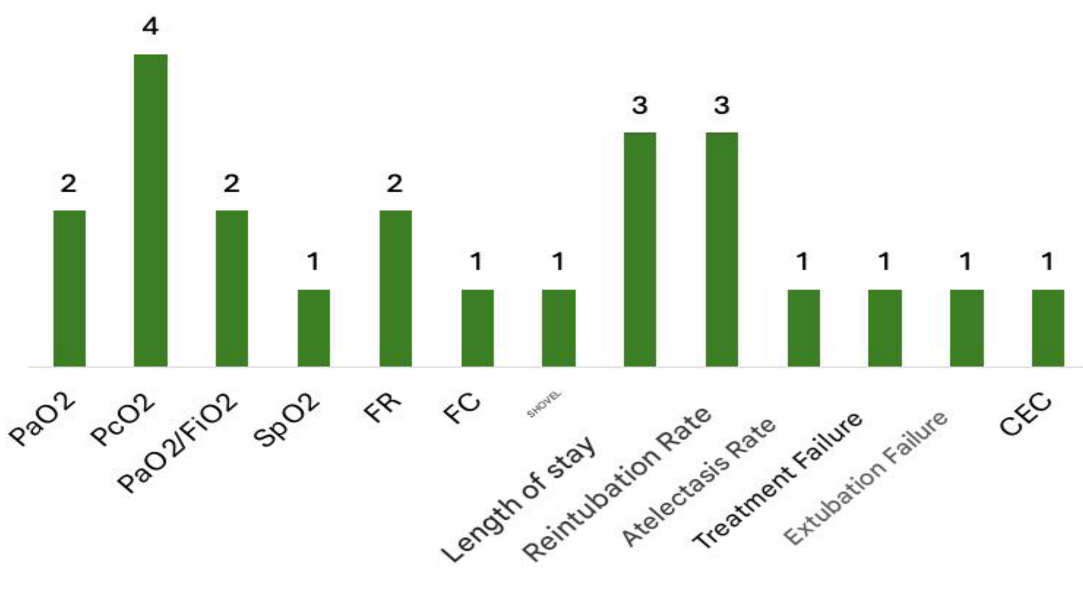
Graph 3: Distribution of the clinical variables evaluated in the included studies.



Source: Prepared by the authors.

Table 1 - Methodological characterization and main clinical outcomes of the included studies (author/ year of publication, type of study, objective, sample, and outcome). Salvador/BA- Brazil, 2025.

Author and year	Type of study	Goal	Sample	Outcomes
Yi-Rong Zheng et al.,2023	Retrospective cohort	To compare the efficacy and safety of high-flow nasal cannula (HFNC) and conventional oxygen therapy (TOC) in fiberoptic bronchoscopy (FB) after congenital heart surgery (CHS) in children.	Children undergoing FB after simple CHS (ventricular septal defect, patent atrial septal defect, or patent ductus arteriosus) in the cardiac intensive care unit (ICU) from May 2021 to May 2022.	During the examination, the TcPCO2 (transcutaneous carbon dioxide tension) rate: lower in the HFNC group than in the COT (conventional oxygen therapy) group (39.6±3.0 vs 43.5±3.9 mm Hg, $p<0.001$). During the examination, the rate of TcPO2 (transcutaneous oxygen tension): higher in the HFNC group than in the COT group (TcPO2: 90.3±9.3 vs 80.6±11.1 mm Hg). During the test, SpO2 (oxygen saturation): higher in the HFNC group than in the TOC group (SpO2: 95.6±2.5 vs 92.1%±2.0%; $p<0.001$). RR, HR, MAP (mean arterial pressure), SpO2, TcPO2 and TcPCO2: there was no significant difference between the two groups 30 min before and after the test ($p>0.05$).
Erkut Öztürk et al., 2024	Retrospective observational	To evaluate the potential positive effects of HFNC treatment in the prevention of postoperative atelectasis and reintubation in pediatric cardiac surgery patients.	Full-term newborns and infants under 6 months of age who underwent congenital heart surgery from November 1, 2022 to November 1, 2023 and were followed in the pediatric cardiac ICU.	Reintubation rates in the first 72 hours: in HFNC users, one patient (2.5%) and non-HFNC users were five patients (12.5%) ($p < 0.05$). The 24-hour reintubation rates: HFNC users one patient (2.5%) and non-HFNC users were three patients (7.5%). Reintubation rates at 48 hours: HFNC users one patient (2.5%) and non-HFNC users five patients (12.5%). Rates of postoperative atelectasis at 24 hours: median scores 2 for HFNC users and 2.5 for non-HFNC users ($p > 0.05$). Postoperative atelectasis rates at 48 hours: median scores 1.5 for HFNC users and 3.5 for non-HFNC users ($p < 0.05$). Postoperative atelectasis rates at 72 hours: median scores 1 for HFNC users and 3 for non-HFNC users ($p < 0.05$).
Taiga Itagaki et al., 2019	Prospective Crusader	To determine whether HFNC improved thoraco-abdominal synchrony in pediatric subjects with mild to moderate respiratory failure after cardiac surgery.	Pediatric subjects with a body weight of 2–10 kg; subjects with mild to moderate respiratory failure who experienced one or more of the following after extubation: SpO2< 95% without supplemental oxygen (for acyanotic heart disease); respiratory rate > 50 breaths/min; asynchronous or paradoxical breathing pattern.	Respiratory rate, maximal compartment amplitude/VT, phase angle, and minute volume decreased significantly by 2 L/kg/min ($P < 0.05$ for all), but not by 1 L/kg/min. Pac02 had no difference between oxygen therapies.

Giuseppina Testa et al., 2014	Randomized controlled trial	The aim of this study was to compare high-flow nasal cannula (HFNC) and conventional O2 therapy (OT) in pediatric patients undergoing cardiac surgery; Main objective: to evaluate whether HFNC was able to improve PaCO2 elimination in the first 48 hours after postoperative extubation. Secondary objectives: to evaluate whether HFNC compared with OT was able to improve the following parameters: PaO2 and PAO2/FIO2 values at different time points up to 48 h after extubation; the rate of treatment failure for respiratory or cardiac reasons; the need for post-extubation respiratory support; the rate of extubation failure; the rate of pulmonary atelectasis documented by a radiologist who compared the chest X-ray before extubation with the one performed 12 hours after extubation; development of complications related to nasal prongs defined as nasal ulcers, gastric distention, and need for supplemental sedation; length of stay in the PICU.	Pediatric cardiac surgical patients less than 18 months of age.	PaCO2: values at baseline were not significantly different between the HFNC and conventional oxygen therapy groups (P = 0.64), and the values remained similar in the two groups throughout the study period (P = 0.5). PaO2: values at baseline were similar (P = 0.5) and significantly higher in the HFNC group at 6.12, 24, and 48 hours post-extubation (P = 0.01, at all time points). The PaO2/FiO2:values ratio were similar at baseline (P = 0.45) and significantly higher in the HFNC group at post-extubation hours (P < 0.001 at all time points). Reintubation rate: 4.6% in the HFNC group (2 patients) and 4.3% (2 patients) in the conventional oxygen therapy group (P = 1.0). The median length of stay in the PICU: 4.5 days (IQR 2–7 days) in the HFNC group and 5 days (IQR 3–9 days) in the conventional oxygen therapy group (P = 0.56). Treatment failure: there was none in the HFNC group (P = 0.008) and in the conventional oxygen therapy group it was 15% (7 patients, 6 patients for respiratory reasons and 1 for cardiac reasons). All patients with treatment failure required a non-invasive form of respiratory support.
Robert P Richter et al.,2019	Retrospective cohort	To describe the impact of postoperative respiratory support with PAP versus HFNC in infants with congenital heart disease. Primary objective: to explore the impact of the initial respiratory modality on the extubation failure rate. Secondary objective: To evaluate the association of post-extubation respiratory support mode with the utilization of post-surgical resources, including the total duration of respiratory support (i.e., time to reach low-flow nasal cannula- LFNC and room air).	Patients less than 6 months of age admitted to the Children's of Alabama ICU between July 1, 2012, and June 30, 2015, following congenital heart surgery that required cardiopulmonary bypass (CPB) via open sternotomy.	Extubation failure (up to 48 hours): 10% (5 patients) with HFNC, | 16% (8 patients) with PAP, P= 0.549. *The rate of extubation failure did not differ significantly between the groups that used support with indication of respiratory failure (n=21), shock (n=6), cardiac arrest (n=3), and altered mental status (n=1). Postoperative hospital stay (days): 14% (7–23) for HFNC, 22% (10.5–29) for PAP use, P=0.015 (Significant).

Farzaneh Enayati et al., 2021	Randomized controlled clinical trial	To evaluate the effect of high-flow nasal cannula (HFNC) after early extubation in children undergoing cardiac surgery.	Children aged 1 to 24 months undergoing cardiac surgery from March 5 to August 30, 2020, in an intensive care unit (ICU) post-pediatric cardiac surgery.	Cardiopulmonary bypass: HFNC: 78.79 ± 23.06 CONTROL: 75 ± 21.52 p=0.442). *After surgery, the incidence of respiratory failure decreased in both groups, with no significant difference between them (p > 0.05). *Before surgery - HFNC: 31 (60.8), control: 20 (50) p-value = 0.957. *On entry into the ICU-HFNC: 22 (25.9) control: 9 (10.6) p-value = 0.497. PaO2/FiO2: values were similar before extubation in both groups (P > 0.05). The HFNC group had the best values than the control group after extubation (P > 0.05); *The groups had a statistical difference at 1 hour after extubation, 6 hours, 12 hours, 24 hours and 36 hours after extubation, and the mean and standard deviation of the HFNC group was better/lower mainly at 1 hour, 24 hours and 36 hours after extubation. PCO2: similar before extubation in both groups (P > 0.05) and was lower in the HFNC group compared to the control group after extubation (P > 0.05), and the mean and standard deviation of the HFNC group was better/lower mainly at 6 hours, 24 hours and 36 hours after extubation. Incidence rates of reintubation were 9.6% in the HFNC group and 47.5% in the control group, (P < 0.013). ICU length of stay: patients had a shorter length of stay in the HFNC group (2.55 ± 0.53 days) than in the control group (3.34 ± 0.59 days) (P<0.001).

HFNC: High-flow nasal cannula; TOC: Conventional oxygen therapy; FB: Optical fiber; CHS: Congenital heart surgery; TCPCO2: Transcutaneous carbon dioxide tension; OCT2: Transcutaneous oxygen tension; PACO2/ PCO2: Partial pressure of carbon dioxide; PAO2: Partial pressure of oxygen; SPO2: Oxygen saturation; PAO2 /FIO2: Ratio between the partial pressure of arterial oxygen and the fraction of inspired oxygen; RR: Respiratory rate; HR: Heart Rate; MAP: Mean arterial pressure; OT: Oxygen therapy; PICU: Pediatric care unit; ICU: Intensive care unit; PAP: Positive airway pressure; LFNC: Low-flow nasal cannula; CPB: Cardiopulmonary bypass; HLOS: Length of hospital stay.

DISCUSSION

The hemodynamic effects reported in the studies show significant outcomes, such as improvement in PaO_2 and decreased PCO_2, when related to the use of HFNC with other therapeutic modalities in pediatric patients in the postoperative period. In addition, with regard to clinical outcomes, most of the studies analyzed point to a reduction in reintubation rates among patients who received HFNC, demonstrating promising results in relation to conventional oxygen therapy and noninvasive ventilation (NIV). This therapeutic strategy was also associated with a decrease in the length of stay of cardiac patients in pediatric intensive care units (PICUs).

PaO_2 has been widely discussed among authors. One study evaluated the efficacy and safety of HFNC compared with conventional oxygen therapy, using fiberoptic bronchoscopy to examine the inside of the airway. During this procedure, it was observed that the variable called transcutaneous oxygen tension (TcPaO2) was higher with the use of HFNC than with conventional oxygen therapy. At the same time, PaO_2 values remained similar at the beginning of another study, however, when compared between the groups submitted to HFNC and oxygen therapy, it was found that the HFNC group presented higher values after extubation (Zheng; Chen; Zhou, 2023) 10. Concomitantly, two studies identified that there was no difference in PaO_2 levels in the comparison between HFNC and NIV, assessed 24 hours after the use of the therapies (Jayashankar et al., 2020; Kumar et al., 2022) . Additionally, two studies have highlighted the PaO_2/FiO_2 ratio as an important indicator of gas exchange efficiency. The results indicated that, after extubation, the group that used HFNC presented higher values at all times evaluated. One of the studies detailed that these values were highest at 6, 12, 24 and 36 hours after extubation. (Enayati et al., 2021; Testa et al., 2014) (Enayati et al., 2021)

PCO_2 was similar between the groups that used HFNC, NIV and oxygen therapy, with no statistically significant differences, as evidenced in the studies. A meta-analysis with three studies demonstrated that, when assessing PCO (Itagaki et al., 2019; Testa et al., 2014) 24 hours after the use of HFNC and NIV, the groups also did not show a reduction in the levels of this variable (Jayashankar et al., 2020; Kumar et al., 2022; Shioji et al., 2019) . In addition, carbon dioxide tension was analyzed in the HFNC and oxygen therapy groups, and was lower in patients who used HFNC during the examination. In turn, a specific study demonstrated that PCO_2 was lower in the HFNC group after extubation, indicating a more efficient elimination of retained CO_2. This difference was observed at 6, 24 and 36 hours post-extubation, with no significant variation before the procedure. (Zheng; Chen; Zhou, 2023) (Enayati et al., 2021)

With regard to RF, only two studies made these data available. One of them indicated that there was no difference between the groups evaluated with another therapeutic modality, while the other showed a reduction in RF in the HFNC group, especially when using a rate adjusted in liters per kilogram per minute (L/kg/min). Regarding SpO2, HR and BP, only one study evaluated these clinical outcomes, finding only improvement in saturation and no differences were identified between the other variables analyzed before and after the test. The duration of cardiopulmonary bypass did not present significant differences between the HFNC group and the control group. Similarly, in studies that compared HFNC with NIV, no differences were observed in this variable between the groups, with a value of $p = 0.07$. (Itagaki et al., 2019; Zheng; Chen; Zhou, 2023) (Zheng; Chen; Zhou, 2023) (Enayati et al., 2021) (Beshish et al., 2023; Jayashankar et al., 2020; Kumar et al., 2022)

Another point highlighted is that there was no failure in the treatment with the use of HFNC, while in the group submitted to conventional oxygen therapy, failure was observed for reasons such as respiratory or cardiac complications, thus requiring non-invasive respiratory support. In addition, the incidence of respiratory failure decreased in both the HFNC and control groups, in the period before surgery and after in the ICU. When analyzing the rates of postoperative atelectasis in patients who used HFNC or not, a slight reduction was observed among those who used it. The rate of extubation failure did not differ significantly between the groups that used support due to indication of respiratory failure, shock, cardiac arrest, and altered mental status within a period of up to 48 hours. (Testa et al., 2014) (Enayati et al., 2021) (Öztürk et al., 2024) (Richter et al., 2019)

The reintubation rate and length of stay in the pediatric and neonatal intensive care unit (PICU) were clinical variables evaluated. There was a reduction in both outcomes, which is a positive point in the use of HFNC, and the main difference between the studies corresponds to the data collected and the time each author performed this assessment. Among the studies that analyzed these variables, only one did not identify a significant difference in the reintubation rate and length of stay in the PICU among patients who used HFNC in the postoperative period of cardiac surgeries. Corroborating these outcomes, four studies included in a systematic review with meta-analysis assessed the rate of reintubation and three assessed the length of ICU stay comparing the effects of HFNC and NIV. A reduction in the rate of reintubation and hospitalization of these children was observed, presenting a $P<0.05$, despite the heterogeneity between the studies analyzed. The literature also presents the impacts between therapies in the pediatric hospital setting, a clinical trial with 121 children compared the efficacy of HFNC and NIV-PP in the length of hospital stay, and the mean difference observed did not indicate changes, demonstrating similar performance between both interventions. Thus, it is possible to observe that, in relation to these aspects, there is evidence described in the current literature. (Enayati et al., 2021; Öztürk et al., 2024; Richter et al., 2019) (Testa et al., 2014) (Beshish et al., 2023; Jayashankar et al., 2020; Kumar et al., 2022; Shioji et al., 2019) (Beshish et al., 2023; Kumar et al., 2022; Shioji et al., 2019) (Kumar et al., 2022)

Although there are publications, this topic is little discussed, which limits the strength of the evidence. In addition, some studies present heterogeneity in the sample analyzed, did not specify the age range of the children included, which makes it difficult to evaluate and possibly influence on which ages benefited most from the use of HFNC in the postoperative period of cardiac surgeries depending on the type of surgery, heart disease, pulmonary and systemic hemodynamics in the pre- and postoperative periods, variables that may have improved after surgery, since the flow of liters per minute in the use of HFNC is calculated based on the child's age or weight, adapting to the particularity of each patient.

This study has as a limitation the lack of evaluation of the methodological quality of the included articles, which may have compromised the robustness of the evidence, which needs a critical and rigorous analysis, requiring greater caution in the interpretation of the data. In addition, as this is a scoping review, there is considerable variability in the types of studies and methods used, which can make it difficult to categorize, systematize and interpret the results obtained. In addition, another limitation is the absence of attempts to contact the authors to verify the availability of the articles, which may have resulted in the exclusion of relevant publications available from other sources.

Thus, further studies are needed to fill the existing gaps and accurately describe the effects of HFNC, as well as its potential benefits compared to other therapeutic modalities, considering the limitations and imprecision of the available data on the subject.

CONCLUSION

The findings of this study indicate a tendency for the analyzed therapy to contribute to the improvement of PaO_2, PCO_2, reintubation rate and reduction in hospital stay in the postoperative period of pediatric cardiac surgery. However, the results referring to SpO_2, RF, HR, BP, CPB, atelectasis rate, and treatment failure did not show relevant changes in most of the studies evaluated.

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