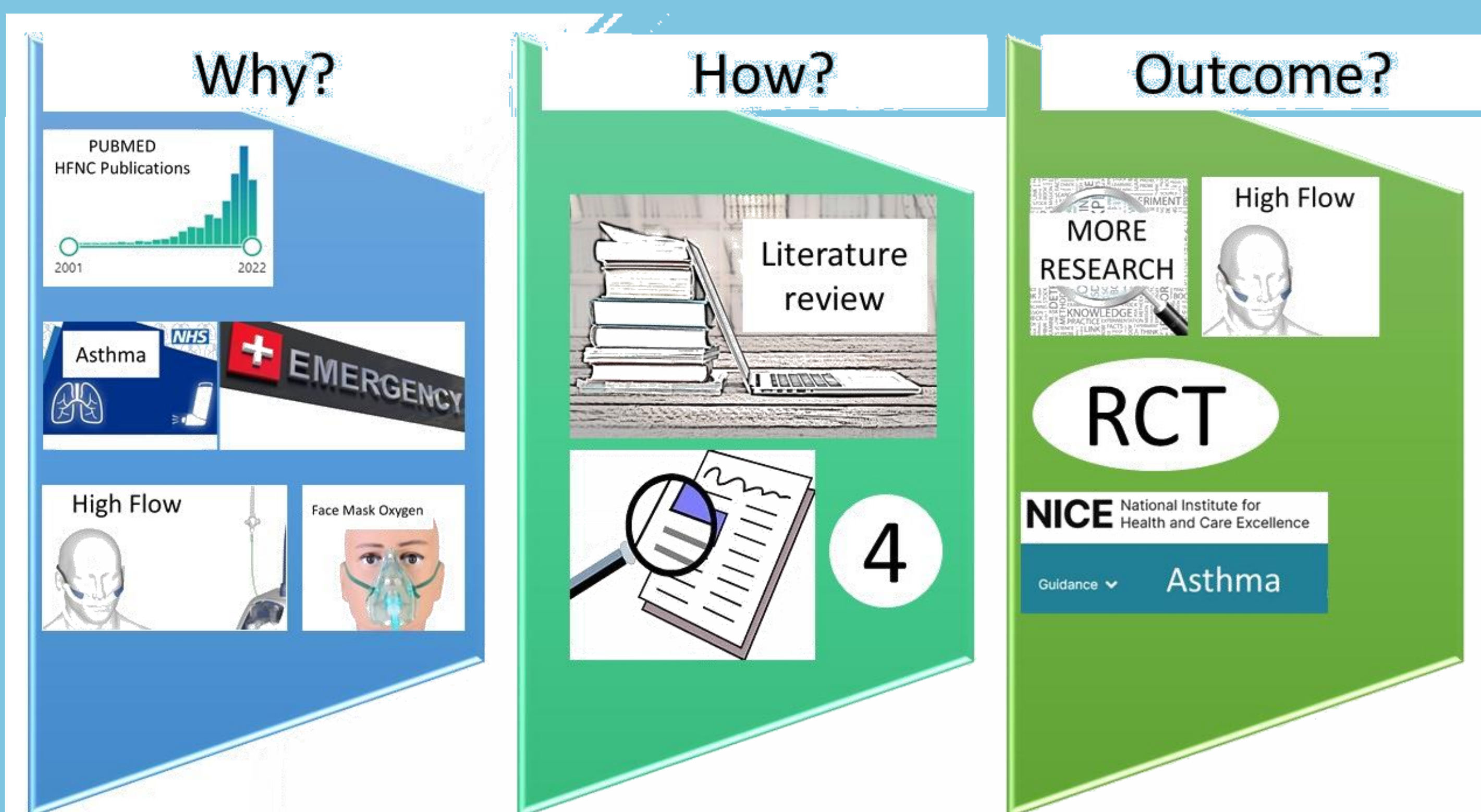


Does humidified High Flow Nasal Cannula Oxygen therapy in Paediatric asthma reduce the need for Paediatric Intensive Care Unit admission?

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Introduction

Asthma remains a leading cause of Paediatric hospital admission. In addition to asthma pharmacotherapy, children with acute severe or life-threatening exacerbation of asthma need close monitoring, oxygen therapy, and sometimes high dependency or intensive care.

Oxygen therapy is usually delivered via nasal prongs or face mask. While High flow nasal cannula (HFNC) is routinely used and has been demonstrated to be an effective technique in bronchiolitis management^{1,2}, data or clinical trials to evidence the use of HFNC in asthma is lacking and not yet included in NICE (QS25) recommendations³.

A critical care outreach review of a patient in the Emergency Department presenting with severe asthma raised the question as to whether the initiation of HFNC would provide symptom control and avoid the need for escalation to intensive care as well as the need for other forms of ventilator support.

Aims

The aim of this literature review is to determine the potential benefit of HFNC in a patient with acute asthmatic exacerbation.

Methods

A clinical question was posed: 'Would HFNC provide better support and avoid PICU admission compared to conventional oxygen therapy (COT)?'. A systematic literature search was performed (PubMed 15/03/2022) using the search words: HFNC, Asthma and Paediatric. Abstracts were screened by the authors for inclusion (as per PICO) and relevant evidence summarised. Review articles were excluded^{4,5}.

Population: Hospitalised Paediatric patients (<18years) with acute asthma; **Intervention:** HFNC; **Comparison:** COT; **Outcome:** ICU admission, ventilation, resolution of respiratory distress scores and length of hospital stay (LOS).

25 articles identified with 4 primary studies meeting PICO inclusion criteria (figure 1).

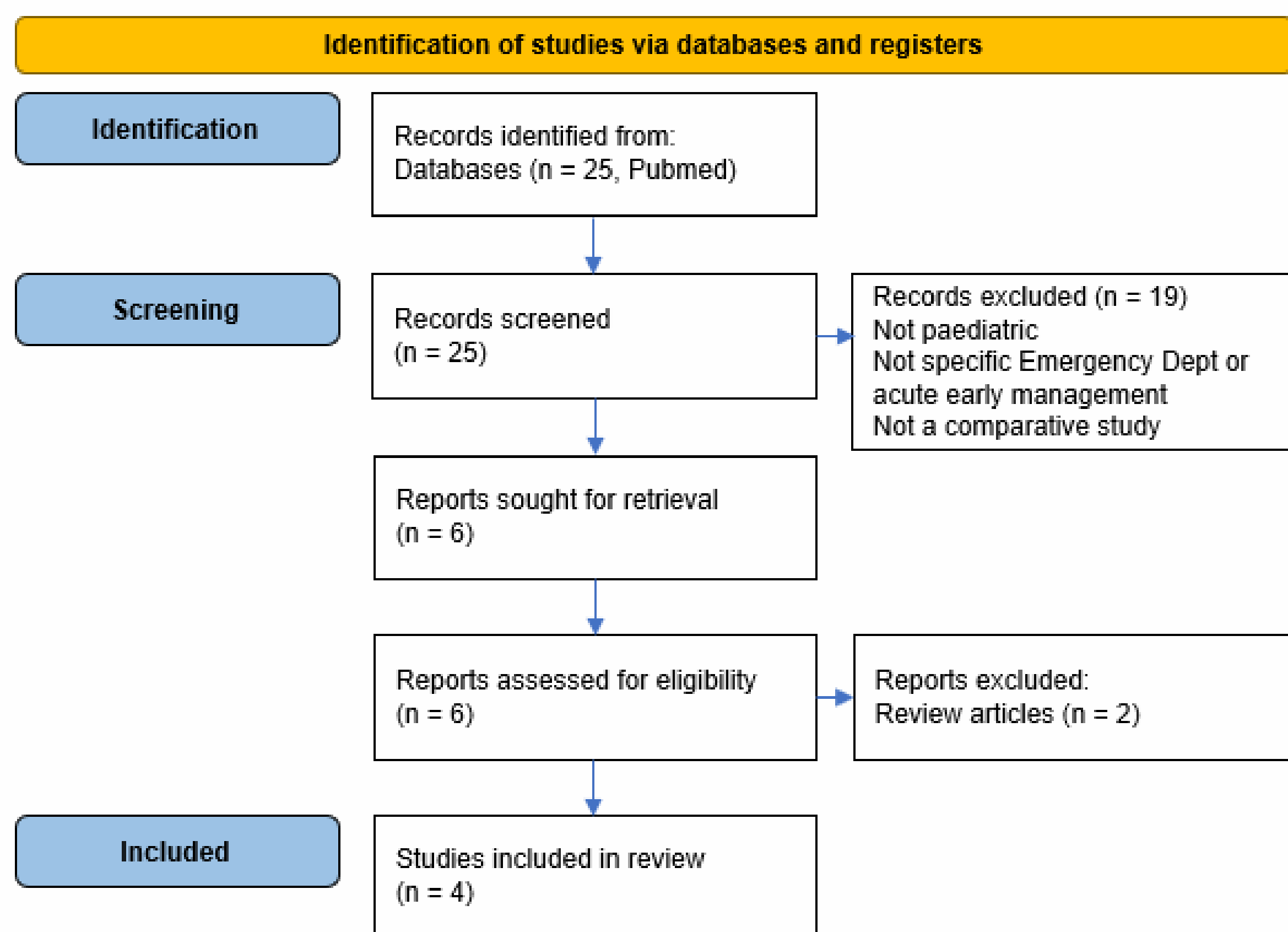


Figure 1: PRISMA flow diagram⁶

Results

The evidence is inconclusive, with 2 studies showing HFNC improves some variables (respiratory & heart rate, SpO₂, pulmonary score (PS)) while having no effect in 2 other studies (Table 1). None of the studies report improvement in LOS or ICU admission.

| PMID | Title | First Author | Reference | Conclusion |
|----------|--|--------------------------|--|---|
| 29331328 | Pilot Clinical Trial of High-Flow Oxygen Therapy in Children with Asthma in the Emergency Service | Yolanda Ballesterro | J Pediatr. 2018 Mar;194:204-210.e3. | Randomised controlled trial of HFNC vs COT in 62 patients (HFNC 30, COT 32) with a pulmonary score (PS) ≥6 or oxygen saturation <94% with a face mask despite initial treatment (salbutamol/ipratropium bromide and corticosteroids). Improved PS in first 2h of therapy in HFNC vs COT group. No differences in disposition, LOS, and need for additional therapies. |
| 32186587 | High flow nasal cannula oxygen therapy in patients with asthmatic crisis in the paediatric emergency department [Article in English, Spanish] | Rodolfo Gauto Benitez | Rev Chil Pediatr. 2019 Dec;90(6):642-648. | Randomised controlled trial HFNC vs COT in 65 patients (HFNC 32, COT 33). No difference in the respiratory effort score measurements every 2 hours. No patients were admitted to intensive care. |
| 30322768 | [Treatment with high-flow oxygen therapy in asthma exacerbations in a paediatric hospital ward: Experience from 2012 to 2016] [Article in Spanish] | Felipe González Martínez | An Pediatr (Engl Ed). 2019 Feb;90(2):72-78 | Retrospective descriptive study, HFNC vs COT, 536 asthma patients, 40 required HFNC. HR, RR, PS significantly decreased at 3-6 hours after starting HFNC. Not a direct therapy comparison. |
| 33975902 | High-Flow Nasal Cannula in Paediatric Critical Asthma | Rachel M Gates | Respir Care. 2021 Aug;66(8):1240-1246. | Retrospective descriptive study; 171 patients (HFNC 104, aerosol mask 67); patients in PICU. There were no significant differences for hospital LOS, paediatric ICU LOS or time to improved pulmonary score between the HFNC and aerosol mask groups. |

Table 1: Evidence summary from literature review

Discussion and Conclusion

Clinical bottom line: HFNC is an increasingly utilised, and effective method of respiratory support. Albeit safe to use, there is mixed evidence that HFNC may be beneficial in acute asthma. It is unclear if HFNC can help to avoid ICU admission. Some patients continue to need further escalation of care which must be done in a timely manner and may include PICU admission.

As the results of this literature search are inconclusive, the authors suggest that the findings of this literature review should be taken with caution. The authors propose to use this literature review to inform a formal systematic review process.

The authors recommend the development of guidance for the initiation, escalation and de-escalation of HFNC therapy, use of early warning scores or PS to measure response, and early referral to critical care for additional respiratory support in those failing to respond to treatment. NICE should include a review of HFNC therapy evidence when assessing recommendations for acute asthma care.

The authors propose that large multi-centre RCTs be undertaken. Also, the effect of respiratory support needs to be analysed independent of asthma pharmacotherapy.

Additional References

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