

Comparison of High Flow Nasal Cannula, Continuous Positive Airway Pressure and Bilevel Positive Airway Pressure in Children and Adolescents with Acute Asthma

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ABSTRACT

Background: Asthma is a common obstructive airway disease in children and adolescents. High flow nasal cannula (HFNC), continuous positive airway pressure (CPAP) and bilevel positive airway pressure (BiPAP) are non-invasive respiratory support (NRS) modalities used in respiratory distress. Pediatric Asthma Score (PAS) is used in children and adolescents aged 2 to 18 years to guide in-patient management. PAS is determined by respiratory rate for age, oxygen requirement, auscultation, retractions and dyspnea. There are few studies comparing HFNC, CPAP and BiPAP in acute asthma (AA).

Objective: To explore if HFNC is effective in management of AA.

Design/Methods: Retrospective chart review of children and adolescents aged 2-18 years admitted to Flushing Hospital Medical Center Jan 2012 to Nov 2018 with AA. Exclusion criteria included all patients with cardiopulmonary disease, PAS < 6 and restrictive respiratory disease. Data collected include age, gender, ethnicity, previous asthma history (PAH), type and days on NIRS, number of continuous albuterol nebulization (CAN), length of stay (LOS) and transfers. PAS was calculated at 0, 6, 24, 48 and 72 hrs. Data were analyzed using SPSS software, ANOVA and chi-square test, p<0.05 was considered significant.

Results: Of 146 charts reviewed, 9 met exclusion criteria. Of the remaining 137, G1(13%) patients received HFNC, G2(9%) on CPAP/BiPAP and G3(77%) on no NRS. G1, G2 and G3 were compared for gender (44%, 50%, 54% male), median age (3.6, 6.3, 6.1 years), ethnicity (61%, 75%, 83% Hispanic) and median PAS on admission (7.7, 9.4, 9). PAH was none or intermittent in 28% and moderate asthma in 35%. PAS at baseline between groups, F=2.72, p=0.07, average number of CAN (1.2, 5.2, 2.1) F=4.1, p=0.02, average LOS (4, 5, 4 days) F=5.36, p<0.01, days on NRS (1.5 vs 2.4 days), t=2.67, p=0.01 and PICU transfers (6%, 67%, 27%), x=9.41, p<0.01.

Conclusion(s): In our small sample, patients on HFNC were younger, required fewer number of CAN, shorter duration on NIRS, lower LOS and fewer transfers to PICU than those on CPAP/BiPAP.

INTRODUCTION

- Asthma is a common obstructive airway disease in children and adolescents
- High flow nasal cannula (HFNC), continuous positive airway pressure (CPAP) and bilevel positive airway pressure (BiPAP) are non-invasive respiratory support modalities
- Pediatric Asthma Score (PAS) is used in children and adolescents aged 2 to 18 years to guide in-patient management
- PAS is determined by respiratory rate for age, oxygen requirement, auscultation, retractions and dyspnea
- There are few studies comparing HFNC, CPAP, and BiPAP in acute asthma

OBJECTIVE

To explore if high flow nasal cannula (HFNC) is effective in management of acute asthma

METHODS

- Design:** Retrospective chart review
- Settings:** Flushing Hospital Medical Center
- IRB:** Approved by Flushing Hospital Medical Center
- Time Frame:** January 2012 to November 2018
- Inclusion criteria:** Children and adolescents aged 2-18 years admitted to FHMC with acute asthma exacerbation
- Exclusion criteria:** Patients with cardiopulmonary disease, restrictive respiratory disease, smoking history and not discharged from FHMC
- Tool:** Pediatric Asthma Score (respiratory rate for age, oxygen requirement, auscultation, retractions and dyspnea)
- Statistical analyses:** Mann-Whitney U test for nonparametric independent sample, chi-square test and ANOVA, p<0.05 was considered significant

RESULTS

- Charts reviewed:** 146
- Charts met inclusion criteria:** 137
- Demographics data:** ethnicity (79% Hispanics)
- Pediatric Asthma Score (PAS) on admission, 0, 6, 24, 48 and 72 hours**
- Clinical data:**
 - Type and days on non invasive respiratory support (NIRS), Figure 1**
 - Length of stay (LOS), Figure 2
 - Number of continuous albuterol nebulization (CAN), Figure 3
 - Number of transfers to PICU, Figure 4

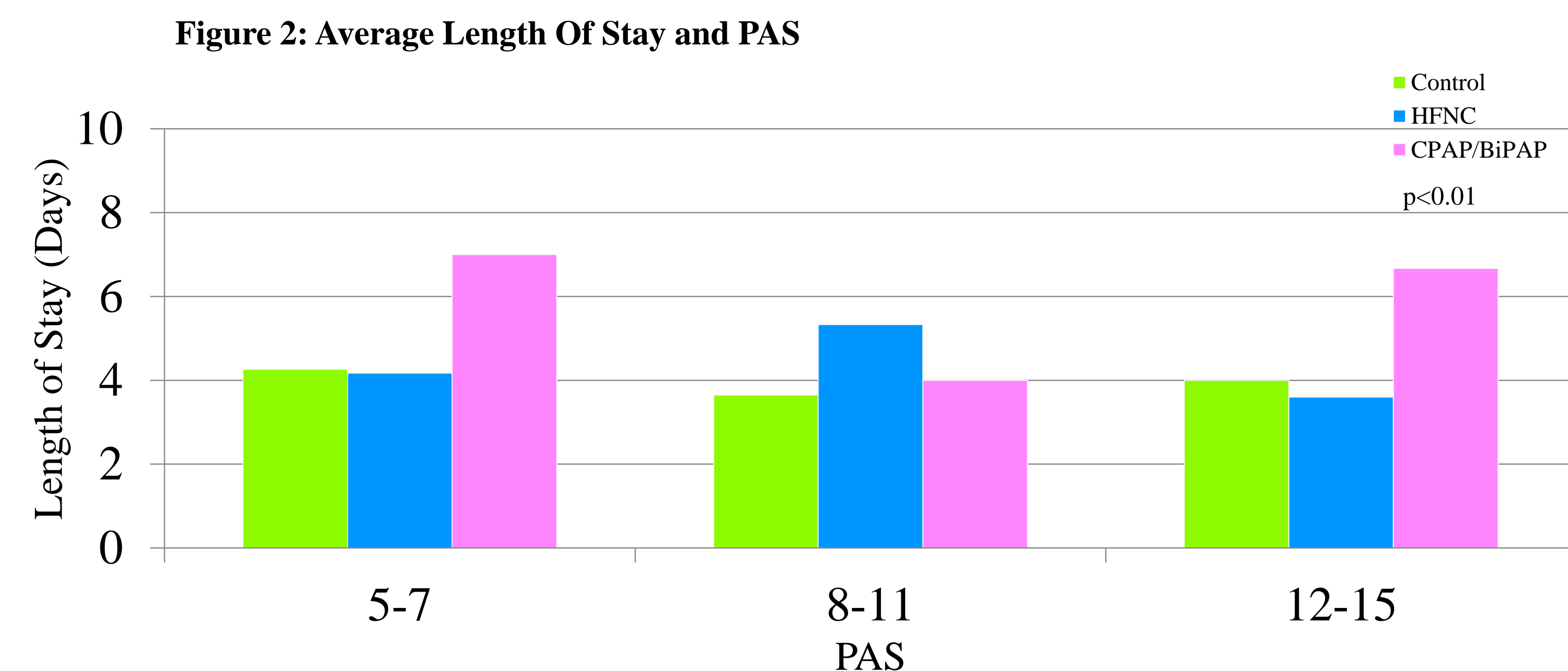
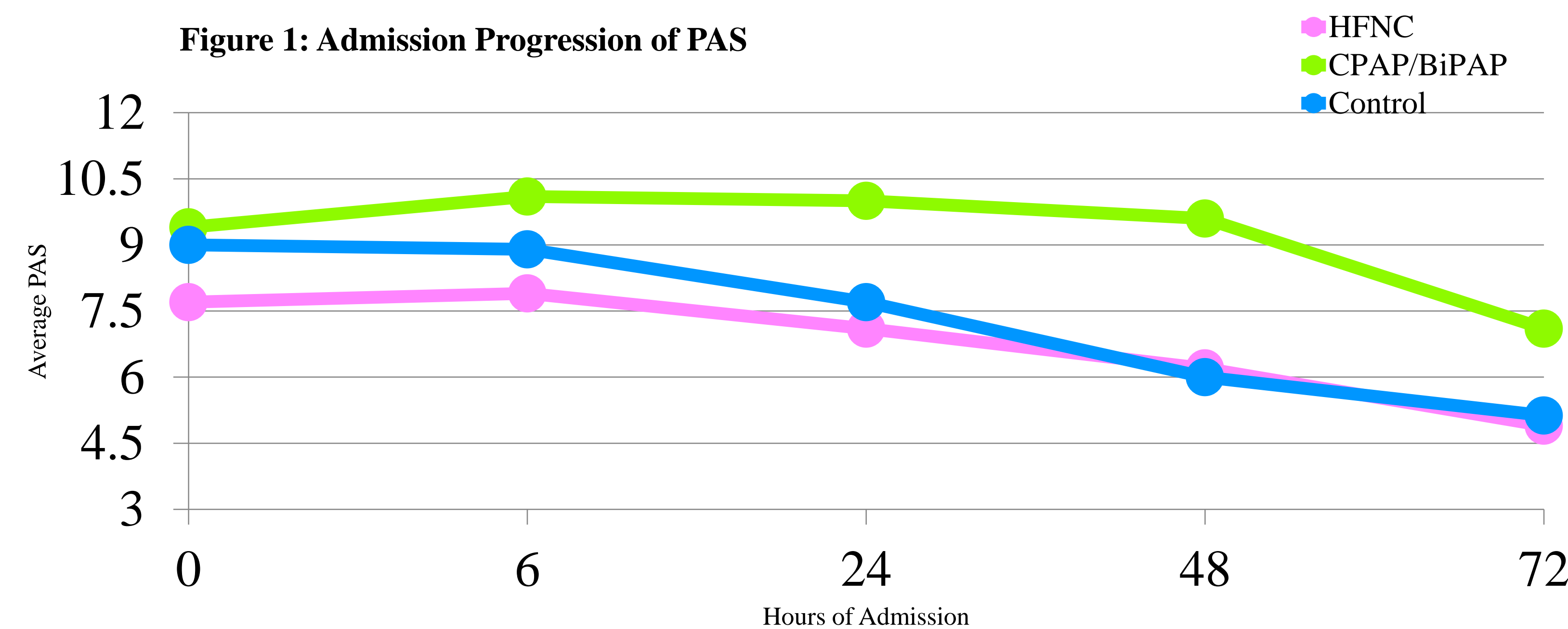


Figure 3: Average CAN and PAS

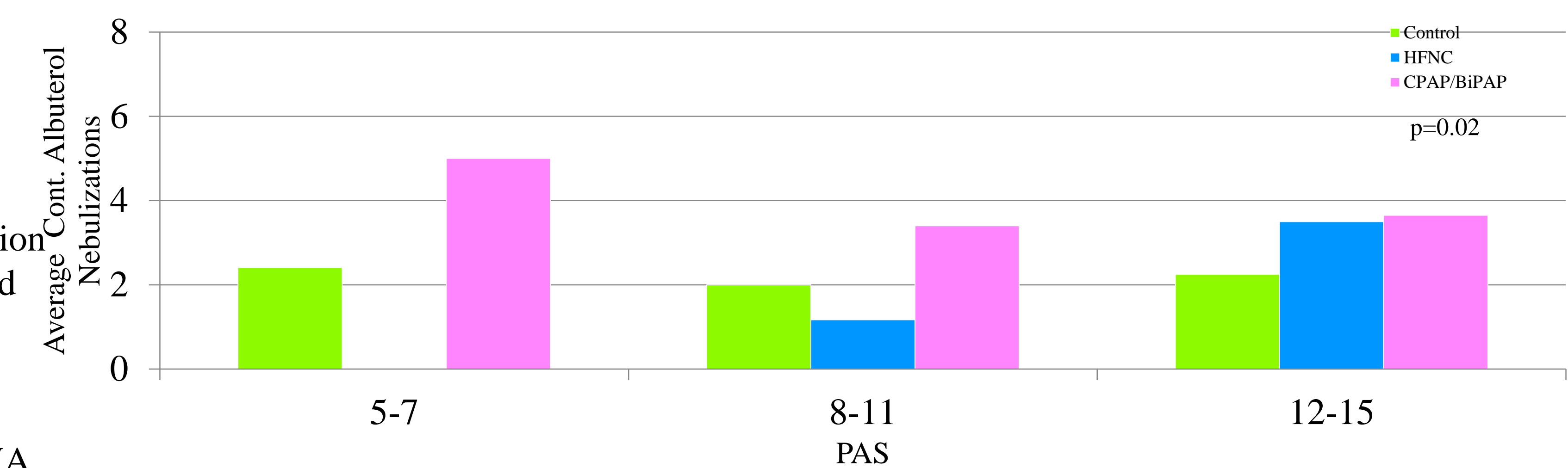
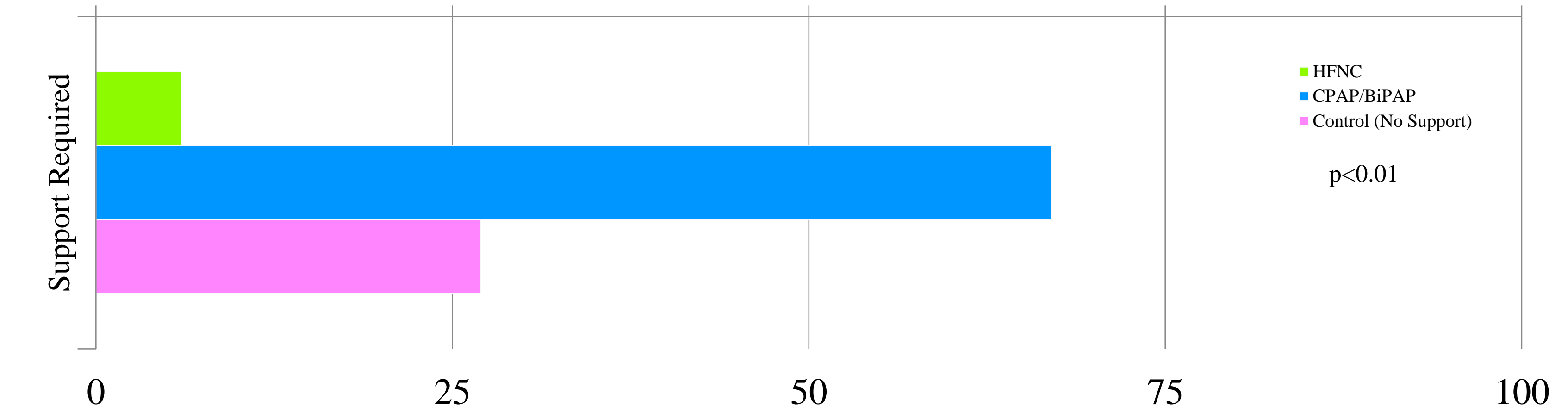


Figure 4: PICU Transfers (%)



CONCLUSIONS

Patients on high flow nasal cannula were younger, required fewer number of continuous albuterol nebulization, shorter duration of non-invasive respiratory support, lower length of stay and fewer transfers to PICU than those on CPAP/BiPAP.

LIMITATION

Small sample size

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