

# PHYSIOLOGICAL EFFECTS OF HIGH FLOW NASAL CANNULA VS HELMET CONTINUOUS POSITIVE AIRWAY PRESSURE IN PEDIATRIC ACUTE HYPOXEMIC RESPIRATORY FAILURE

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Argomento: Insufficienza respiratoria acuta e ventilazione meccanica

**OBJECTIVES:** Continuous Positive Airway Pressure (CPAP) is widely used in infants with Acute Hypoxemic Respiratory Failure (AHRF). Recently, High Flow Nasal Cannula (HFNC) therapy was introduced. We conducted a physiological crossover randomized trial comparing free high-flow helmet CPAP vs HFNC 2 and 3 lts/kg/min. Primary end-point of the study was esophageal Pressure Time Product /min (PTPes). Secondary end-points included: gas-exchange and physiological parameters. **METHODS:** Children aged 15 days to 3 years with AHRF (S/F ratio < 300, and two of the following: RR > 2 SD according to age, active contraction of auxiliary muscles or paradoxical abdominal motion) admitted to PICU were recruited to receive helmet CPAP 7cmH<sub>2</sub>O, HFNC 2 and 3lts/kg/min in a randomized order. Every trial was delivered for 20 minutes, with 10 minutes washout period in between. An esophageal probe was placed for pleural pressure measurement. Children were sedated with protocolized procedure with dexmedetomidine 0.5 mcg/kg/hr. Demographic and physiological parameters (weight, age, sex, PIM3, Arterial Blood Pressure, Heart and Respiratory Rate, transcutaneous gases and peripheral oxygen saturation) were also collected. **RESULTS:** seven children (F 71% - M 29%) were included so far. Median age was 17 months (8,3-27,1)<sup>IC95%</sup>, median weight was 9.4kgm(8.7-11)<sup>IC95%</sup> median PIM 3 was -4(-7.6 - -3)<sup>IC95%</sup>. At baseline, tpCO<sub>2</sub> was 43mmHg(33-52)<sup>IC95%</sup>, RR was 53/min(41-64)<sup>IC95%</sup>, S/F ratio was 196 (126-247)<sup>IC95%</sup>, HR was 125bpm(116-163)<sup>IC95%</sup>, ΔPES was 18,6cmH<sub>2</sub>O(23.2-27.6)<sup>IC95%</sup>, PTPes was 10.2 cmH<sub>2</sub>O's(5.8-16.6)<sup>IC95%</sup>, PTPes/min was 660 cmH<sub>2</sub>O's/min(340-780)<sup>IC95%</sup>. No differences were found between HFNC and baseline regarding PTPes and PTPes/min. Helmet CPAP was associated with lower PTPes [8cmH<sub>2</sub>O's(4,8-12)<sup>IC95%</sup>] PTPes/min [200cmH<sub>2</sub>O's/min(115-633)<sup>IC95%</sup>] ΔPES[14.1cmH<sub>2</sub>O(14.1-16)] and RR [38/min(29-47)<sup>IC95%</sup>], compared both to baseline and HFNC trials (p<005). We found no differences in S/F, HR and tpCO<sub>2</sub> between trials. **CONCLUSIONS:** Helmet CPAP was more effective than HFNC in decreasing PTPes/min. Further randomized controlled trials are needed to confirm these findings.