**RESEARCH TOPIC CLI19**

# High-Flow Nasal Cannula versus Continuous Positive Airway Pressure in Naive Pneumonia: A Randomized Controlled Trial with Multimodal Assessment in the Emergency Department

**Research area**
Medical Area

**Clinical Unit name**
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**Abstract**
Hypoxemic acute respiratory failure (ARF) secondary to pneumonia is a leading cause of Emergency Department (ED) admissions. While High-Flow Nasal Cannula (HFNC) and Continuous Positive Airway Pressure (CPAP) are established therapies, landmark trials validating their efficacy have predominantly been conducted in the highly controlled environment of Intensive Care Units (ICUs). The ED represents an acute frontline setting with completely different clinical, staffing, and logistical dynamics; consequently, robust data directly comparing these modalities in this fast-paced, resource-constrained environment is strikingly lacking. This is particularly true for "naive" patients, those with no prior history of chronic respiratory diseases. This project aims to bridge this gap through a prospective, randomized clinical trial designed to identify the optimal frontline non-invasive respiratory support. Adult patients presenting to the ED with clinical and radiological signs of pneumonia complicated by hypoxemic ARF will be randomized in a 1:1 ratio to receive either HFNC or helmet/mask CPAP.

To early predict device failure and mitigate the risk of Patient-Self Inflicted Lung Injury (P-SILI), the study adopts an innovative approach. Standard clinical assessment, measured via the ROX index, will be dynamically integrated with bedside point-of-care ultrasound (POCUS) to evaluate diaphragmatic excursion and thickening fraction. Supported by the collection of systemic inflammatory biomarkers at admission, this comprehensive monitoring strategy aims to capture the patient's respiratory drive and inflammatory phenotype before overt clinical deterioration occurs.

The primary endpoint of the trial is to evaluate the non-inferiority of HFNC compared to CPAP in preventing the need for endotracheal intubation within 7 days of ED admission. Concurrently, the project addresses several crucial secondary endpoints, including the assessment of overall 30-day mortality, device tolerance, and the incidence of light sedation required to ensure patient compliance. The study will also investigate the correlation between

diaphragmatic ultrasound kinetics and the ROX index as an early predictor of respiratory exhaustion. Finally, the trial will explore the differential efficacy of HFNC versus CPAP across specific etiological subsets (e.g., viral versus bacterial or atypical pneumonia). This critical analysis will help determine whether the underlying pathogen and the associated lung mechanics should influence and guide the choice of the most appropriate non-invasive support right from triage.

**Scientific references**


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