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LETTER TO THE EDITOR
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A Possible Alternative in the Treatment of Obstructive Airway Disease in Pediatric Intensive Care Patients

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We have carefully reviewed the article "Respiratory Syncytial Virus Infections in Pediatric Intensive Care: Association of Sociodemographic Data and Clinical Outcomes with Viral and Bacterial Co-infections" by Ülkem Koçoğlu Barlas et al.[1] While acknowledging the high accuracy of the authors' study, we agree that high-flow nasal cannula-oxygen therapy remains the most common method of respiratory support for Respiratory syncytial virus (RSV) infections. However, the authors did not address some critical aspects.

In recent years, infectious diseases have become a significant focus in pediatric intensive care units, necessitating a comprehensive and rapid management approach. Increasing scientific understanding of Severe acute respiratory syndrome-related coronavirus 2 (SARS-CoV-2) and other infections reveals that acute bronchiolitis, bronchitis, and bronchopneumonia caused by both novel and known resistant viruses and bacteria trigger a cascade of inflammatory responses in the bronchoalveolar system. This inflammatory response provokes excessive mucus and sputum production, leading to airway obstruction.[2] Consequently, the respiratory system's inability to clear the airways effectively results in impaired oxygen delivery to the blood through the alveoli, ultimately causing hypoxia.[3] As patients' general condition deteriorates, this often leads to their hospitalization in intensive care units.

We concur that high-flow nasal cannula-oxygen therapy is effective for combating hypoxia. In such situations, ventilatory support and increased oxygen delivery serve as therapeutic measures, particularly when airway obstruction is present. However, if the inflammatory response overwhelms the immune system's defenses, mucus and pus can accumulate in the airway lumen.[4] This obstructive process prevents effective oxygen from reaching the alveoli, impeding normal gas exchange and blood oxygenation. Unfortunately, even high-flow nasal cannula usage does not yield significant improvements, with average patient survival rates around 48%.[5] Therefore, additional strategies are essential to enhance clinical outcomes.

When high-flow nasal cannulation is insufficient, extracorporeal membrane oxygenation (ECMO) may be indicated.[6] Although ECMO is crucial for treating patients with airway obstruction, its application necessitates substantial financial and technical resources often unavailable in many healthcare settings. The high costs associated with ECMO create serious financial barriers for numerous clinics, limiting its use.[7] In this context, one priority area should be developing more accessible and cost-effective methods to improve patient survival.

Recent studies suggest that alkaline hydrogen peroxide solution is a promising method for removing airway obstructions.[8] Research has shown that sputum and mucus contain the enzyme catalase, released upon cellular disruption. Experiments indicate that local hyperthermia, with temperatures above 37°C, in conjunction with isotonic or hypertonic 3% hydrogen peroxide solutions containing 5%10% sodium bicarbonate, effectively affects biological masses, allowing for an intensive "cold boiling" process enriched with catalase, facilitating their dissolution.[8,9]

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The most gentle and convenient method for this approach remains the aerosol inhalation of a warm solution of hydrogen peroxide and sodium bicarbonate. This process, when reacting with catalase, produces a physico-chemical reaction that releases gas (oxygen) and water. A key aspect of this approach is liquefying sputum and mucus, promoting the unobstructed flow of oxygen into the blood through the alveoli once liquefied. This method not only enhances airway patency but also allows for more efficient gas exchange in the lungs.

In conclusion, the exploration of innovative methods such as aerosol inhalation of alkaline hydrogen peroxide solutions is essential for improving clinical outcomes in ICU patients suffering from respiratory infections, highlighting the need for further research in this area.[10]

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