



EDITORIAL

High-flow oxygen therapy: Non-invasive respiratory support goes out of the PICU. Is it an efficient alternative?☆



Oxigenoterapia de alto flujo: el soporte respiratorio no invasivo sale de la UCIP. ¿Es una alternativa eficiente?

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“More medicine is not better medicine”
Elliot S Fisher, New York Times, December 1, 2003.

A few years have passed since, in the midst of the debate for health care reform in the United States, this New York Times opinion piece brought awareness to the fact that efficiency was a necessary condition to attain sustainability (financial solvency) in public health care systems. Efficiency not through the implementation of budget cuts, as some understood it, but by investing solely on therapeutic and diagnostic methods of proven cost-effectiveness. This, in turn, requires better information (rigorous scientific evidence) and better incentives. The bioethical principle of justice concerns us all, health care managers and practitioners alike.

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In recent years, high flow nasal cannula (HFNC) oxygen therapy has been emerging as a well-tolerated and feasible technique to help our patients, especially those with hypoxaemic respiratory failure, cope with respiratory distress. However, its indications in paediatric practice have yet to be clearly established. Before generalising its use in PICUs, paediatric wards and emergency departments, it is essential that we establish its efficacy, actual effectiveness in clinical practice and its efficiency, with a critical evaluation of the most recent scientific evidence.

In science, efficacy is a relative concept: it is defined based on the control treatment that is used for comparison. Compared to conventional oxygen therapy, in pneumonia¹ and bronchiolitis² as well as the early stages of acute respiratory distress syndrome, in the event of acute severe hypoxaemic respiratory failure, the type of non-invasive respiratory support that has been proven efficacious and effective (and is therefore indicated) is continuous positive airway pressure (CPAP) with or without pressure support ventilation. Today, we also know that in this regard, HFNC is not more efficacious than CPAP in the management of pneumonia³ or bronchiolitis.⁴

The use of HFNC has only been proven to be more efficacious than low-flow nasal cannula in patients with

bronchiolitis with mild to moderate hypoxaemic respiratory failure.^{5,6} Compared to conventional oxygen therapy, it alleviates respiratory distress and decreases the frequency of treatment failure, but it does not reduce the frequency of admission to the PICU, the length of stay or the duration of supplemental oxygen. Prospective studies are required to analyse the clinical effectiveness of HFNC in patients with bronchiolitis managed in the inpatient ward.

In cases of hypercapnic respiratory failure secondary to severe status asthmaticus, non-invasive ventilation (NIV) potentiates the effects of pharmacotherapy. Its use in the emergency department can prevent hospital admissions,⁷ while in the PICU it alleviates respiratory distress and reduces the need for inhaled bronchodilators and rescue therapies.⁸ For some years now, NIV has been the first-line mode of respiratory support in paediatric asthma. The use of HFNC in children with status asthmaticus admitted to the PICU may delay initiation of NIV and therefore prolong the duration of respiratory support and the length of stay in the PICU.⁹

A recent randomised clinical trial¹⁰ showed that compared to standard bronchodilator therapy (excluding NIV), HFNC delivered on an emergency basis in children with moderate to severe asthma was not associated with any statistically significant changes in the outcomes under study. The only outcome that was better in the HFNC group was the improvement of symptoms, which was assessed without masking. In the current issue of *Anales de Pediatría*, González Martínez et al.¹¹ present a prospective cohort study with multivariate analysis on the real-life effectiveness of HFNC in the management of asthma exacerbations at the paediatric ward level. Paediatricians were more likely to use this approach in more severely ill patients or patients with a higher number of previous admissions. Its use was associated with improvement at 3–6 h of treatment. Compared to the use of lower flow rates, the use of high flow rates (15 L/min) independently and significantly reduced the probability of admission to the PICU. This aspect seems relevant when it comes to determining the initial flow rate in clinical practice.

The second step, after establishing the effectiveness of HFNC, is to analyse its cost-efficiency, as has been done in the field of neonatology.¹² But the efficacy of a treatment is a necessary condition for its efficiency. So the only way that HFNC may be efficient is in comparison to conventional supplemental oxygen delivery through nasal prongs. And the most dependable estimate, taking into account current prices, shows that it is not a cost-effective therapy.¹³ Treatment with HFNC only seems to improve patient comfort, whereas it increases costs by two orders of magnitude. We may be squandering the taxpayers' money. Under these circumstances, rationality dictates that the use of this approach be suspended until evidence of its cost-effectiveness becomes available and a clinical practice guideline developed to guide its appropriate use.

Unsubstantiated fads, beliefs and fantasies threaten all sciences, including medicine. They undermine the quality of care and result in exorbitant costs and a huge variability in clinical practices, the outcomes of which are not actually known. The best approach to fighting these threats in pursuit of the sustainability of our health care system is to base expenditure on robust scientific evidence and on the

economic concept of opportunity cost. The rational solution is not to cut costs, which is certain to hurt the quality of the system. The right approach is to withdraw investment: to eliminate resources allocated to medical practices that are of little benefit to health and reallocate them to other practices that have been proven to be efficacious, effective and efficient.

Economic theory teaches us that an option that can bring real solutions is innovation: to research the application of efficacious therapies outside the PICU. Non-invasive ventilation is used in adult inpatient wards, and the effectiveness of bubble CPAP in paediatric wards has already been demonstrated in developing countries. Thus, a very promising strategy whose effectiveness is worth investigating is the early use of CPAP in patients with bronchiolitis in paediatric wards or during interhospital transport. The results of the experience published in the current issue of *Anales de Pediatría* on this approach are encouraging.¹⁴

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