

Editorial

Enteral feeding in children on non-invasive ventilation is feasible, but clinicians remain fearful

Delivering adequate nutrition to meet the child's energy goals in critical illness is vital, with enteral nutrition the preferred route. Yet many barriers exist, in organisational processes, patient factors and clinician fears, which prevent the timely delivery of enteral nutrition (EN)[1,2,3]. Canarie et al [4] in a large (n=444) retrospective 6 USA PICU study found that non-invasive ventilation (NIV) was the most significant treatment factor that delayed the initiation of EN. The use of (and options for) NIV has increased markedly in the last decade in both within PICUs and within the hospital in general [5], so reluctance to enterally feed children on NIV -has become a concern. NIV of course is used as both a step up and a step down treatment to support the child's own respiratory efforts and reduce the need for intubation and invasive ventilation.

Children presenting with severe bronchiolitis form the largest sub group of critically ill children requiring NIV. However, nutrition guidelines based on evidence are elusive. Current guidelines simply recommend naso-gastric feeds or intravenous fluids for infants with a diagnosis of bronchiolitis who cannot maintain hydration orally, but there is no evidence to any being more beneficial [6]. Still, clinician fears predominantly relate to the theoretical need for escalation of respiratory support and intubation, while on NIV therapy, with a potential risk of vomiting, aspiration and pneumonia.

Therefore, it is timely that Leroue and colleagues [7] in this edition have examined the practice of delivering EN in a group of children on NIV. This single centre, retrospective cohort study included 562 children, 69% under five years of age and virtually all (98%) with a medical diagnosis receiving different types of NIV. At the time when EN was commenced, NIV was delivered with continuous positive airway pressure (CPAP), Biphasic positive airway pressure (BiPAP) and High Flow Nasal Cannula (HFNC), in 13%, 32% and 42% respectively, with a few children weaned off NIV before EN

commenced. More than half (57%) required escalation of their respiratory support during the PICU admission. The unit had local nutrition guidelines (as recommended by ASPEN guidelines [8]) which were followed by a PICU nutrition support team. These consisted of a proactive nutritional strategy, in favour of early enteral nutrition (oral or via jejunal tube). Consequently, they found that in 64% of children, EN was initiated within 24 hours of admission and 67% children did achieve their estimated energy goals during their PICU stay (median 2 days). This was predominantly by oral feeding (54%) or by transpyloric (TP) feeding (30%). In their multivariate analysis, they found two factors, were independently associated with the likelihood of not initiating early EN in the first 24 hours: the need of higher NIV support (use of BiPAP) and the use of continuous sedation (all with dexmedetomidine). Of note, 12% children suffered adverse events (54 pneumonia and five aspiration pneumonia), which is considerably lower than that reported in the adult literature [9] but still a concern. The retrospective design did not allow for further analysis of these complications, and no link with nutrition could be investigated. The lack of any clearly defined diagnostic criteria for ventilator-associated pneumonia (VAP) in this study is another limitation, which authors have acknowledged. In the children fed by TP route, there were multiple x-rays required (median two per patient) and a number of tube misplacements, so although TP feeding may appear the obvious choice in terms of reducing risk of aspiration, it is not ideal. Further limitations also relate to the retrospective nature of the study and the lack of being able to determine clinical decision making regarding initiation NIV or EN, which again are acknowledged.

Achieving energy and protein goals was one major aim of Leroue et al, unfortunately, but the authors did not detail how these nutritional goals were set. Indeed, nutritional requirements of critically ill children on NIV support are unknown. It is known that the critically ill child's energy requirements are lower than those of healthy children, based on large indirect calorimetry studies [10,11], and some equations (e.g. Schofield equation) are an approximation of these needs. However, all these studies have been conducted on intubated children, as indirect calorimetry is impossible to perform under NIV support (mainly because of major air leaks), and their results

should not be extrapolated to children on NIV therapy. NIV treated children have a higher work of breathing which may lead to increased nutritional requirements. Consequently, when on NIV children's nutritional goals cannot be considered similar to invasively ventilated children nor to healthy children. Leroue et al defined EN interruption according to anaesthesiology "nil per oral" 6 hour policy. However, gastric emptying is often delayed in critically ill children (due to multifactorial gastroparesis), compared to elective surgical children and an empty stomach cannot be guaranteed after 6 hours, therefore the extrapolation of anaesthesiology guidelines should be undertaken cautiously, as these may not be accurate in the intensive care setting [12].

Nevertheless, Leroue et al [7] have begun the research into this increasing group of children (both within and outside the PICU). There is now some evidence that these children can be safely fed enterally, but many clinicians are still reluctant to initiate feeds. Further prospective research needs to be undertaken around feeding in children on NIV and the authors suggest further research into the optimal enteral feeding method (gastric versus transpyloric) for children on NIV. There remain many other uncertainties around enteral nutrition in this critically ill children subgroup, which we need to investigate, including optimal nutrition goals, continuous versus bolus enteral feeding, oral versus tube feeding and the use of enriched formulas in this population.

References:

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