

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 (7) defined EN interruption according to anesthesiology "nil per oral" 6-hour policy. However, gastric emptying is often delayed in critically ill children (due to multifactorial gastroparesis), compared with elective surgical children, and an empty stomach cannot be guaranteed after 6 hours, therefore the extrapolation of anesthesiology 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 vs transpyloric) for children on NIV. There remain many other uncertainties around EN 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.

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Is the ICU a Risk Factor for Future Asthma Readmissions?*

Christopher L. Carroll, MD, MS

Department of Pediatrics
Connecticut Children's Medical Center
Hartford, CT

Children with severe asthma exacerbations are commonly admitted to a PICU, which can lead to days or even weeks of hospitalization (1–4). However, despite an increasing number of ICU admissions for severe asthma in children (5), these severe exacerbations are still understudied

(2). There is little research investigating the best way to treat these exacerbations, and there are few studies examining how to predict who is at risk for severe exacerbations. This excellent study by Tse and Samson (5) helps get at the latter.

In this issue of *Pediatric Critical Care Medicine*, Tse and Samson (5) conducted a retrospective analysis of all Canadian children admitted to the hospital with asthma over a 6-year period (2008–2014). The authors used a pan-Canadian inpatient database that had unique identifiers for each child and allowed for tracking of readmissions. Outcomes were compared in two cohorts of children: those admitted to the ICU during their first asthma admission, and those admitted to the ward during their first asthma admission. The authors theorized that children admitted to the ICU during their first asthma admission would have a shorter time to asthma-related readmission. In other words, children admitted to the ICU with a severe asthma exacerbation were more at risk for readmission and potentially represented a more severe asthma phenotype.

*See also p. 1099.

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The readmission rate in the entire cohort was high; 10% of all children were readmitted at least once during the year following their initial index admission, and 23% were readmitted at least once within 5 years. As hypothesized, children admitted to the ICU during their first asthma admission were significantly more likely to be readmitted within 180 days, 1 year, and 3 years of discharge. Within 1 year, 14% of children admitted to the ICU initially were readmitted, compared with 10% of the children admitted to the ward initially. Within 3 years, 24% of those admitted to the ICU were readmitted, compared with 18% of those admitted to the ward. Interestingly, on bivariate analyses, the authors found that intubation during the initial index hospitalization was a protective factor against readmission, while preschool age was a risk factor for readmission.

Like many good studies, this study (5) raises as many questions as it answers. Is this a distinct phenotype that requires closer attention? Should we monitor and treat this phenotype more closely? Is there anything that we can do to prevent readmission? And, why is intubation protective? Was there an intrinsic characteristic of the kids who were intubated that reduced the risk of readmission? Or was it the way these intubated children were managed post hospitalization? Were kids who were intubated more closely monitored after discharge? Seen by a pulmonologist/allergist? And, does this provide a clue suggesting that it is possible to prevent readmission? Unfortunately, some of the data that may have helped to answer these questions (such as sociodemographic data, referral data, and baseline asthma severity) are not available in this retrospective database. But, these questions provide an excellent jumping-off point for others to study!

Several investigators have examined this population of children with severe asthma exacerbations to try to identify phenotypes that are more at risk for severe exacerbations (6, 7). Maffei et al (7) described a group of children with severe asthma exacerbations who developed rapidly progressive respiratory failure requiring intubation but then also had rapid improvement. However, other investigators have cast doubt on this phenotype by describing that children presenting to a community hospital (rather than a children's hospital) were more likely to be intubated with acute asthma (7). This suggests that intubation history may not be valid as an indicator of risk for future severe exacerbations as one might expect. Additionally, in this study by Tse and Samson (5), a history of intubation was protective against future readmissions. It seems that history of ICU admission is a better sign that a child carries an increased risk of readmission and may be more prone to severe exacerbations. However, more studies are needed in this population of children with severe asthma.

Part of the reason we do not have more research in this area is the inconsistency in how we define "severe asthma" (2). Do we mean severe baseline asthma? Or severe exacerbations? Asthma in children is different from asthma in adults. There are children with severe baseline asthma, but many of the children admitted to an ICU with severe asthma exacerbations have mild or intermittent baseline asthma (8). Additionally, children are treated differently and generally more aggressively than adults with severe asthma exacerbations (1), and many return to a fairly asymptomatic state following their ICU admission for severe asthma (9). Should we be decoupling severe baseline asthma and severe asthma exacerbations in children? And, although this population is well known and appreciated by PICU providers, many outside of our field are unaware of this population of children (10). Compared with the number of adults with severe asthma, the number of children with severe asthma exacerbations is small. Until there is more uniformity in our definitions, and more understanding in the larger medical community that this population exists, we are unlikely to make significant progress toward determining who exactly is at risk for these severe exacerbations.

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