

Paediatric update



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Welcome to our paediatric nutrition column 'Paediatric update'. In each column, Kiran Atwal, Freelance Paediatric Dietitian, will update you on new guidance, tools and current affairs. Here, Kiran explores 'balancing optimum nutrition and the impact of enteral feeding intolerance in critically ill children'.

How is it defined and why is it controversial?

Defining enteral feeding intolerance in clinical practice has been controversial due to the variability in the indicators used, the lack of standardised measurements and the subjective nature of symptoms. In children, particularly the young, communicating symptoms effectively or reliably may be challenging or impossible. The clinical presentation also depends on the stage of gastrointestinal development, growth requirements and the child's age, as well as the underlying clinical condition.¹ There is currently no universally agreed definition of enteral feeding intolerance; together, this lack of consensus complicates its assessment and the delivery of adequate nutrition.² Unnecessary or prolonged feeding interruptions due to enteral feeding intolerance assessments can result in underfeeding, which is especially detrimental for critically ill children who have high energy and growth requirements. While overly lenient approaches could risk complications such as aspiration.³ As such, striking a balance is difficult.

What does the latest evidence say?

Published towards the end of last year, a scoping review examined the range of measurements used to assess enteral feeding intolerance in critically ill children from evidence between 2004-2023. Across 32 articles, included mainly from the US, China and Spain, key indicators of enteral feeding intolerance used were:⁴

- 1. Gastric residual volume (GRV):** GRV was the most frequently used indicator to measure gastric emptying, cited in 22 studies. However, there was no consensus on the cut-off values for defining high GRV. Various studies set different thresholds, which ranged from 50% of the feeding volume in the last 4 hours to values calculated based on body weight (ranging from 3-5 ml/kg).
- 2. Diarrhoea:** Mentioned in 20 studies, diarrhoea was commonly defined based on stool frequency and consistency. However, the thresholds varied, with definitions ranging from 3 to 6 loose stools per 24 hours.

3. Vomiting: Nine studies included vomiting as an indicator, typically defining it as 2 or more episodes within 24 hours involving gastric content.

4. Other symptoms: Abdominal distension, assessed by changes in abdominal girth (increases 1.5-2 cm in 24 hours) or intra-abdominal pressure (>10 mmHg); constipation, assessed by days without stools which ranged from 24 hours to 4 days; signs of aspiration, assessed by presence of stomach contents in the respiratory tract or gastric pepsin in tracheal secretions.

Although many other symptoms were listed, such as nausea, abdominal pain, increased bowel sounds and gastrointestinal haemorrhage, there was no assessment detail provided.⁴

Other than GRV, some novel measurements of gastric emptying were listed but less commonly used due to logistical limitations and a lack of agreed objective standards: 1) ultrasound of the gastric antrum diameters (in a supine position and a right lateral decubitus position) to calculate the gastric content volume; and 2) acetaminophen absorption test, whereby increases in blood concentrations reflect gastric emptying (as acetaminophen cannot be absorbed in the stomach).⁴

So, what does this mean?

This latest scoping review highlights the extent of variation in each indicator of enteral feeding intolerance as well as the different methods and standards that can be used.⁴ This can lead to difficulties in balancing safety with optimum nutritional provision in the clinical setting, which may create variability in the outcome of critically ill children. A need for more detailed studies with physiological measurements of enteral feeding intolerance and patient outcomes is evident, especially as there is some debate on whether GRV correlates with feeding intolerance or complications.⁵ This will help to redefine enteral feeding intolerance assessments and enable more informed enteral feeding decisions by clinicians.

References: 1. Mehta NM, et al. (2010). Challenges to optimal enteral nutrition in a multidisciplinary pediatric intensive care unit. JPEN J Parenter Enteral Nutr.; 34(1): 38-45. 2. Eveleens RD, et al. (2020). Definitions, predictors and outcomes of feeding intolerance in critically ill children: A systematic review. Clin Nutr.; 39(3): 685-693. 3. Tume LN, et al. (2020). Barriers to Delivery of Enteral Nutrition in Pediatric Intensive Care: A World Survey. Pediatr Crit Care Med.; 21(9): e661-e671. 4. Li Y, et al. (2024). Measurements of enteral feeding intolerance in critically ill children: a scoping review. Front Pediatr.; 12: 1441171. 5. Tume LN, et al. (2017). Routine gastric residual volume measurement and energy target achievement in the PICU: a comparison study. Eur J Pediatr.; 176(12): 1637-1644.