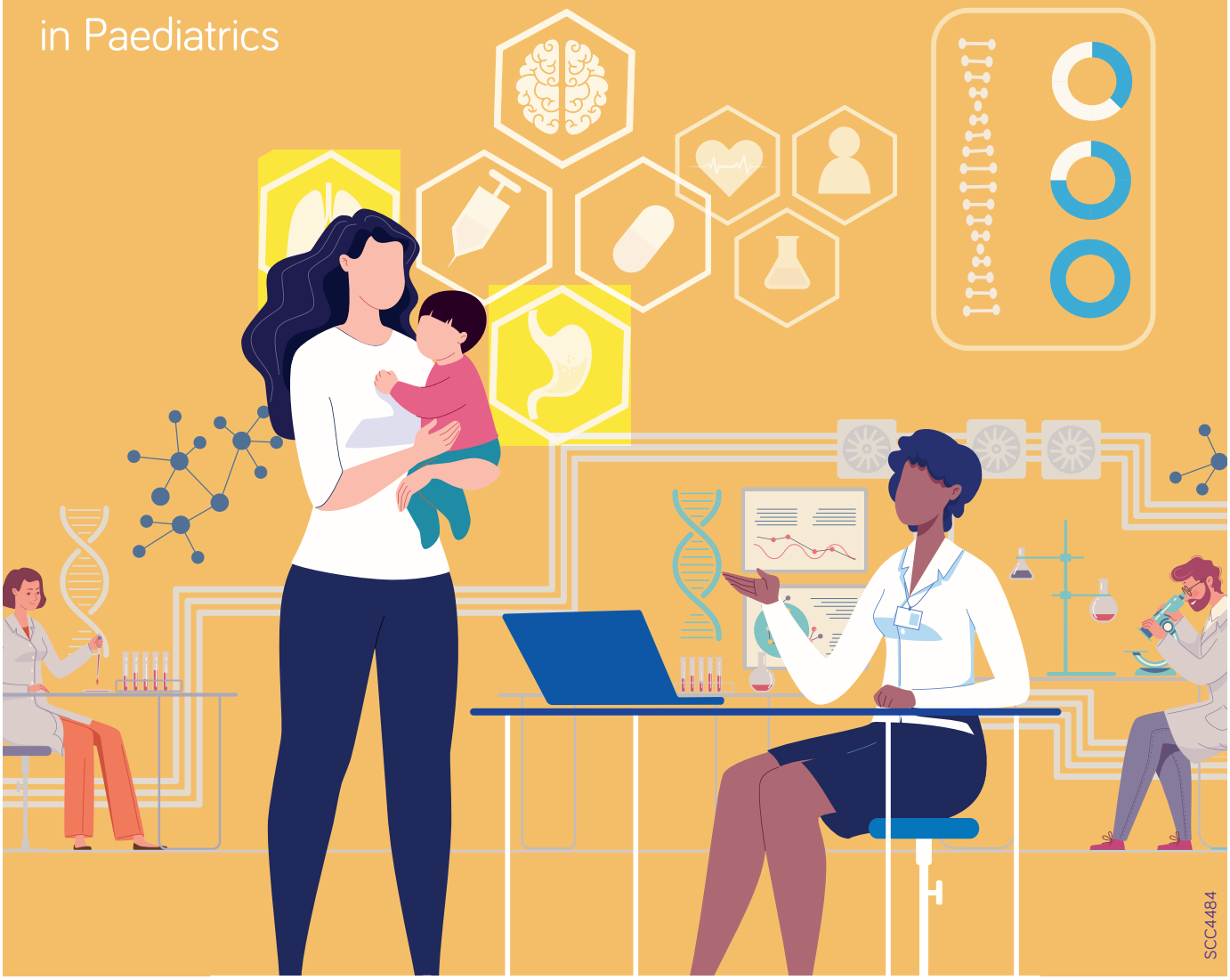
SMALLTALK

PAEDIATRIC NUTRITION MAGAZINE FOR HEALTHCARE PROFESSIONALS

EMERGING SCIENCE AND EVOLVING PRACTICES

in Paediatrics



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Spring/Summer 2025

Meet the Editors

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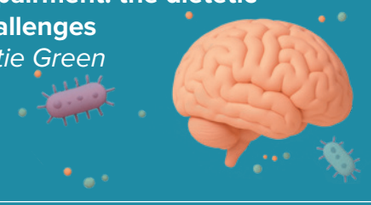

Allergy

Regulars

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Welcome

to the Spring/Summer edition of Small Talk

In this latest edition of **Small Talk**, we delve into some of the most recent advances in dietetics that may impact your practice. You'll also find our regular features, including key diary dates, research highlights, and the popular 'Ask the Expert' section.

One of the most significant shifts in modern healthcare has been the integration of artificial intelligence (AI) and digital technologies. While these tools hold the potential to revolutionise clinical practice, they also present certain challenges. In this edition, **Dr Sarah-Jane Reilly** presents a highly informative article on **the use of AI and digital technologies in dietetics**, discussing both the benefits and the potential drawbacks.

Katie Green explores the complex issue of **feed intolerance in children with neurological impairment**. These children often face unique nutritional challenges, and here Katie provides valuable insights into effective management strategies to ensure their nutritional needs are met.

Prof Nicholas Embleton then takes us through some of the **recent advances in preterm nutrition** – an area that has seen a considerable amount of research activity during the last few years.

We then consider the emerging issue of **legume allergies** with **Misbah Primett**. Understanding the prevalence, diagnosis and management of these allergies is crucial in delivering effective nutritional support.

Rachel Wood offers some practical guidance on **managing complex allergy patients over 12 months of age**, including a case study to support clinicians when navigating these challenging cases.

Aveen Bannon presents the innovative approach of **using food-based play** to address feeding problems in children, helping parents and children to make mealtimes less stressful.

We conclude with a **Day in the Life of Duane Mellor**, a paediatric diabetes, academic and media dietitian, who shares his insights into the dynamic and fast-paced world of media.

We hope this issue provides valuable insights and tools to enhance your practice. Happy reading!

Best wishes,

Vicky

Vicky Furmidge-Owen

If you have any feedback, questions for our next edition or ask the expert, or would like to contribute to our next edition, we'd love to hear from you.

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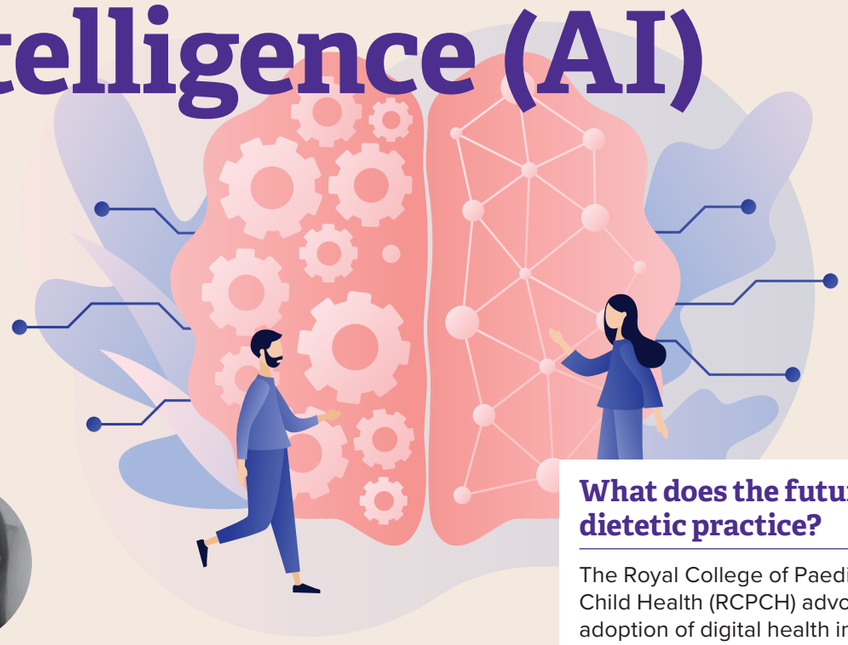
Welcome to the world of artificial intelligence (AI)



DR SARAH-JANE REILLY
Registered Dietitian, Resident Doctor, Public Health Researcher

AI is an evolving branch of computer science focused on performing tasks that require human intelligence such as learning, reasoning, problem-solving, perception and language comprehension.[1] AI is not intended to replace clinicians[2] but to automate repetitive or analytical tasks to enable clinicians to focus on human interaction and care.[3] The Topol Report[4] has cited AI as a powerful tool in streamlining processes, supporting diagnostics, personalising treatment and increasing productivity. According to the UK Government Public Attitudes to Data and AI: Tracker Survey[5], 52% of respondents believe AI will have a positive impact on healthcare.

What does the future hold for dietetic practice?

The Royal College of Paediatrics and Child Health (RCPCH) advocates for the adoption of digital health innovation as part of the NHS 10 year plan.[6] In dietetics, the main applications of AI relate to dietary assessment, lifestyle intervention, weight management, social support and nutritional epidemiology.[7] Concerns about AI relate to data ethics, bias in programming, the accountability of outputs and confidentiality.[8] Critics of AI in dietetics have argued that platforms such as ChatGPT are unable to provide the same quality and accuracy of nutritional advice when compared to that of a registered dietitian.[9] However, this argument assumes that the goal of AI is to substitute professional advice and fails to recognise the vital role of AI in supporting patient education and improving the efficiency of clinical processes. If we consider that there is only one dietitian available for every 7,380 people in the UK[10], equitable access to dietetic care is clearly an issue. In this article, I highlight how digital technology can bridge this gap and enhance paediatric dietetic care.

Potential of AI in predicting those at risk of disease

AI can be used to analyse electronic patient records to determine complex patterns in patient information in order to identify children at risk of certain diseases like malnutrition.[11] Using these algorithms, malnutrition identification could be streamlined to overcome common barriers to the completion of screening tools, such as knowledge and time.[12] A recent systematic review by Janssen et al[13] found that >90% of AI malnutrition models are not yet implemented into clinical practice despite known benefits. The success of these models relies on the quality of the data and infrastructure used to generate algorithms[14] but where appropriately utilised, they can support early dietetic intervention. This has been shown in Phoenix Children's Hospital in the US where predictive analysis is routinely used to screen children for undiagnosed malnutrition, with 80% accuracy.[15]

Building on the success of sensor devices, such as the FreeStyle Libre[16], efforts are currently being made to develop wearables, capable of collating information on diet, physical activity, sleep quality and stress levels, in addition to continuous glucose monitoring to predict the future risk of hypoglycaemic events.[17] A recent review of these predictive algorithms found their accuracy to be 70-99% with overall satisfactory performance reported.[17]

Encouraging preventive and participatory practice

AI has an important role to play in preventive healthcare. It can analyse dietary habits, physical activity levels and genomic information to predict the risk of obesity in children.[18] It can predict the likelihood of developing type 1 diabetes by analysing primary care contacts while signalling warning alerts to clinicians to reduce the number of children presenting to hospital with diabetic ketoacidosis.[19] Similarly, AI metrics on failure to attend appointments and the likelihood of readmission can be generated to improve services. Using online platforms, parents can access their child's records, monitor health information, view management plans and communicate with their dietitian directly.[20] This can promote transparency, build trust and empower caregivers to play an active role in their child's management.[11] AI platforms can integrate useful tools such as language translation, consultation transcription and recipe generation. An example of an AI platform that incorporates these features is HeidiHealth.[21]

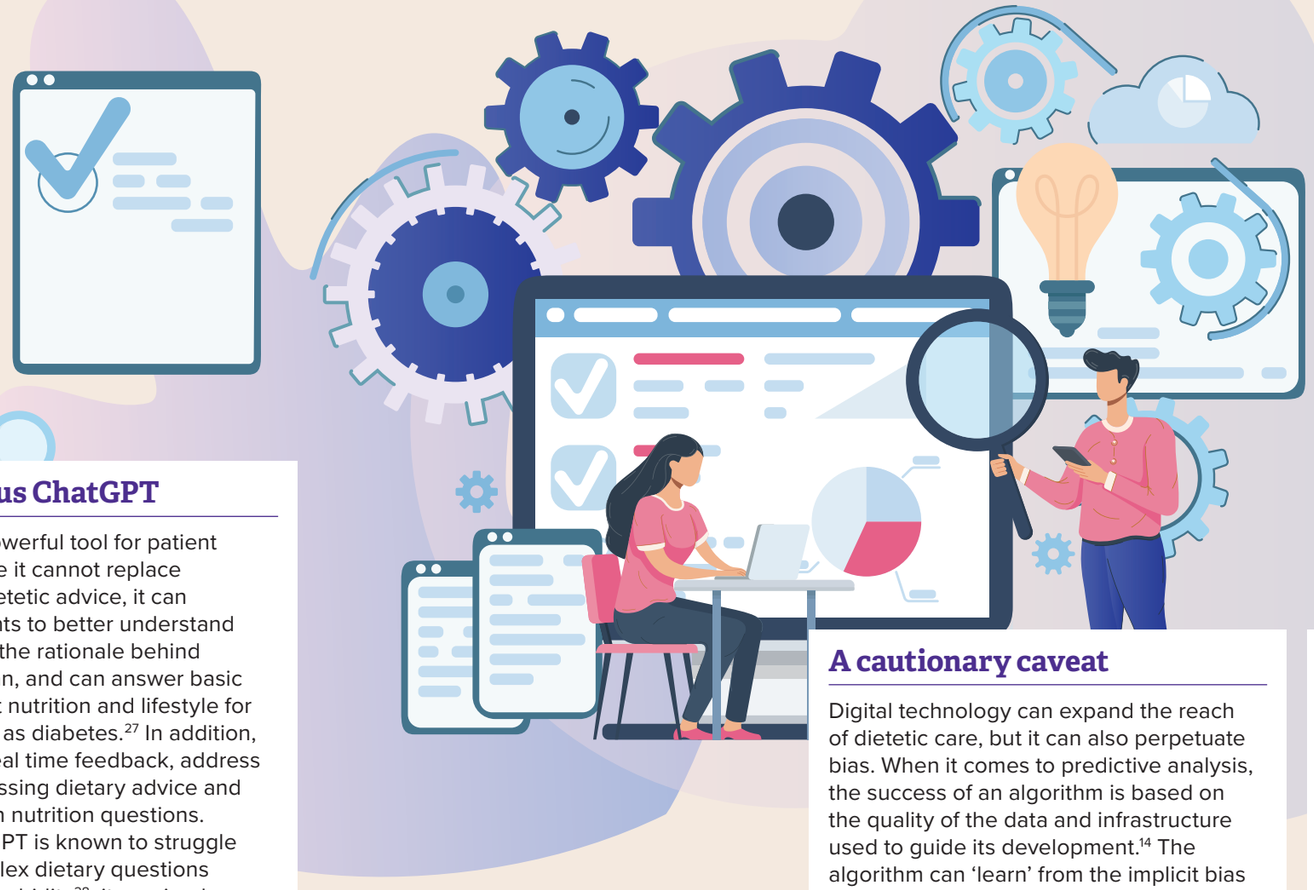
> "The availability of digital technology and AI in dietetics represents an exciting opportunity"

Mobile health for dietary assessment and management

Mobile applications can be a useful tool in assessing dietary intake, adherence to diet plans and supporting patient education.[7] Apps such as COCO Nutritionist, which combine speech analysis with food mapping have been shown to be as accurate as the gold standard 24hr intake.[22] Similarly, the FRANI-AI app, designed to assess dietary intake in adolescents, showed no difference in dietary intake when compared to the 24hr intake.[23] Such apps could save dietitians valuable time by recording intake and screening for nutritional deficiencies ahead of dietetic appointments. Apps that assess intake using AI image recognition could also encourage children to learn more about the nutritional qualities of food through digital engagement and fun. Many apps are now capable of linking the nutritional content of food with digital wearables to provide information on energy balance.[24] Although these apps may struggle to identify multiple food items or varying shapes of food[7], they could play a vital role in nutrition education for children.

Internet-based platforms

A recent meta-analysis and systematic review found that online weight management programmes for overweight children are more likely to result in a significant BMI reduction when compared with lifestyle modification alone.[25] Unlike conventional weight management groups, where there are often high attrition rates, the average attendance of participants in the meta-analysis was over 85%, indicating high service user acceptability.[25] Online platforms can facilitate self-management. For example, the BDA award winning resource, DigiBete, is a video platform and app consisting of evidence-based resources for young people, families and communities with type 1 diabetes.[26]



The infamous ChatGPT

ChatGPT is a powerful tool for patient education. While it cannot replace personalised dietetic advice, it can empower patients to better understand their diagnosis, the rationale behind their dietetic plan, and can answer basic questions about nutrition and lifestyle for conditions such as diabetes.[27] In addition, it can provide real time feedback, address inequity in accessing dietary advice and answer common nutrition questions. Although ChatGPT is known to struggle to answer complex dietary questions relating to co-morbidity[28], it received higher scores for correctness, actionability and comprehensibility in one study where answers to eight common nutrition questions were compared to dietitian responses, highlighting its potential utility in generating basic advice.[29]

> It offers an opportunity to develop referral systems which could employ predictive analysis to help automate the identification of patients at risk of nutrition related illness

A cautionary caveat

Digital technology can expand the reach of dietetic care, but it can also perpetuate bias. When it comes to predictive analysis, the success of an algorithm is based on the quality of the data and infrastructure used to guide its development.[14] The algorithm can 'learn' from the implicit bias of humans to generate misrepresentative results.[14] In one study examining race and gender bias, AI was found to favour Caucasian representation in six search engine results[30] highlighting the need for inclusive AI design. Dietitians can help to mitigate against this bias by ensuring that the predictive algorithms they design and use are adaptive to each new dataset for the population they serve.[31]

Concerns relating to the accountability of outputs generated by AI technology have also been raised.[8] It is advisable for dietitians to verify the accuracy of the information generated from these technologies and to counsel patients on the strengths and limitations of technology such as ChatGPT. The Code of Ethics of the Professional Committee of the European Federation of the Associations of Dietitians (EFAD)[32] has highlighted many of the potential benefits of AI and digital technology outlined in this article.

However, they have expressed concern over the potential for AI to introduce 'dehumanisation.' Patient-centred communication techniques, such as motivational interviewing, can be more difficult to elicit via technology[33] and, while AI can mimic human writing, it often lacks the spontaneity of genuine human engagement.[34]

Finally, one of the most pertinent concerns regarding AI and digital technology in the paediatric context relates to privacy. Many digital technologies grapple with a trade-off between moralistic ethics and financial incentivisation.[35] In a recent statement, the Children's Commissioner expressed concern about how children's data could potentially be exploited by third parties that employ generative AI technology.[36] While children and young people use digital technologies on a daily basis, it is important for clinicians to highlight to parents and young people that these technologies should not be used to share sensitive information. In response to these concerns, ethical frameworks on the use of AI in healthcare are being developed[37,38] which advocate for the financial incentivisation of ethical, legal and social consideration in AI design.

Conclusion

Overall, the availability of digital technology and AI in dietetics represents an exciting opportunity to optimise efficiency and expand the reach of paediatric dietetic care. It offers an opportunity to develop referral systems, which could employ predictive analysis to help automate the identification of patients at risk of nutrition-related illnesses. It encourages preventative and participatory practice and promotes the use of mobile health to empower patients to play an active role in their own care. When considering AI and digital technology applications in dietetic practice, it is important to recognise their limitations as well as to consider their broader societal implications. This knowledge is crucial to ensure that patients and their families receive appropriate and balanced information on the potential benefits of AI and digital technology in dietetics.

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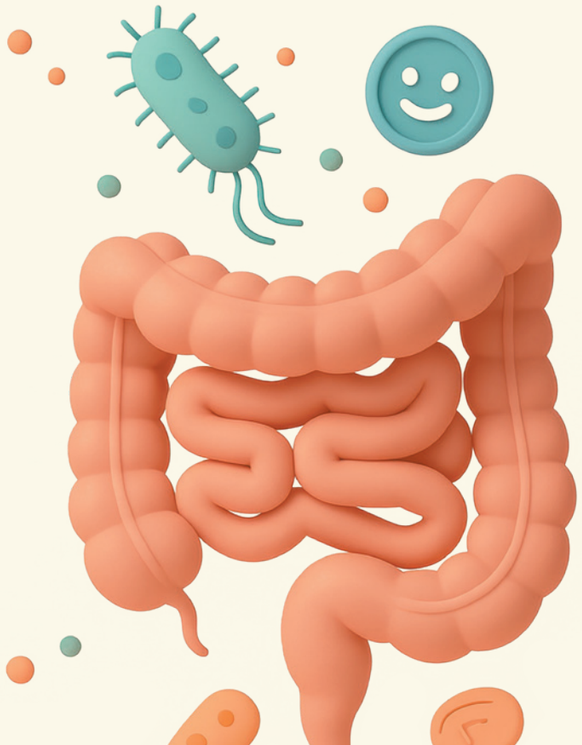
Exploring feed intolerance in children with neurological impairment: the dietetic challenges



Introduction

It is increasingly likely that any dietitians working in the field of paediatrics will be involved in the management of a child with a condition causing neurological impairment (NI). Prevalence of this group of disorders continues to increase globally, and is an evolving field of dietetics with new nutritional products and approaches to supporting nutrition on the horizon.

Before attempting to solve the riddle of feed intolerance management, it is important to understand the mechanisms by which the normal function of the gastrointestinal (GI) tract are adversely affected in conditions of NI.

What is NI?

NI encompasses a diverse range of conditions that affect central and peripheral nervous systems. Some conditions have minimal effects on GI function, while other cause significant disruption to normal digestion and, with progression of disease, can ultimately cause complete gut failure.

There are hundreds of classified neurological conditions, resulting from congenital conditions, acquired brain injuries, metabolic disorders, and progressive neurodegenerative diseases. The most common motor disability in childhood is cerebral palsy (CP), an umbrella term for a group of disorders that affect movement, muscle tone, balance, and posture. Like many conditions causing NI, the severity can vary greatly.

Why is feed intolerance common with NI?

The enteric nervous system (ENS), a complex network of neurons embedded within the GI tract, is often referred to as the 'second brain'. It contains approximately 200-600 million neurons, compared to around 100 million neurons in the spinal cord! The ENS controls autonomic functions of digestion, such as motility, secretion, gut hormone release and absorption, and interacts with the immune system in the gut.

In NI, disrupted communication between the ENS and central nervous system (CNS) can result in symptoms associated with feeding. This, coupled with altered muscle tone, reduced physical activity and side-effects of medications, can result in significant GI disturbances. Many neurological diseases are degenerative, and disease progression often goes hand-in-hand with a deterioration in GI function.

> In NI, disrupted communication between the ENS and central nervous system (CNS) can result in symptoms associated with feeding

Causes of feed intolerance in NI

Problems can occur anywhere throughout the GI tract. There is a high incidence of oral or dental problems which contribute to feeding difficulties in children with NI, including jaw instability, altered lip tone, bruxism (grinding of teeth) and sialorrhoea (drooling).[1] Oropharyngeal dysfunction is estimated to affect over 90% of children with NI.[1] Some children with swallowing difficulties are safe to continue oral feeding (+/- enteral tube feeding support) but adaptations may be required in texture modification, food fortification and body positioning for meals. As the time taken to orally feed increases, so does the risk of suboptimal intake of both nutrients and fluids.

Skeletal abnormalities can also affect the GI tract, which can increase the likelihood of reflux, vomiting and discomfort, and increases the risk of superior mesenteric artery (SMA) syndrome.[1] This occurs due to loss of fat mass between the mesenteric artery and aorta, distorting the angle between these vessels, causing partial or complete small bowel obstruction (Diagram 1). SMA can occur in anyone with significant malnutrition, but is compounded by the effects of spinal position in scoliosis and other skeletal abnormalities.

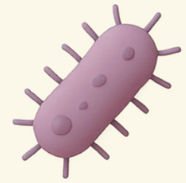
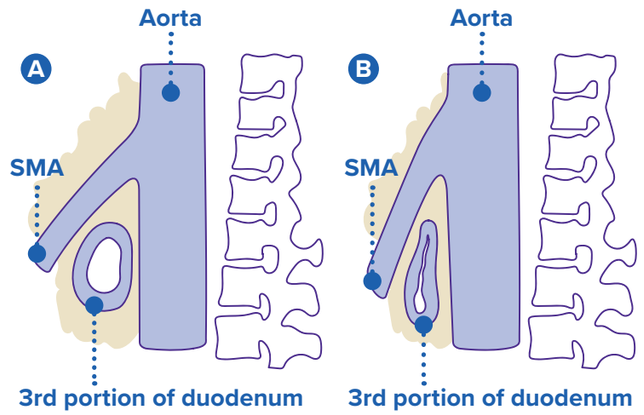


Diagram 1



A shows normal positioning of the duodenum and B shows distortion with superior mesenteric artery (SMA) syndrome

Gastroesophageal reflux disease (GORD) is extremely common, with prevalence estimated at 70% of all children with NI, manifesting as discomfort, pain, retching and/or vomiting.[1] At worst, it can lead to life-threatening events associated with aspiration and apnoeas. The real-life impact of GORD is that enteral feeds may be reduced to try and prevent distressing reflux events, resulting in suboptimal nutrition and fluid input. GORD can be managed medically with proton pump inhibitors (PPIs), which suppress acid production, but the viscosity of stomach contents is not altered, so vomiting or non-acid reflux may continue even with treatment.

Diarrhoea in children with NI is a frequent and multifactorial issue that can significantly compromise nutritional status. Diarrhoea not only hampers nutrient absorption but also increases the risk of dehydration and electrolyte disturbances. Managing diarrhoea in this population involves a careful reassessment of feeding type and delivery mode.

Constipation is one of the most common and challenging issues in managing children with NI.[1] Due to factors such as reduced mobility, impaired neuromuscular control, and side effects of medications – these children can experience near absent bowel motility. Many specialised enteral feeds do not contain any dietary fibre. The combination of poor motility and no dietary fibre source can lead to chronic discomfort, abdominal distension and, in severe cases, faecal impaction. A vicious cycle of suboptimal feed input due to symptoms can ensue.

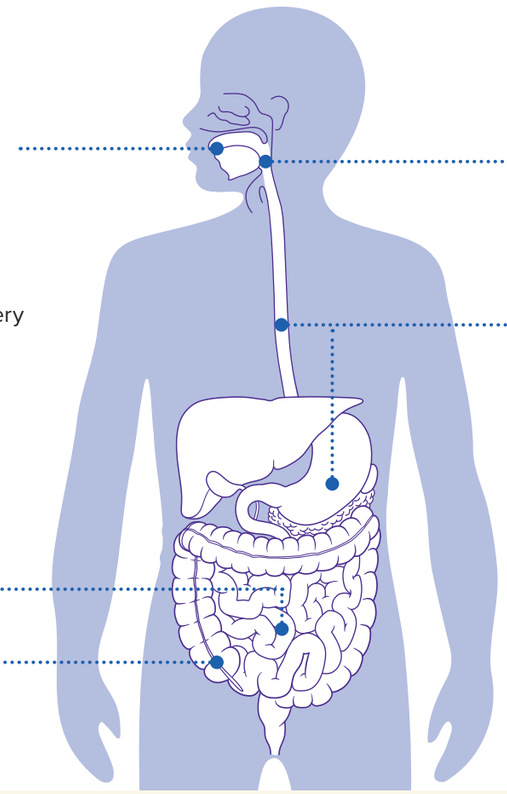
Addressing constipation requires a coordinated approach, ensuring adequate fluid intake, the addition of a dietary fibre supplement (if not present in feeds), and medications to promote colonic motility and treat impaction effectively when it occurs.

Many of the symptoms of feed intolerance are not solely caused by the underlying condition affecting GI motility and function. Side-effects of medications can be significant and polypharmacy is commonplace in this patient group.

Oral
- problems with teeth
- jaw instability
- bruxism (grinding)
- sialorrhoea (drooling)

Small intestine
- superior mesenteric artery syndrome (SMA)
- dumping syndrome
- retrograde peristalsis – small bowel contents refluxing back into the stomach
- dysmotility
- bloating
- malabsorption

Large intestine
- constipation
- diarrhoea



Oropharyngeal dysfunction
- dysphagia – risk of aspiration

Oesophagus and stomach
- gastroesophageal reflux disease (GORD) and risk of aspiration
- bloating
- aerophagia (air swallowing)
- vomiting
- delayed gastric emptying
- gastroparesis

Non-site specific
- GI dystonia

What is GI dystonia?

This is sometimes termed ‘gastrointestinal dystonia of severe neurodisability’ and is an emerging phenomenon in NI. It occurs when enteral feeding induces painful muscle spasms, causing hypertonicity, retching or vomiting and abdominal distention.[2]

A Multidisciplinary Disciplinary Team (MDT) approach is key to managing feed intolerance in NI. Without an effective MDT, decisions around alternative routes of feeding, changes to medications and many other aspects of care cannot be made in a timely manner.

Assessing nutritional status

Assessment of nutritional status in NI is complex. Altered body composition and mobility issues can lead to difficulty in obtaining and interpreting measurements. Growth charts designed for typically developing children, or specifically for CP, do not reflect expected growth pattern for individuals.

The European Society of Paediatric Gastroenterology, Hepatology and Nutrition (ESPGHAN) guide – Recommendations for Nutritional Management of Children with Neurological Impairment (NI) – provides guidance for this patient group.[3]

Summary points from ESPGHAN:

- Micronutrients should be checked annually
- Growth should be assessed in infants every 1-3 months
- Follow-up anthropometry to be carried out at least 6 monthly
- Regular monitoring of body weight and fat mass recommended to assess energy requirements.

Estimating nutritional requirements

Energy needs in this group vary widely depending on mobility, muscle tone, and metabolic rate, as well as by age and expected growth potential. Overestimation contributes to excessive weight gain, while underestimation risks malnutrition. ESPGHAN recommend the use of dietary reference standards (DRI) for typically developing children, but caveat this by advising this may overestimate energy requirements if there is growth delay, reduced activity levels and an alteration in fat free mass. Spasticity, or involuntary muscle contractions, which are common in conditions affecting motor function, increase energy expenditure by up to 10%.[3,4] However, the most severely affected have lower activity expenditure, which must also be considered.

Assessment of the nutritional adequacy, based on serial measurements and observation, are key to ensuring that calculations are neither under- or over-estimating energy needs.[3,4]

ESPGHAN advise protein, fluid and micronutrient requirements are similar to those of unaffected children. If energy requirements are low, it is challenging to meet protein and micronutrient requirements without exceeding caloric need. Supplementation or a low energy, nutritionally complete enteral feed may be appropriate.[3,4]

As with estimating requirements in typically developing children that are overweight, ideal body weight should be used to calculate fluid, energy and protein requirements in children with NI. This is of particular importance with feed intolerance, as overfeeding may be the root cause. Reducing feed input alone may alleviate symptoms without a change to feed type, route or medications.

> “Managing feed intolerance in children with NI can be challenging”

Route of feeding

It is inevitable that if one route of feeding is not well tolerated, or dysmotility is worsening, then an alternative route of feeding will be considered. There appears to have been a significant increase in the practice of jejunal feeding, which can lead to considerable improvements in nutritional adequacy and quality of life. However, bypassing the stomach and duodenum is far from physiologically normal, necessitates continuous pump feeding for administration, and presents its own feed tolerance conundrums. For example, if a child has malabsorption and diarrhoea, feeding further into the GI tract is likely to exacerbate this. If jejunal feeding is used for significant reflux and delayed gastric emptying, it will not prevent production of gastric secretions, which can cause similar problems. In some cases, dysmotility causes retrograde peristalsis, with feed given jejunally, moving back up the small intestine and into the stomach.

As some types of feeding tube can only be sited in specialist centres, access to the appropriate feeding tubes may be a limiting factor. MDT collaboration is essential to ensure that decisions around feeding route are made in a timely manner with appropriate onward referrals where necessary.

In the event of intestinal failure, where all possible feeding routes have been exhausted, parenteral nutrition (PN) may be considered. Although appropriate nutrition and hydration can be given intravenously, there are ethical considerations that need to be made. A lengthy hospital admission for stabilisation and training would be needed and the burden of care of home PN is significant. An MDT approach to such a decision is vital.

Enteral feed options

The range of commercially available enteral feed products is ever changing. Newer products or strategies may not have been available or widely used at the time of consensus statements or guidelines being published. For example, blended diet was previously not recommended but is now widely accepted and endorsed by the British Dietetic Association (BDA).[5]

Blended diet, if the correct type of feeding tube is in situ, has immense potential and an emerging evidence-base to support its use.[5] This requires careful preparation, strict hygiene, and regular monitoring to ensure nutritional adequacy and safety but, if appropriate support is given, many families can safely provide blended food for their tube-fed child.

Commercially available feeds can be used alongside blended diet, much like oral nutritional supplements are used alongside oral diet. This approach may help to minimise the risks of nutritional inadequacy, while maintaining variety and offer a practical option for families.

> The range of enteral feeding products available is ever changing

A summary of ESPGHAN recommendations for enteral feed type and administration for children with NI:[4]

Standard enteral feeds with fibre: First-line nutrition should be age-appropriate, 1.0 kcal/ml polymeric formulas containing fibre to support motility.

Low energy enteral feeds with fibre: Consider a low energy, high-fibre, micronutrient-replete feed in children with lower activity levels.

Hydrolysed protein feeds: Consider trialling in cases of feed intolerance and these may reduce retching and gastroesophageal reflux symptoms.

Consider high energy enteral feed with fibre: In cases of poor volume tolerance, 1.5 kcal/ml feeds may be beneficial, provided hydration is monitored.

Combination of bolus and continuous feeding: Nocturnal continuous feeding combined with daytime bolus feeds is often recommended for children with poor volume tolerance.

It is a common misconception that tolerance to enteral feeds is related to the volume that is given, with some dietitians favouring high energy enteral feeds (containing 1.5 kcal/ml), or even low volume oral nutritional supplements (containing 2.4 kcal/ml) to avoid using larger volumes in sensitive patients. High energy feeds are designed to support increased requirements and/or fluid restriction. If used in patients that do not have high energy needs, this results in feeding plans not meeting fluid requirements. In practice, additional water must then be given, as either large water flushes, or as continuous infusions alongside or in breaks from pump feeding. This effectively dilutes the feed given but is less practical and increases the burden of care.

In GI dysmotility, particularly with GORD, hydrolysed protein feeds have been found to support tolerance.[4] It is common in dietetic practice to progress from a whole protein feed to a hydrolysed protein feed, when feed intolerance occurs. Symptoms should be monitored to assess whether there has been improvement, and challenges with previously used feeds can also be considered to confirm these results.

On the horizon/what next?

The gut-brain axis is an emerging area of research in many fields, including paediatric neurology and gastroenterology. Supporting a healthy microbiome is likely to be key in improving GI function and alleviating symptoms in patients with NI.[6,7] Commercial enteral feeding products that support this concept are already being produced or in the early stages of production. The addition of real foods to enteral feeds, as well as prebiotics and probiotics across a wider range of feeds, is likely to happen soon. As varying sources of macronutrients and fibre may support a more physiological digestive process and diverse microbiome, the concept of rotating between feed products and varying feed delivery plans on a cyclical basis may offer a promising approach to improve gut function and manage feed intolerance in children with NI.

Conclusion

Managing feed intolerance in children with NI is a challenge that requires an understanding of the relationship between the neurological and gastrointestinal systems and an individualised, multidisciplinary approach. Regular assessment of feed tolerance, energy needs, and hydration status is essential. Evidence-based feeding strategies, including appropriate enteral feed selection, can significantly improve patient outcomes and quality of life. Advances in practice, such as recognising GI dystonia, the use of blended diet and the emergence of new enteral feed products, will continue to refine best practices in this complex patient population.

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Legume allergies: a rising challenge

The prevalence of food allergies continues to rise, with emerging case reports of serious reactions to legumes, such as peas and chickpeas, being highlighted in recent years.[1] These allergens pose significant clinical challenges. Unlike more commonly recognised legume allergens, such as peanut and soy, other legumes remain outside the main 14 allergens in Europe, making them less well-known and potentially more difficult to manage. Dietitians working within paediatric settings are increasingly encountering children who present with multiple legume allergies, necessitating a tailored approach to dietary management.

The legume family

Legumes form a large and diverse family of plants, including subgroups such as lentils, peas, beans, chickpeas, and fenugreek (Table 1).

Legumes are not only found in their whole food form (Table 1) but are also widely used in processed foods. Ingredients like pea protein, chickpea flour, and soy derivatives are increasingly incorporated into plant-based products as affordable and sustainable ways to boost nutritional value.[2] These ingredients can be found in a wide variety of processed goods, from meat substitutes to snacks, and are often in a concentrated form which makes them more allergenic.[3,4]

Legumes are nutritionally dense, offering an excellent source of protein, fibre, B vitamins, magnesium, and zinc. For many families, particularly those following a plant-based diet, legumes provide a critical source of nutrition, serving as a key protein alternative to animal products.

When legumes need to be avoided due to an allergy, it poses significant challenges, especially for children who are vegetarian or vegan. The removal of these foods from the diet can result in nutritional gaps, such as deficiencies in protein, fibre, and essential micronutrients. Dietitians need to work closely with families to ensure that these nutrients are adequately replaced through alternative food sources, such as quinoa, nuts (if tolerated), seeds, eggs (if appropriate), and fortified plant-based products, ensuring they are free from legumes.

Table 1: Subgroups within the legume family*

Legume	Varieties
Beans	Kidney bean, black bean, pinto bean, navy bean, adzuki bean, green bean, tepary bean
Peas	Green peas, snow peas, sugar snap peas
Lentils	Brown lentils, green lentils, puy lentils, black lentils
Soy	Soy beans, edamame beans (young soy beans)
Lupins	Sweet lupin, bitter lupin, tarwi lupin
Fenugreek	
Chickpeas	Kabuli chickpeas, desi chickpeas
Mung peas	Whole mung peas, split mung, black gram
Fava beans	
Peanut	

*List is not exhaustive

Allergen labelling

As discussed, very few legumes fall into the 14 allergens required to be highlighted on food labels in European/UK law,[5] adding to the challenges of managing a legume allergy. While all food ingredients should be listed in the ingredients list, it can be hard to identify legumes; many have alternative names and companies frequently reformulate foods to include legumes. This reinforces the need for families to be vigilant when reading food labels and for dietitians to educate them about the risks of hidden allergens, including any alternative names. Additionally, current UK food labelling laws do not require the declaration of some compound ingredients present in quantities under 2% of the food.[6] In practice, this means that dietitians may need to contact food manufacturers to confirm the presence/absence of legume ingredients when not clearly listed.

Working as a team

As shown in Table 1, legumes are a large family with many subgroups, therefore avoidance of all legumes is not only burdensome for families but is also often unnecessary. Data on legume cross-reactivity remains limited and seems to vary by country. For example, lentil allergy has been reported in Spain in individuals allergic to peanuts, meanwhile it's rarely reported America.[7] While case reports are increasing, studies on legume allergy in the UK are lacking. Given the complexity of legume allergies, and their importance in plant-based diets, it is essential that dietitians collaborate with allergy teams to identify which options are safe for food challenges. By selecting and challenging specific legumes, children can gradually introduce these into their diet, helping diversify their food options and reduce the negative impact on quality of life. As dietitians, our role is to prioritise the most suitable legumes for introduction, considering both the family's dietary preferences and the nutritional needs of the child.

Living with a legume allergy can impact many aspects of a child's life, including eating out and even attending school, particularly when it comes to meal provision. We commonly encounter cases where children are asked to bring their own meals to school due to concerns about allergens. In some instances, children are offered limited alternatives, such as a plain jacket potato, which does not provide a nutritionally balanced meal.

To address this, dietitians can work collaboratively with schools to review menus and identify safe, nutritious meal options. Involving school staff in the process ensures that children with legume allergies are not left with inadequate, nutritionally poor meals. Educating kitchen staff and teachers about allergen management, as well as providing guidance on how to prevent cross-contamination, is also critical when it comes to supporting children in the school environment.

Conclusion

As legume allergies become more prevalent, dietitians will need to become more aware of the allergens involved and adapt their approaches to support families and children in managing them, including addressing hidden sources, nutritional deficiencies and collaborating with schools and healthcare providers. Dietitians play an essential role in allergy management, supporting families to enhance their quality of life by providing education, ongoing monitoring and tailored nutritional advice.

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> "Dietitians working within paediatric settings are increasingly encountering children who present with multiple legume allergies"

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Recent advances in preterm nutrition

Survival for very preterm babies has increased dramatically in the last 20 years. In most high-resource settings, including the UK, more than half of all babies born at 24 weeks post-menstrual age (16 weeks early) now survive, and most will attend normal school. Remarkably, the last 10 years has seen further improvements in the survival for babies born at 22-23 weeks' gestation. Although the ethical debate continues regarding whether to offer or withhold active resuscitation in these tiny babies, most UK tertiary level neonatal intensive care units (NICUs) now regularly care for infants born weighing less than 500g.

Estimating the nutritional needs of very preterm infants <32 weeks' gestation is complex. Studies on body composition suggest that around 85-90% of the weight at birth is water[1], meaning that the lean mass of a 500g newborn baby at 24 weeks is only around 50g. Without exogenous energy, preterm infants would become hypoglycemic within an hour of delivery and become seriously malnourished within 1-2 days. There are no energy or fat 'stores' in a newborn preterm infant, so the only endogenous energy source would be catabolism of lean tissue. Protein represents the majority of their lean mass, with a small contribution from minerals (calcium, phosphate and magnesium). Lipid is present in cell membranes, and neural structures (brain, eyes, nerves etc.), but there are no subcutaneous fat stores, unlike term-born infants where fat represents about 15% of body mass.

What is neonatal nutrition?!

Although many practitioners primarily consider nutrients when discussing neonatal nutrition, it is apparent that good nutritional practice requires a more holistic approach, and nutrition can be considered as four interacting elements:

1 Provision of **macro- and micronutrients** is essential to enable brain and body growth;

2 Recent studies emphasise the functional aspects of human milk, so-called **bionutrients** or immunonutrients.[2,3] These components may be human milk oligosaccharides, hormones and growth factors such as insulin and IGF-1, enzymes, and stem-cells. None of these components are present in parenteral nutrition, and few are present in formula milk.

3 **Microbes** – enteral nutrients and metabolite derivatives interact with bacteria in the gut to produce a range of compounds including vitamins, short chain fatty acids, and anti-inflammatory compounds. Microbes are also acquired from fresh mother's own milk (MOM) and microbes may be administered directly as supplemental probiotics.[4]

4 **Technical and socio-behavioural aspects** – this 4th component of neonatal nutrition includes aspects such as speed of advancement of enteral feeding, bolus versus continuous milk feeds, sensory aspects of feeding, along with staff and parent beliefs and behaviours towards breastfeeding, and additives such as fortifier etc.[2]

Examples of recent advances for these elements of nutrition include:

- Recent large trials show that **feeds** can be advanced at ~30 ml/kg/day in stable preterm infants.[4]
- Exposing preterm infants to the **smell and taste** of their mother's milk may improve feed tolerance.[5]
- Whilst Donor Human Milk (DHM) is associated with a lower risk of necrotising enterocolitis (NEC), availability and usage may also impact on **beliefs and behaviours** of staff towards the use of MOM.[6]

Parenteral Nutrition (PN)

A newborn very preterm infant has virtually no fat or energy stores, so the immediate provision of energy is essential. For more than 20 years now, we have commenced parenteral nutrition (PN) on admission to the NICU.[2] PN provides amino acids and carbohydrates (dextrose/glucose) in aqueous solutions, along with electrolytes, minerals, vitamins and trace elements. Aqueous solutions are administered alongside intravenous lipid emulsions (ILE) which provide a source of essential fatty acids and energy. Recent studies and guidelines show that immediate commencement of PN appears safe, but there is still debate about the optimal intake of macronutrients.

We use standard PN solutions and start with a total fluid intake of 100ml/kg/day which provides around 2g/kg/day of protein, 1g/kg/day of ILE, and 60kcal/kg/day total energy. We increase this over the next 2-3 days to a maximum intake of 3-3.5g/kg/day protein and 3g/kg/day lipid, with total calories of about 90-100kcal/kg/day. Recent randomised controlled trials (RCTs) do not show any evidence that starting at higher intakes results in any important benefits, and there are some studies that suggest caution with how much PN is given.[7,8] A large observational study suggested that whilst early PN is common, this may be associated with an increase in morbidities such as lung disease.[9] Others have suggested that PN macronutrient intakes should be decreased during critical illness, such as during sepsis or NEC.[10] During critical illness, a preterm infant rapidly becomes catabolic, releasing free amino acids and fatty acids, and endogenous glucose production increases which frequently results in hyperglycaemia. Providing high intakes of macronutrients at this stage may overload

> "Survival of very preterm babies has increased dramatically in the last 20 years"

innate mechanisms (autophagy) that dispose of the protein breakdown products which may cause harm to cellular metabolism.[11] We therefore reduce macronutrient intakes to about 60-70% of maximum during critical illness.

Oropharyngeal colostrum

Until about 10 years ago, it was typical for many NICUs to delay starting feeds until the baby was a few days old, and then only increase enteral milk feeds relatively slowly via an oro- or naso-gastric tube. Most preterm infants do not achieve suck-swallow-breathe coordination until around 32-34 weeks' gestation. A series of RCTs has explored the practice of administering colostrum directly into the cheek or mouth of very preterm infants as early as possible, and ideally within the first 6-12 hours.[12] Oropharyngeal colostrum (OPC) is given in very small amounts, around 0.2-0.5 mL, and mainly stays in the mouth as most very preterm infants are unable to swallow. Colostrum contains high amounts of immune proteins and antibodies that can interact with pharyngeal tissue and 'prime' the immune system.[13] OPC may also provide colonisation with healthy bacteria which may decrease the risk of NEC, and the sensory aspects of milk in the mouth may provide comfort. Furthermore, we encourage mothers to administer the OPC to their own baby, potentially providing psychological benefits, improved bonding and perhaps improving subsequent breastmilk provision.

> ESPGHAN published an updated position paper in 2022 with intake recommendations and practices

Donated human milk (DHM)

DHM is recommended for preterm infants by various organisations including the WHO (World Health Organisation) and ESPGHAN (European Society for Paediatric Gastroenterology Hepatology and Nutrition) where there is a shortfall in MOM. A recent large RCT in the US compared the use of DHM versus preterm formula to make up any shortfall in the provision of MOM to very preterm infants.[14] The population of mother's recruited differed somewhat to typical UK NICU populations in that around half of those enrolled in the US had high rates of socio-economic disadvantage. Nevertheless, the trial showed no benefit on infant brain outcome at 2 years of age, emphasising that the cognitive benefits of breastmilk are restricted to the use of MOM. Importantly, NEC was significantly lower in those infants receiving DHM, but growth was also slower. However, when this RCT was included in an update to the Cochrane systematic review on the use of DHM, the rate of NEC in infants receiving DHM was shown to be 50% lower compared to formula.[15] We have therefore moved to using DHM routinely in the last few years where there is a shortfall in provision of MOM. Importantly, however, there is no apparent reduction in mortality with the use of DHM, suggesting the DHM might not reduce the most serious forms of NEC. Further RCTs, carefully designed in partnership with parents, are needed. There is also an important need for RCTs in other settings and contexts, for example, in low- and middle-income countries, and in NICUs with lower background rates of NEC.

Human milk derived fortifiers

Data show lower rates of NEC with higher intakes of MOM, and the use of DHM rather than formula, and this has led many to consider whether an exclusive human milk diet (EHMD) might be beneficial. Most very preterm babies will benefit from the addition of a so-called breastmilk fortifier ('fortifier') composed of additional protein and energy, along with minerals, electrolytes and trace elements. Fortifiers have been used widely for more than 30 years. In Europe, most fortifiers use hydrolysed cow milk whey protein, and carbohydrate as the energy source. However, in the US and other countries, whole protein may be used, and fortifiers may contain fat in combination with carbohydrate for energy.

Using fortifiers therefore exposes infants to cow milk proteins and there has been a concern that this may increase the risks of NEC.

In 2010, a key RCT showed a lower rate of NEC when infants were fed an EHMD using commercially prepared fortifiers derived from human milk.[16] Since then other companies have produced human-milk derived fortifiers (HMDF) either as freeze-dried powder or frozen liquid concentrate. Several observational studies have been published, some of which support a lower rate of NEC, while others do not.[17,18] A recent Swedish RCT of over 200 very preterm infants showed no difference in the rate of NEC between infants fed only on MOM and DHM and the use of a HMDF, compared to infants receiving MOM, DHM and a cow-milk derived fortifier.[19] This suggests that in settings where there are high rates of MOM, and no use of formula, the use of a cow-milk derived fortifier does not appear to significantly increase the risk of NEC.

Finally, it should be noted that HMDFs are much more expensive than cow-milk derived fortifiers, emphasising the need for cost analyses, and consideration of the 'opportunity costs', i.e. if the money used to purchase fortifiers was used to provide lactation consultants, might we have higher rates of MOM usage and lower rates of NEC?

Bionutrients and micronutrients added to enteral feeds

Human milk is composed of casein and whey proteins, and the proportion of these changes over the first few days from colostrum to early milk, followed by 'mature milk' produced in later lactation, i.e. after the first few weeks. A key whey protein is **lactoferrin** (LF), which is initially digested into a peptide called lactoferricin which has anti-infective properties. Concentrations of LF are especially high in colostrum and may provide immune protection in the first few days. Preterm infants typically only receive small amounts of milk in the first few days, and several RCTs have explored whether additional LF (derived either from cow-milk or artificially produced human-recombinant-LF) might reduce the risk of late-onset sepsis in preterm infants. Some RCTs have suggested benefit, but the largest RCT to date was conducted in the UK and showed no apparent benefit from routine LF supplementation.[20–22]

Insulin is a component of human breastmilk, and concentrations are especially high in the first few days. Insulin, along with many other components in breastmilk, such as IGF-1, can bind to the intestinal villi and act as growth factors. Insulin is a large protein molecule which is not absorbed into the blood stream intact and does not influence blood glucose concentrations. A recent RCT compared enteral insulin to placebo in preterm infants in the first month of life and showed that full feeds were achieved quicker, with no apparent adverse effects.[23] This RCT recruited >300 infants, but further studies are needed to confirm this effect and determine if there are any additional impacts, for example on NEC or growth, before this can be considered routinely in clinical practice.

Docosahexaenoic acid (DHA) and arachidonic acid (ARA) are polyunsaturated fatty acids derived from the essential fatty acids, alpha-linolenic (ALA) and linoleic acid (LA). Whilst healthy children and adults are capable of synthesising DHA and ARA if there is sufficient supply of ALA and LA, preterm infants may have limited synthetic capacity and are at risk of deficiency. Furthermore, DHA and ARA are present in breastmilk, suggesting that evolutionary mechanisms may have conserved their presence. DHA and ARA are combined with choline (a vitamin-like compound) to form neural tissues, and a series of studies have explored whether supplements might

be beneficial for newborn preterm or sick infants. Some earlier studies suggested that sole DHA supplementation (without additional ARA or choline) may increase risks of chronic lung disease, whilst other studies have shown benefits to IQ 4-5 years later.[24] A recent RCT has shown a reduction in the risk of retinopathy of prematurity (ROP) in preterm infants receiving DHA+ARA supplementation, and this has been supported by another RCT showing immune and brain development benefits.[25–28] A large RCT in the UK is comparing the effects of supplemental DHA+choline+ARA in two groups of patients: both preterm infants <28 weeks gestation, and in term infants born with hypoxic ischaemic encephalopathy (www.npeu.ox.ac.uk/dolfin). There is a lot of research activity in preterm infants using these fatty acids, and further RCTs with long-term follow up may well result in supplements becoming more common in the future.

Guidelines and education

ESPGHAN published an updated position paper in 2022 with intake recommendations and practices.[1] It is important to note that preterm infants are heterogenous, and that many areas of practice lack high quality RCTs, so practitioners should not consider these consensus recommendations as strict guidelines or protocols. Nevertheless, they provide useful information for clinicians across UK, Europe and further afield. In addition, ESPGHAN created an online eLearning course on enteral nutrition which was launched in 2023. The course is split into 4 weeks of learning with around 3 hours learning per week. The course is free to access for a time limited period of 4 weeks, but learners can choose to upgrade, allowing continued access with CPD certification on completion. Over 2500 learners from more than 90 countries have already joined the course (www.futurelearn.com/courses/espghan-recommendation-for-enteral-nutrition-in-preterm-infants).

Conclusions

Neonatal nutrition is complex and considers nutrient, bionutrient, microbial, technical and socio-behavioural factors. There is a considerable amount of research activity and innovation, and recent advances are likely to further improve survival and outcomes for preterm infants in the future.

CONFLICTS OF INTEREST
Dr Embleton declares research funding from Prolacta Biosciences, Neokare, and Nutricia Early Life Nutrition paid to his hospital, and declares speakers' honoraria donated to charity from Nestle Nutrition Institute. Dr Embleton has also received fees donated to charity for advice given to legal firms in the US in Class Action against formula milk companies from parents of babies who developed NEC. Dr Embleton has provided non-remunerated advice as a medical expert to the WHO, ESPGHAN, European Foundation for Care of Newborn Infants (EFCNI), NEC-UK, British Association of Perinatal Medicine (BAPM) and parent-led advocacy organisations and helped establish the UK Neonatal Nutrition Network (N3) and the African Neonatal Nutrition Network. The views expressed in this article are his personal views and do not necessarily reflect those institutions, organisations or companies he is affiliated with. Please see www.neonatalresearch.net for further information.

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> Neonatal nutrition is complex and considers nutrient, bionutrient, microbial, technical and socio-behavioural factors

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Managing the complex allergic patient over 12 months of age with a focus on eosinophilic oesophagitis

Managing a child with food allergies can be incredibly challenging for families. Furthermore, as atopic children grow, the pattern and severity of their allergic reactions may evolve. Things become even more complex when a child reacts to multiple foods, especially when the trigger foods are unknown. This uncertainty can heighten anxiety around mealtimes for both parents and the child, making food and eating a source of stress. In many cases, simply excluding the trigger foods is not enough, and further investigations are needed to reach the correct diagnosis.

Taking an allergy focused history is the first step in determining the correct diagnosis.[1] It is vital at all ages and helps to link the child's symptoms with trigger foods/meals, directing the investigations to confirm the diagnosis. Children who react to multiple foods can have a very restrictive diet with poor macro- and micronutrient intakes, which, long-term, can impact on the child's growth. We are conscious therefore to monitor micronutrient as well as macronutrient intakes to ensure the child is meeting their needs. The four most common food allergies in children are dairy, wheat, soya and egg.[2] Children who are avoiding these foods without supplementation are missing several key nutrients including calcium, protein, vitamins and some of the main energy sources.

Having a severe reaction to a food or being on an already restricted diet, e.g. vegan, can add to the complexity of managing these children, meaning you are even more restricted with the types of foods you can offer.

One of the key roles of a parent is to provide the food for their child.[3] However, the child may choose not to eat the food offered which leads to stress. Children who are anxious about

a possible allergic reaction can often refuse to eat food offered at mealtimes. Once a child gets distressed at the food table, it starts the fight or flight response which shuts down the hunger sensation. Keeping the table environment calm and playful can help encourage intake of preferred foods.

Feeding aversions

A feeding or food aversion occurs when a baby or child consistently refuses a bottle or food they previously accepted. They may push it away, become distressed at the thought of eating, or even resist approaching the table due to negative associations with feeding.[4,5] It can be a learnt aversion linked with symptoms occurring every time they eat, and the child associates a certain food or situation with being stressful or painful. This is common in those with food allergies if they have had a previous allergic reaction to a food.

From 6 months of age, feeding is a learnt experience, it is no longer just a natural reflex. We must teach infants and children about food: about how it feels, what it looks like, smells like and, finally, what it tastes like. It is important that food is FUN, is playful and exciting, and that the routine is consistent. Once a child has had a negative experience with food and eating, we need to reteach them about the whole process.

In older children, food allergy management extends beyond simply avoiding the allergens —it also involves addressing concerns around growth as well as eating behaviours. Navigating feeding aversions can be challenging, especially when a child has multiple food allergies. which may also be combined with vegan or vegetarian diets, further limiting meal options. Under these circumstances, the focus shifts to ensuring adequate calories are achieved using preferred and safe foods, while prioritising key nutrients like calcium, iron, and protein to achieve target growth and development. Equally important is promoting a positive (stress free) and safe feeding environment for the child and family.

Children learn to eat by observing others and naturally gravitate toward the foods they see being shared. This becomes more pronounced after the age of one, as they begin eating with peers and become more aware of feeling 'different' when given alternative foods that look different to those given to others around them. Additionally, children with both eczema and food allergies may have limited sensory exposure to foods, as concerns about skin irritation can restrict opportunities for play-based learning and tactile exploration of new foods.

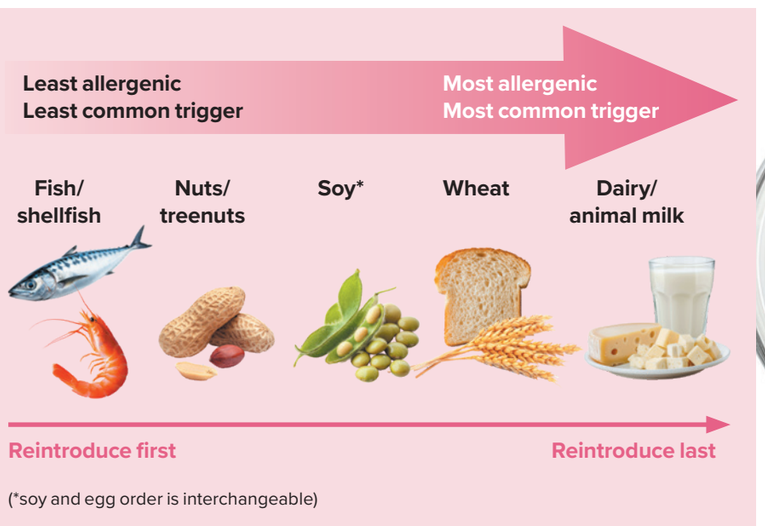
What is EoE?

Eosinophillic Esophagitis (EoE) is a chronic inflammatory immune mediated disease, and a diagnosis of EoE is made based on symptoms of dysphagia, food bolus obstruction and poor feeding.[6] The inflammatory characteristics of EoE are driven by food allergens while finding the culprit food is often the most challenging part of getting symptoms under control. Children who have had a history of food allergy as infants are more at risk of developing EoE later in life, and that is when you get an allergic response that may be different to the original symptoms.[7] A diagnosis of EoE can be very burdensome for families who need to navigate multiple food exclusions and challenges.

Choosing a diet strategy after diagnosis is the role of the clinical team, and is based on the food allergy focused history and severity of symptoms. There is no clinical guideline or recommendation supporting one ideal dietary approach for EoE. Six, four and two food exclusions in combination with proton pump inhibitors (PPIs) and topical corticosteroids are common strategies.[8,9] Food eliminations can be long and tiresome for families with no immediate symptom relief, which can increase the risk of further weight loss in the child and aversive behaviours around foods. A period of exclusive elemental diet is a more top-down approach that can help manage symptoms quickly, followed by food reintroductions, leaving the most allergenic foods to last (Diagram 1). However, this is a lengthy process and compliance can be poor, especially in older children who may need a nasogastric tube to complete the exclusive elemental diet for eight weeks.

There are many factors to consider when deciding on the dietary treatment for EoE, including the patients desire and motivation to engage with dietary changes, their preferences (as you are relying on them complying with treatment), their current nutritional status, and the ability of the family and patient to follow the restrictions. What we commonly see with EoE is that feeding aversions have already taken hold, due to instant symptoms after eating, so getting the right treatment quickly can help reduce the aversive behaviour to food developing.

Diagram 1: Proposed order of food reintroduction in EoE[2]



> A feeding or food aversion occurs when a baby or child consistently refuses a bottle or food they previously accepted

Conclusion

Managing children with complex allergies over 12 months of age can be challenging, due to changes in the pattern and severity of allergic symptoms, a greater awareness of being 'different' from peers, and aversions to foods and eating can develop. Multiple food allergies and restricted diets can add to this complexity. Children who have experienced a food allergy in infancy are a greater risk of developing EoE later. Managing EoE involves navigating multiple food exclusions and other treatments which can be burdensome for families. Dietary approaches will vary depending on the situation, but a period on an exclusive elemental diet may be beneficial for some patients to help manage symptoms quickly.

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RACHEL WOOD
Specialist Paediatric Dietitian

A case of eosinophilic oesophagitis in a 6-year-old with a previous cow's milk allergy

His weight had dropped to the 2nd centile, mainly due to the restrictive nature of his diet and symptoms

Presentation

Joseph is a 6-year-old boy referred to the paediatric gastroenterology dietitians following an endoscopy by the paediatric gastroenterologists which confirmed Eosinophilic Oesophagitis (EoE). He had significant weight loss and restricted eating habits.

Clinical history

Joseph was diagnosed with non-IgE-mediated cow's milk protein allergy (CMPA) at 7 months of age. His symptoms included reflux, eczema and blood in stools following weaning from breastmilk onto formula. Joseph was born at 3.4kg on the 50th centile for weight and dropped to the 25th centile by 5 months of age. He was refusing his bottles and back arching, and feeding became stressful for the family.

Joseph was started on an extensively hydrolysed formula (Aptamil Pepti 2) at 5 months and subsequently moved to Neocate LCP after 4 weeks, which is when all his symptoms resolved. He was weaned successfully onto a dairy free diet from 6 months. At 1 year of age, he was 9.2kg and had regained his weight, so he was transitioned onto oat milk and followed the milk ladder successfully at around 2 years of age.

Joseph lives at home with his parents and younger brother. He now has asthma, eczema and hay fever.

Diagnosis

Joseph was referred to the Joint Gastroenterology and Allergy Clinic at 6 years of age with a 7-month history of food sticking in his throat, vomiting and abdominal pains. His weight had dropped to the 2nd centile, mainly due to the restrictive nature of his diet and symptoms associated with eating. Given his history of milk allergy and atopy, the working diagnosis was Eosinophilic Oesophagitis (EoE). A 2013 systematic review of the incidence of EoE reported 0.2 in 100,000 children in the UK.[1] Since then, our understanding of EoE has evolved rapidly as the number of cases climb. The prevalence in the western world has been estimated as 63 in 100,000 since 2017.[2]

Discussion on the benefit of IgE blood tests for Joseph concluded against using them due to insufficient evidence for their benefit in this population. The European Society for Paediatric Gastroenterology, Hepatology and Nutrition Working Group on Eosinophilic Gastrointestinal Diseases (ESPGHAN EGID WG) recommend against using these tests to predict dietary triggers in EoE.[3] Instead, a thorough allergy-focused history should be performed to help determine dietary triggers.

Endoscopy showed inflammatory changes in the oesophagus and biopsies came back showing 28 eosinophils per high-power field (HPF) (> 15 high-power field is used as a diagnostic marker) which, alongside the history of symptoms, confirmed the diagnosis.

Assessment

Joseph started to become pickier with foods from 5 years of age and complained of tummy pains; he started taking less food and stopped drinking milk. Mum thought it was anxiety about starting school, but he was missing meals and hiding foods and Mum would find his lunch in the bin. There was a significant concern about his nutritional status and his reluctance to eat solid food, as he now associated it with pain.

Anthropometry

	Admission 6 years 7 months	Centiles	After 8 weeks of elemental diet	Centiles
Weight	17kg	1st centile	20.5kg	33rd centile
Height	120cm	55th centile	121.5cm	73rd centile
% Median BMI	76.1%	<0.4th centile	89.5%	8th centile

Estimated nutritional requirements

EAR	1650 kcal/day
71kcals/kg	1207kcals/day
Protein RNI	28.3g/day
Fluid	1350ml/day

EAR, estimated average requirement; RNI, recommended nutrient intake.

Dietary management

It was agreed by the team and family to admit Joseph to hospital to establish him on 8 weeks of an elemental diet. This would be followed by a six-food elimination diet with work around building more positive associations with feeding and food. Joseph was happy to stop eating food for 8 weeks to help with his symptoms.

Day	Total feed volume per day (Neocate Junior)	% of nutrient requirement	Number and volume of feeds per day
1	600mls	43%	3 x 200mls
2	1000mls	71%	5 x 200mls
3	1200mls	86%	6 x 200mls
4	1400mls	100%	7 x 200mls

> The inflammation caused by the eosinophils is driven and precipitated by food allergens

It was explained that he may need a Nasogastric Tube (NG) to take the full volume, but he wanted to try and drink the Neocate Junior first.

Aim = 1400kcals/day, as a halfway point between EAR and kcals/kg.

Joseph liked and tolerated the strawberry flavoured Neocate Junior orally. Neocate Junior was started at 1kcals/ml to ensure he also met his fluid requirements. Joseph successfully met his target volume orally after four days and, once his bloods were stable, he was able to go home by day six.

Follow up

Joseph's mum was called every two weeks by the dietitians to monitor weight and progress on the elemental diet. On the last call, we talked about food reintroduction.

Discussion

We know that the inflammation caused by the eosinophils is driven and precipitated by food allergens. The tricky part is deciphering which food allergens are causing it.

After 8 weeks of elemental diet as liquid therapy, Joseph's weight increased to 20.5kg (9th–25th centile) and we started introducing foods but avoiding the six main allergens (dairy, soya, wheat, egg, fish and nuts). Joseph was reluctant with certain textures at first, in case food started sticking in his oesophagus, as all his other symptoms had resolved. It was suspected that dairy and wheat could be the problem allergens. These are the two most common foods associated with EoE, which also correspond with Joseph's atopy and history of milk allergy, and he had previously eaten a lot of wheat-based foods.

The benefit of taking the elemental diet orally meant there were no barriers to going back to school, playing football and going out with his friends once he started to feel better. This enabled compliance and completion of the 8 weeks of liquid therapy. Challenges we encountered were boredom and compliance, and he needed lots of encouragement and support from his family and friends to continue the treatment. Most children doing this would need an NGT.

ESPGHAN[3] and British Society for Paediatric Gastroenterology, Hepatology and Nutrition (BSPGHAN)[4] guidelines recommend repeating endoscopies and biopsies after each dietary change to show the exclusions are effective or to find the trigger food. This can be challenging with repeat general anaesthetics and long waiting lists within the NHS. An alternative is basing food introduction on symptoms alone and can involve quite intensive dietetic input around the types of foods and the child's likes and dislikes.

EoE is being increasingly diagnosed in children and it's important to manage their symptoms as food aversion can be very difficult to overcome. The use of Neocate Junior improved Joseph's quality of life, avoiding the need for an NGT, and enabled all his food allergen related symptoms to settle down.

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IMPORTANT NOTICE:
Breastfeeding is best. Aptamil Pepti 2, Neocate LCP and Neocate Junior are Foods for Special Medical Purposes and should only be used under medical supervision after full consideration of the feeding options available, including breastfeeding. Aptamil Pepti 2 is for the dietary management of cow's milk allergy and is suitable for use for infants from 6 months as part of a balanced diet and as a principal source of nourishment with other foods for children. Neocate LCP is for the dietary management of Cow's Milk Allergy, Multiple Food Protein Allergies and other conditions where an amino acid-based formula is recommended and is suitable for use as the sole source of nutrition for infants under one year of age. Neocate Junior is for the dietary management of Cow's Milk Allergy, Multiple Food Protein Allergies and other conditions requiring an amino acid-based formula, for children over one year of age. Refer to labels for details.

NUTRICIA ACADEMY
Feed your mind

Up2Date

2024-25 has seen the publication of several review papers and updates to paediatric dietetic guidelines – particularly for cow's milk allergy (CMA). Here are some key highlights that may impact your practice:

FEBRUARY 2024

Vandenplas Y et al – An ESPGHAN position paper on the diagnosis, management, and prevention of CMA[1]

This paper provides an update to the 2012 guideline and covers the diagnosis, prevention and management of CMA with a focus on gastrointestinal manifestations. ESPGHAN also discuss the impact on nutrition, growth and quality of life, plus the role of plant-based feeds.

What has changed?

This guidance paper is the first to separate out diagnostic elimination diets from therapeutic elimination diets.

Breastfed infants:

- Maternal diet restriction is now only recommended in rare cases where exclusively breastfed infants have chronic symptoms – in these cases, maternal exclusion should be 2-4 weeks (while continuing breastfeeding) followed by reintroduction and symptom monitoring.

Non-breastfed infants:

- During the diagnostic elimination phase, ESPGHAN now suggest that symptom improvement should be seen within 1-2 weeks of cow's milk exclusion in suspected IgE-mediated CMA and 2-4 weeks in suspected non-IgE-mediated CMA.
- For ongoing management in both IgE and non-IgE-mediated CMA, they recommend exclusion for 6 months, or up to 9-12 months of age, whichever arrives first, before challenge.
- In both phases, an extensively hydrolysed formula (EHF) continues to be recommended as the first choice for most children with IgE and non-IgE-mediated CMA, stepping up to an amino acid-based formula (AAF) where symptoms are not resolved.
- AAFs are the first choice for children with previous anaphylaxis, multiple or severe complex GI allergies, faltering growth, acute or chronic food protein-induced enterocolitis syndrome (FPIES) and cases of eosinophilic oesophagitis (EoE) not responding to extended exclusion diets.
- Dietary monitoring of nutritional intakes, particularly vitamin D and calcium, are recommended, especially if exclusion continues beyond 12 months of age.

JUNE 2024

Amil-Dias J et al – Diagnosis and management of eosinophilic esophagitis in children: an update from ESPGHAN[2]

The updated guidelines include the latest research reflecting advancements in the understanding of EoE.

- Diagnostic criteria have been revised and simplified and no longer require non-response to proton pump inhibitors (PPIs).
- PPIs form a treatment option instead of a diagnostic tool.
- The importance of quality of life is covered and how it should be assessed.
- New therapeutic options are considered, like biologics and simplified empiric elimination diets.
- Dietary management:
  - Recommends against:
    - using skin prick tests/specific IgE-tests to predict dietary triggers
    - the routine use of targeted elimination diets (TED)
  - Individualised empiric elimination diets are recommended as first-line dietary treatment:
    - Six food elimination diets induce remission in most patients
    - The first foods to eliminate are cow's milk, gluten-containing cereals and eggs in a step-up elimination diet
  - Suggest the use of AAFs as an option for children with multiple food allergies, failure to thrive, or those with severe disease who do not respond, or are unable, to follow highly restricted diets.

WAO – Diagnosis and Rationale for Action against Cow's Milk Allergy (DRACMA) guideline update

The DRACMA guidelines have recently been updated to incorporate new evidence and practices. Rather than one comprehensive guideline, as presented in 2010, the updated version has been divided into 18 chapters with particular focus on diagnosis, selecting replacement formulas for non-breastfed babies and the use of immunotherapy.

The most recent chapters published in 2024 were:

Bognanni A et al – Milk supplement/replacement formulas for infants and toddlers with CMA – systematic review[3]

- Systematically reviews specialised formulas for non-breastfed infants as an established approach to minimise the risk of severe allergic reactions while avoiding nutritional deficiencies.

Venter C et al – Nutritional management of cow's milk allergy[4]

- Provides a comprehensive review of the nutritional management of CMA, covering hypoallergenic formulas, use of other mammalian milks, plant-based beverages and practical considerations for milk avoidance and meal planning.

Bognanni A et al – Recommendations on milk formula supplements with and without probiotics for infants and toddlers with CMA[5]

Reviews the different management options available for formula-fed infants.

- Recommends extensively hydrolysed formulas or rice hydrolysates as a first-line, amino acid-based formulas as second-line, and soya formulas as the third choice.

JANUARY 2025

NICE Guideline – Maternal and child nutrition: nutrition and weight management in pregnancy, and nutrition in children up to 5 years[6]

This updated NICE guideline replaces PH11 Maternal and Child Nutrition from 2008; and partially replaces PH27 Weight Management Before, During and After Pregnancy from 2010.

It covers an extensive set of recommendations, highlighting the importance of personalised healthcare using evidence-based information, including sections on:

- Vitamin supplementation during pregnancy and in the under fives
- Healthy eating, physical activity and weight management in pregnancy – including guidance on weight stigma
- Supporting breastfeeding
- The introduction of solid foods and healthy eating behaviours
- Weight monitoring for babies and children from 6 months to 5 years.

FEBRUARY AND MARCH 2025

2025 has also seen the publication of two extensive review papers on clinical presentation, diagnosis and management of non-IgE-mediated food allergies in children:

Groetch M et al – Clinical presentation and nutrition management of non-IgE-mediated food allergy in children[7]

Meyer R et al – An update on the diagnosis and management of non-IgE-mediated food allergies in children[8]

Both provide comprehensive reviews on the diverse presentations of non-IgE-mediated food allergies and practical guidance to assist clinicians with diagnosis and nutritional management.

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Aveen Bannon
Specialist Disordered Eating Dietitian

Who said dietetics is all work and no play?

A novel approach to problem feeders

Many children go through a selective eating phase, but a large percentage will grow out of this as they are exposed more to foods, tastes and textures. However, there are a few exceptions, and this is where the challenge lies. Research indicates that 79% of children with Autism Spectrum Disorder (ASD) are selective eaters, and 95% can be cautious about trying new foods.[1] Meanwhile, selective eating is not confined to those with ASD and can cause distress for both the child and family.

ARFID (Avoidant/Restrictive Food Intake Disorder) is a mental health diagnosis whereby the child has difficulty eating and may have nutritional issues, without body image concerns.[2] PFD (Paediatric Feeding Disorder) is considered when there is impaired oral intake that is not age-appropriate and is associated with medical, nutritional, feeding skill, and/or psychosocial dysfunction.[3] PFD requires a multidisciplinary diagnosis. From a dietetic standpoint, these conditions can overlap, and treatment methods can be similar.[4]

Repeated exposure to a food can help increase intake. Studies suggest trying a food 14-20 times.[5] I explain to families that this is often not about the taste of the food but acclimatising to how it feels in the mouths, how it smells or perhaps how it looks. The power of playing with food, without pressure to eat the food, seems to reduce some of the anxiety around broadening food choices for this patient group.

A problem feeder will often include less than 20 foods in their diet, and almost always eats different foods from the rest of the family while avoiding entire categories of food textures or types, e.g. chewy foods or vegetables. It can take over 20-25 steps to introduce a new food.[6] Playing with food is something I learnt from the Sequential Oral Sensory (SOS) Approach to Feeding, developed by Dr Kay Toowmy. Integrating play with food in a relaxed, stress-free environment reduces the expectation of eating the food, making food exploration more enjoyable and less threatening.[6]

> It can take over 20-25 steps to introduce a new food

Eight senses are involved in eating: **sight**, **smell**, **taste**, **touch**, **hearing**, **vestibular** (helps with balance and the coordination required to eat food,), **interoception** (the sense of internal states, like hunger and fullness), and **proprioception** (knowing where our body parts are which helps with coordinating eating and utensil use).

The idea of playing with food is to make it fun but also engage the senses, build curiosity and help the child feel more in control of the process. The setting for the play meal and family meals is important. Sitting in a 90-90-90 pattern is important, where the child has their feet supported on the floor or a step, with their ankles and knees are at a 90-degree angle, and the back is supported at a 90-degree angle with legs.[6] The atmosphere should be quiet with no distractions and using plain, white tableware.

Make a list of foods the child eats and divide them into food groups: proteins, carbohydrates and fruit/vegetables. Choose 5-7 foods, each with a different texture, e.g. purée, juice, meltable, hard mechanical, soft mechanical. The food choice is not about complementing tastes or what the child will eat. The process is all about exposure and interaction with food. However, it's advisable to start and finish with a safe food so the experience is not too daunting.

Case study:

A 6-year-old girl with limited food intake, taking mainly soft mechanical/meltable foods that are beige in colour. She experienced constipation and became upset if asked to eat new foods.

Play meal – milk, cream cracker, yoghurt, cooked parsnip, 'Snax' potato crisps, sliced banana.

In this play scenario, we made a boat with the parsnip pieces, made little people out of the bananas and parsnip, the yoghurt became the sea and sunscreen, the 'Snax' were hats for the people, and some were broken up to become crabs... all led by the child. Interestingly, the child would not tolerate the banana or parsnip on the plate or the 'Snax' on the table at the beginning of the session. She gradually allowed parsnip and yoghurt to be placed on the plate, but would not touch them, and the two safe foods were milk and crackers. By the end, the child was putting her finger in the yoghurt to use as sunscreen on the banana and parsnip, touching both foods. Then, she proceeded to pick up a banana to use as a paintbrush. Eventually, she touched the 'Snax' to crush them, brought the small pieces to her face to smell them, and rubbed them on her lip.

Putting it into practice

Approaching this in a clinical setting may not always be practical, but support can be offered to help parents to try it at home. It is important to note that a multidisciplinary team—including a dietitian, occupational therapist, speech and language therapist and psychologist—may be necessary for complex feeding challenges.

In the context of problem feeders in paediatric practice, play-based therapies are engaging, low-stress methods to help children build positive relationships with food. Through play, children gradually overcome aversions, expand their diet, and improve their nutritional intake in a supportive, stress-free environment.

Key points:

1. Create a calm, distraction-free eating space.
2. Use child-friendly plates, utensils, and cups.
3. Explain to the child that they are not required to eat the food but can explore and play with it.
4. Model curiosity by interacting with the food yourself, e.g. looking, touching, smelling, licking, tasting.
5. Pair new foods with familiar, preferred foods.
6. Start with small, non-threatening amounts.
7. Present foods in fun shapes to increase appeal.
8. Gradually increase the quantity and variety of foods and textures.
9. Keep interactions with food fun, voice light and happy!
10. Observe which foods the child engages with and how they progress through the steps to eating.

> Play-based therapies are engaging, low-stress methods to help children build positive relationships with food

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Ask The Experts

Do you have a question for our expert?

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Prof Nicholas Embleton
Professor of Neonatal Medicine

Q. What future developments for breastmilk fortification might we see?

There is still uncertainty around the best time to start breastmilk fortifiers, the optimal macronutrient composition and whether different amounts should be used when fortifying mother's own milk compared to donor breastmilk. Pragmatic trials may resolve some of these uncertainties. There may also be further trials to explore for how long they should be provided; many hospitals stop adding fortifiers as the baby starts to feed directly from the breast, but we still don't know whether continuing to offer a fortifier following discharge is beneficial. We need to know the effects on growth, especially head growth, but it would be essential to ensure that offering fortifier after discharge doesn't negatively impact on breastfeeding duration.

Over the last years, there have been changes in composition of fortifiers and, whilst many fortifiers only provide additional energy as carbohydrate, some manufacturers have started to add fat. Recent data on the potential benefits of adding long chain fatty acids (DHA etc.) might mean that the composition of fortifiers will be further adapted in the future to provide additional DHA and possibly other bio-nutrients as well.

Jacqui Lowdon
Clinical Specialist Paediatric Dietitian, Cystic Fibrosis

Q. With faltering growth, if a child hasn't caught up in growth in terms of weight or height by 2 years of age, could this affect their overall growth potential and if so, by how much?

There is a lack of a consensus on the extent to which catch-up growth in later childhood and adolescence reduces the height deficit incurred in early childhood.

Cross-sectional data from the Demographic and Health Surveys (DHS)[1] suggest that recovery from faltering growth after two years of age is unlikely and, therefore, the "window of opportunity" for preventing undernutrition ends at two years. However, there is evidence to challenge these findings[2-4]; these data suggest that there is significant opportunity for catch-up growth post-infancy, for example in those with stunting. One study by Adair et al., (1999) demonstrated catch-up growth in children in their pre-adolescent years.[5] So, although data in this area are limited, evidence suggests that children may still achieve catch-up growth in later years, even if they haven't managed to do so before 2 years of age.

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A DAY IN THE LIFE OF

a Paediatric Diabetes, Academic and Media Dietitian

It is often said that in today's modern workforce, most people do not have one single job, but up to 9[1] across their working life. I have followed a similar path, and I will share with you why I remain committed to working as a dietitian.

When I began my working life as a dietitian, I quickly became focused on adults living with diabetes at St Helier Hospital, Carshalton. I chose diabetes, due to my fascination with how the body uses fuel. I moved through a number of clinical roles, before completing a PhD at the University of Hull where I investigated the effects of polyphenol-rich chocolate in people living with type 2 diabetes.[2] This gave me early exposure to the media interest in nutrition research, along with how it can be misinterpreted and overstated.

Since then, I have had a varied career, working at universities in the UK and Australia. Last year I took the decision to move back into paediatric diabetes at the University Hospitals of Leicester NHS Trust. My clinical role involves multi-disciplinary team clinics, as well as seeing children and young people with their families or carers on the wards.

Although I am passionate about diabetic care and being part of a great multi-disciplinary team, I thought it might be interesting to focus on how I manage my academic and media work alongside a busy NHS role.

Media work is an area I developed over several years; it is often unpaid and needs to be slotted in around other jobs. In all honesty, this was not about self-promotion, or developing a career, but was born out of frustration with the frequent spreading of misinformation. My interest started during my PhD where I observed the hype in the media around chocolate, which was simply not supported by my data. My dietetic work helped me develop the skills to critically review the science and communicate impartial and scientifically accurate messages to the public, which is the perfect match for media commentary. Linked to this, and demonstrating these skills, I published a paper in the Journal of Human Nutrition and Dietetics[3] showing how research can be stretched in press releases and then further sensationalised by the media.

Although the process of writing an academic paper is similar to working directly with the media, the big difference is time. Writing academic papers can take a lot of time, something a rolling and constant 24 hour a day media cycle does not tolerate. Media work can also be frustrating. For instance, you are invited for a radio interview about the latest weight loss medication, only for it to be cancelled last minute when a more pressing news item emerges. Equally, many journalists (particularly those working on website-based news) tend to have very short deadlines, often only a few hours. Since returning to the NHS, I've found it harder to accommodate these requests as clinics and patients always come first.

> **My media work was born out of frustration with the frequent spreading of misinformation**

However, I have managed to continue my writing for The Conversation, a news site written by academics but edited by journalists. So far, I have written 60 articles that have reached just under 6 million readers. This has its own challenges; for example, I am writing about research that has just happened, meaning a short deadline, but it needs to be checked, edited and copy edited which can delay publication. A recent example is an article that discussed the effects of fizzy water on weight loss[4] based on research; despite being provided with the paper before its official publication date, my piece on the article was not published for a full week afterwards. So, timing is important and difficult to get right. The best thing you can do as a writer is meet your deadlines.

Being involved in media work can also bring you into conflict with others, so it is important to remain objective and try to avoid biases and personal preferences. I have encountered this firsthand when discussing ultra processed foods (UPFs) with the media. This is a challenging area, and there are valid arguments from both sides which I acknowledge. But, when drawing a conclusion, I tend to critique the limitations before suggesting a way forward. In this case, I felt that the NOVA classification (which groups foods according to industrial processing) oversimplified foods with anomalies for European food systems. My proposal was to start with a focus on added fat, salt and sugar in manufactured foods, which was not exactly aligned with the others. However, a core technique used in media interviews is to acknowledge and bridge while helping to get your point across.

Outside of the NHS and media, I maintain my honorary academic links with Aston University and University of Canberra and act as an associate editor for the Journal of Human Nutrition and Dietetics. This can at times mean difficulties balancing my work with my personal life, which is something I don't always get right – I need to learn to say no sometimes. When I get some free time, I enjoy cooking and running. If I were to offer any advice, I'd recommend actively seeking out opportunities and mentors – they rarely come looking for you! Remember there are plenty of opportunities out there, so say yes to some, but always remember that it is okay, and sometimes necessary, to say no. Look after yourself, pace yourself, and don't be afraid to reinvent yourself along the way.

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DIARY DATES 2025

14–17 MAY

ESPGHAN Congress
WHERE: Messukeskus Helskini, Finland

4–7 JUNE

European Cystic Fibrosis Conference
WHERE: Allianz MiCo Milan, Italy

13–16 JUNE

EACCI Congress
WHERE: Scottish Event Campus (SEC), Glasgow

1 JULY

Nutricia Paediatric Symposium
WHERE: Burlington Hotel, Birmingham

1–2 JULY

Nutrition Society Conference
WHERE: Burleigh Court, Loughborough

8–9 OCTOBER

Nutricia Annual Congress
WHERE: Royal Society of Medicine, London

16–18 OCTOBER

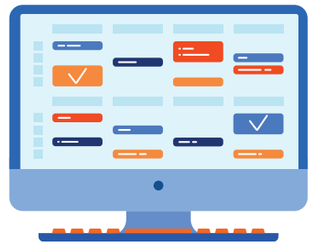
BSACI Annual Conference
WHERE: International Convention Centre (ICC), Newport, Wales

18–20 OCTOBER

European Academy of Paediatric Societies (EAPS) 2025
WHERE: Lisbon, Portugal

23–25 OCTOBER

EAACI PAAM
WHERE: Palma de Mallorca, Spain



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Accurate at time of publication: January 2025.

scGOS:/lcFOS: short chain galacto-oligosaccharides / long chain fructo-oligosaccharides; **2'-FL**: 2'-fucosyllactose.

† MIMS UK & Ireland, October 2024. ~ Product can be provided to patients upon the request of a Healthcare Professional. They are intended for the purpose of professional evaluation only. ¥preclinical data; ^ study in healthy term infants recieving a formula with GOS only (control) or GOS plus either 0.2g/L or 1.0g/L 2'-FL and compared to a breastfed reference group; *post hoc analysis of the control group and the 0.2g/L 2'-FL formula group from the Marriage et al. 2015 study.

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