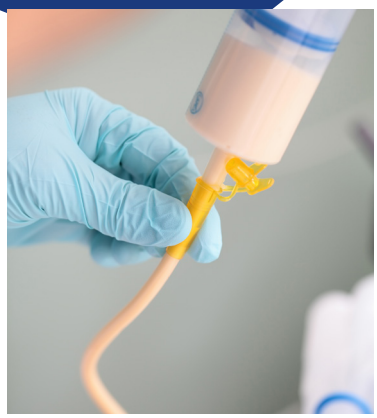
OPINION PIECE:

Experience within an Acute Paediatric Centre using an Enteral Tube Feed Containing Food-Derived Ingredients.

FOR HEALTHCARE PROFESSIONALS ONLY

Dr Graeme O'Connor
Research Lead for Dietetics, Great Ormond Street Hospital, London, UK



Background

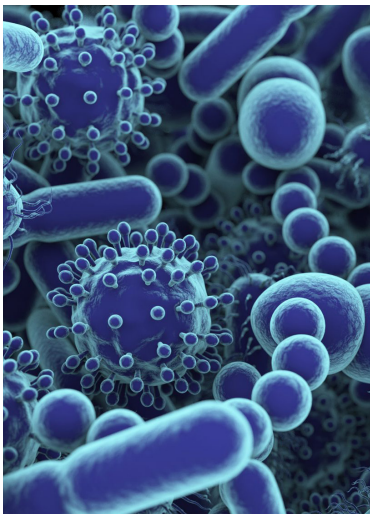
Feeding tubes is the preferred route for the nutritional support for children who are unable to meet their nutritional requirements orally. Commercially produced complete nutritional formulas are commonly delivered to children requiring enteral nutrition. However, a cultural shift toward consuming a more "natural" diet consisting of whole foods has caused the use of blended tube feeds to grow in popularity among parents and carers in recent years[1].

Provision of nutrition through enteral nutrition helps to maintain gut function by preserving gut immunity[2]. Clinical manifestations of feeding intolerance are some of the complications that can occur in patients[3].

Microbiomes and Dysbiosis

The frequency of diarrhoea in enteral nutrition in hospitalised patients ranges from 29% to 72%[4]. Antibiotic treatment is strongly associated with diarrhoea in patients receiving enteral nutrition and is associated with alterations of gut microbiota, which leads to increased risk of pathogen overgrowth and altered metabolism of macronutrients which induces osmotic diarrhoea and malabsorption of essential nutrients[5].

The human gastrointestinal tract contains around 1014 microorganisms (including bacteria) which are commonly referred to as the gut microbiome. The majority of microbiomes reside within the distal parts of the gastrointestinal tract[6]. Diarrhoea contributes to malnutrition through reduction in nutritional intake, decrease in absorption of nutrients, and increase in catabolism of nutrient reserves[7].



Blended Diets

Blended diet refers to the use of family foods blended and administered into an enteral feeding tube. Interest is growing in the use of blended diet for management of feeding difficulties, reflux and improved bowel function in the paediatric population. It is perceived the more "natural" and better tolerated compared to commercially available enteral formulas. A study in children who are dependent on enteral nutrition reported that blended diet improved clinical outcomes (e.g. gagging, vomiting, tolerance) compared to commercially available enteral formulas[8].

Furthermore, a study by Samela *et al*, monitored the use of enteral tube feed containing blended food, and transitioned 10 paediatric intestinal failure patients >1 year of age from an elemental formula to a formula with food-derived ingredients. Around 80% of these patients had their colon in continuity. Blended diet caused more formed and less frequent stools and had appropriate weight gain after one year on a blended diet[9].

However, as Chandrasekar *et al* correctly points out there is limited evidence that blended diets can significantly reduce gastrointestinal symptoms associated with tube feeding and improve aspects of quality of life. Therefore, more research is needed to evaluate whether blended diets with and enteral tube feed containing food-derived ingredients support growth in children and to explore potential complications. Research is also needed on the mechanisms by which blended diets and enteral tube feed containing blended food reduce adverse symptoms associated with tube feeding, with evaluation of gastric function and gut microbiome[1].

Short Chain Fatty Acids

Prebiotics were shown in multiple human studies to increase the concentrations of bifidobacteria. Lactobacillus and bifidobacteria are referred to as probiotics and improve gut barrier function, host immunity, and reduce overgrowth of pathogenic bacteria, such as Clostridia[10]. There is growing evidence for the beneficial effects of fibre enriched enteral formulas and enteral tube feed containing food-derived ingredients, which can stimulate the growth of beneficial normal flora bacteria, thereby inhibiting harmful bacteria. In the large intestine, the microbiota ferments non-digested dietary fibre. Bacterial fermentation of the ingested fibre in the colon produces short chain fatty acids, primarily acetic, propionic and butyric acid, which epithelial cells use as an energy source[11].

Butyrate is considered the main energy substrate for enterocytes and a stimulator of growth and differentiation. Moreover, short chain fatty acids are crucial to inhibit pro-inflammatory mediator activities in the intestinal epithelium[12]. The use of soluble fibre in all haemodynamically stable, critically ill patients is safe and may be considered to be beneficial for reducing gastrointestinal symptoms, mainly diarrhoea. Therefore, the use of soluble fibre may assist in the treatment of critically ill patients[13].

Our Experience

One of the dichotomies faced with using blended diets in the intensive care unit is that the variability in each feed may impact serum electrolyte balance. However, children admitted to intensive care are most needing of a blended diet due to the barrage of intravenous antibiotics which causes dysbiosis. The availability of enteral tube feed containing food-derived ingredients food has in part helped to overcome this obstacle.

Currently, our department guidelines only permit the use of an enteral tube feed containing food-derived ingredients if a family has been following a blended diet at home and refuses to use a standard enteral formula. Around 10% of families admitted to our Trust still refuse to give an enteral tube feed containing food-derived ingredients. One of the main limiting factors of commercially available enteral tube feed containing food-derived ingredients is they contain meat and dairy. A plant based enteral tube feed containing food-derived ingredients has the potential to eliminate these issues and may serve as a more beneficial formula due to the higher intake of fibre, serving as an excellent source of prebiotics and promoting gut short chain fatty acid production.

An unexpected outcome noted from the use of ‘enteral tube feed containing blended food-derived ingredients was that families requested to continue with the product on discharge from hospital. Families liked the option and freedom of having a ready-made enteral tube feed containing blended food ingredients to compliment a blended diet.

This combination of two feeding methods may reduce one of greatest risks associated with a blended diet – the risk of nutritional inadequacy if the blended diet does not contain the right nutrients in the right amounts. Blended diets should be implemented with the support from a dietitian and other healthcare professionals[14].

Professional guidance - BDA position paper

The British Dietetic Association recently amended its guidelines to enable UK dietitians to consistently support a blended diet for tube-fed individuals, and to encourage an open, multidisciplinary approach to administering blended diets via a feeding tube (BDA Policy Statement[15]). Prior to this, there had been a lack of clear professional guidance.

Conclusion

As blended diets increase in popularity the need for enteral tube feed containing food-derived ingredients particularly of a plant-based variety is growing. Although blended diets may not be suitable for intensive care or other acute clinical situations, having an alternative such as enteral tube feed containing food-derived ingredients will reduce untimely battles with families on the ward. Enteral tube feed containing food-derived ingredients could serve as a compromise to a blended diet, bridging the gap between a full blended diet and the existing feeds. It could also facilitate engagement between parents and dietitians, as healthcare professionals may feel more confident in recommending a standard commercially available enteral tube feed containing food-derived ingredients which is supported by scientific studies.

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This article was written and developed by Dr Graeme O'Connor – all views are his own. Nestlé Health Science have reimbursed Dr Graeme for his time in developing the article.

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