

Practice Toolkit

The Use of Blended Diet with Enteral Feeding Tubes

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The Association
of UK Dietitians



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1. The Purpose of this Practice Toolkit

In November 2019, the British Dietetic Association (BDA) published a new, public facing, Policy Statement on the use of blended diet with enteral feeding tubes which advised that blended diet can be offered to tube fed individuals and their families as an option as part of patient centred and personalised care (1). The purpose of this Practice Toolkit is to provide supplementary, practical, best practice guidance for UK registered dietitians and other healthcare professionals working in the field of home enteral tube feeding (HETF), to help tube fed individuals receive effective, equitable and quality care. This Practice Toolkit does not aim to determine if blended diet is as safe or efficacious in comparison with commercial enteral formula. Commercial enteral formula have been designed specifically for the purpose of enteral feeding and remain the first line choice for the majority of tube fed individuals, particularly those who are tube fed during short term inpatient admissions (1).

This Practice Toolkit begins with a basic background to blended diet and the reasons why it could be considered by UK registered dietitians as an option in clinical practice (Section 2). Section 3 outlines the process used to develop the recommendations for clinical practice which are outlined in Section 4. It should be highlighted that, despite a marked increase in popularity, blended diet remains under researched. Relevant literature was identified, however, in the main, papers focused on either professional experience or a particular aspect of blended diet under laboratory conditions; there are no robust studies which have looked at the practical application of blended diet. For this reason, the suggested good practice provided in this Practice Toolkit draws also on the expert opinion of UK dietitians and other healthcare professionals working in the field of HETF who have experience supporting families to use blended diet. It is envisaged dietitians who are new to blended diet will be able to use this Practice Toolkit as a reference; in addition they should seek advice and supervision from a dietitian who is experienced. In the appendix of this Practice Toolkit resources have been included which can be adapted for local use, further useful sources of information are also identified. This document is an evolving work in progress and the BDA welcomes feedback and encourages further discussion and research on the topic.

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2. Background

This Section provides a background to the use of blended diet with enteral feeding tubes. Parts of this Section have been adapted from Chapters 1 and 2 of Dr Sarah Durnan's doctoral thesis: '*It's Just Food, Blended*': Exploring Parents' Experiences of Choosing Blended Diet for Their Tube fed Child.' available from curve.coventry.ac.uk (Durnan, Toft, Flaherty, Coad, 2018)

2.1 Context

This Practice Toolkit primarily relates to individuals who are enterally tube fed at home. A practice commonly referred to as home enteral tube feeding (HETF). In the UK, HETF has been increasing steadily since the 1980s (2) (3). The majority of HETF people in the UK are prescribed a commercially prepared formula, designed specifically for the purpose of enteral feeding. These formulas have been readily available since the 1960s (4) (5). In recent years however, the blending of everyday foods with liquid to be given through an enteral feeding tube has become an increasingly popular practice.

The terms 'blended diet' (in reference to the diet as a whole) or 'blends' (in reference to a singular meal or recipe) have been used throughout this document although alternative descriptions exist including home-made formula, liquidised feeds, blenderised food, liquidised diet and pureed table food. No research to date has aimed to establish the proportion of HETF individuals in the UK using blended diet. However, feedback obtained from the Dietitians Interested in Special Children (DISC) group of dietitians, who were consulted as part of the development of this Practice Toolkit, suggested up to 20% of their paediatric HETF caseload are now using some form of blended diet, instead of, or in combination with a commercial enteral formula. This is likely a marked increase since the publication of the first BDA Practice Toolkit on the topic in 2015 (6).

Blended diet is an umbrella term for a wide range of practices. Broadly speaking, blended diet can refer to any food or drink other than water, expressed breast milk, infant formula or commercial enteral formula being given via an enteral feeding tube. The practice has been described as a continuum; at one end some families may choose to give a very small amount of fruit juice or puree in combination with a commercial enteral formula, at the other end of the continuum some families use blends to meet the tube fed individual's full nutritional requirements (7). This wide variation in practice makes blended diet particularly difficult to study, as each individual and their family uses blended diet in a way completely unique to them.

2.2 Reported Physical Benefits

A physiological benefit which has been linked with use of blended diet is the *improvement of gastroesophageal reflux, retching and vomiting symptoms*. Symptoms of reflux, retching and vomiting are common particularly in children and young people who use long term HETF; in some cases, anti-reflux surgery (fundoplication) is used to manage these symptoms, but retching may continue (8). In an uncontrolled observational cohort study by Pentiuik et al. (8), the effects of blended diet on gagging and retching symptoms which had persisted after fundoplication were investigated. This study found that 52% of the thirty-three children were reported by parents to have a 76 - 100% improvement in their symptoms. Furthermore 73% had a $\geq 50\%$ improvement in gagging and retching, while none of the children's symptoms

were reported to have worsened. Subsequent studies in children and young people with neurological conditions have had similar findings. A recent Canadian study (9) found from a sample of twenty children, vomiting was reported to decrease from 76% to 53%. Additionally, gagging and retching was reported to decrease from 82% to 47%. A prospective cohort study (10) of 70 children aged 1-18 years in the USA also found a significant reduction in gastroesophageal reflux symptoms. Most recently, a single centre, retrospective study (11) of 23 children aged 1–18 years who received a blended diet found as many as 95% showed improvement in symptoms. It is not understood why blended diet has a beneficial effect on symptoms of reflux, retching and vomiting in this group, although authors (8) (11) have suggested the increased viscosity of blends, in comparison to commercial enteral formula, is a possible cause.

A second reported physiological benefit of blended diet is *improved bowel habit*. Both diarrhoea and constipation are symptoms commonly associated with HETF. Participants the Pentiuik et al. study. (8) reported a decreased incidence of constipation once established on a blended diet. Conversely, 21% of participants in the study by Batsis et al. (11) were reported to develop constipation following transition to blended diet, although this was treated with water and/or polyethylene glycol. Gallagher et al. (9) analysed participants stool samples before and after introduction of blended diet and found no change in stool frequency. However, the bacterial diversity of stool samples was significantly increased ($p=0.05$), while the relative abundance of harmful proteobacteria was decreased. Furthermore, parents perceived their child to be in less discomfort at six months after transition to blended diet. Hron et al. (10) reported a decreased incidence of abdominal pain and discomfort as well as a decreased incidence of diarrhoea. It is not fully understood why the introduction of a blended diet can have a positive effect on stool frequency and consistency although it has been proposed that the introduction of diverse fibre to the diet is the cause. Authors have also questioned the effect of long-term use of sterile enteral feeds on the gut microbiota (8) (9) (10) (11).

The findings of these cohort studies have been supported by survey studies (12) (13) (14) (15) (16) which have suggested blended diet is chosen by tube fed individuals and their families to manage adverse symptoms. Additionally, an improvement in gastrointestinal symptoms has been reported in both qualitative research and opinion pieces written by professionals working in the specialist field (17) (18) (19) (20) (21) (22) (23).

Qualitative research and professional opinion have reported further physical benefits such as brighter skin, glossy hair and growth of finger nails as well as perceived improved immunity to common illnesses (17) (18) (19) (22). Optimised tolerance is likely to have subsequent benefits for the tube fed individual including improved nutrient absorption which could explain these reports.

2.3 Perceived Social and Emotional Benefits

Social and emotional benefits of blended diet have also been identified. Since the use of gastrostomy feeding became common in the 1980s, concern has been raised that exclusively tube fed individuals are at risk of exclusion from social events centred on food (24). Qualitative research has reported that the use of

blended diet offers the opportunity for exclusively tube fed individuals to share the same foods as their family and friends (17) (18). In one in-depth study (18), parents of children and young people who are tube fed attributed particular significance to special occasions such as birthdays or Christmas. In addition, parents have reported blended diet to offer a *sense of normality* in comparison to commercially prepared enteral formula which is viewed as a medicine, this sense of normality was greatly prized by families (17) (18). The diversity of blended diet was also highly valued by the parents: unlike the uniformity of commercial enteral formula, blends vary in appearance, taste, smell and texture. Making a choice to use blended diet meant parents could pick from an array of ingredients and different foods, which they found to be empowering (18). Parents perceived commercial enteral formula to be a prescribed medicine; administering it felt like a nursing role (17) (18). In contrast use of blended diet was seen as 'real food' and matched more with expectations of their parenting role (17) (18). These qualitative studies have illustrated why participants in cohort studies and survey studies have reported a high level of satisfaction with blended diet.

2.4 Perceived Risks and Concerns

Blended diet has, in the past, been met with caution and some professionals have suggested it could be unsafe in comparison to commercially prepared enteral formulas. In 2017, in a review of the literature, Coad et al. (25) described three distinct professional opinions on the topic; those who see particular benefit, those who believe it is unsafe and substandard in comparison to commercial enteral formula and those who are cautious due to a lack of research evidence. It is unclear if the previously suggested risks of nutritional deficiency, feeding tube occlusion and infection are occurring with significant frequency in comparison to those using commercial enteral formula alone (1). Moreover, it is clear that many UK dietitians are currently supporting tube fed individuals and their families to use blended diet and to date, no incidences of harm have been attributed to blended diet. It has been suggested that it is more risky for families to attempt to use blended diet without the support and guidance of their dietitian (25). For this reason, the BDA Policy Statement was updated in 2019 to help create a culture where the use of blended diet can be openly discussed as a feeding option by the dietitian (1).

Blended diet has previously been described as a 'retrograde step' as blended foods were used in enteral feeding before the development of commercial enteral formulas (6). Evidence with a specific focus was lacking and because of this, the previous Practice Toolkit (6) drew primarily from studies where foods had been blended for use, in bulk, in an inpatient setting because commercially prepared enteral formula were either unavailable or unaffordable. It is difficult to extrapolate the findings of studies, where food blends have been prepared in bulk because commercial enteral formula is unavailable or unaffordable, to the popular practice outlined here, where HETF individuals and their families choose to blend, usually in their own home. The food ingredients differ as does the equipment available, furthermore, a HETF individual is usually medically stable. In recent years several papers have been published which have focused specifically on blended diet as a choice in HETF. For this reason, studies which have used food blends because commercial enteral formula are unavailable or unaffordable were excluded from the literature review and have not been referenced in the development of this updated Practice Toolkit.

3. Development of this Practice Toolkit

3.1 Funding

The development of this Practice Toolkit and the proceeding Policy Statement 'Use of Blended Diet with Enteral Feeding Tubes' (1) were jointly funded by the BDA Paediatric Specialist Group and the Parenteral and Enteral Nutrition Specialist Group (PENG).

3.2 Development of the Working Group

Dr Sarah Durnan and Alisa Kennedy were invited to chair. Expressions of interest were requested via the Paediatric Specialist Group, PENG and the Dietitians Interested in Special Children (DISC) Groups. Denise Kennedy, Ruth Stanley, Sarah Donohoe, Lucy Constable and Sian Thomas were selected due to their extensive experience with blended diet in clinical practice and in Sian's case her research interests in the topic.

3.3 The Development Process

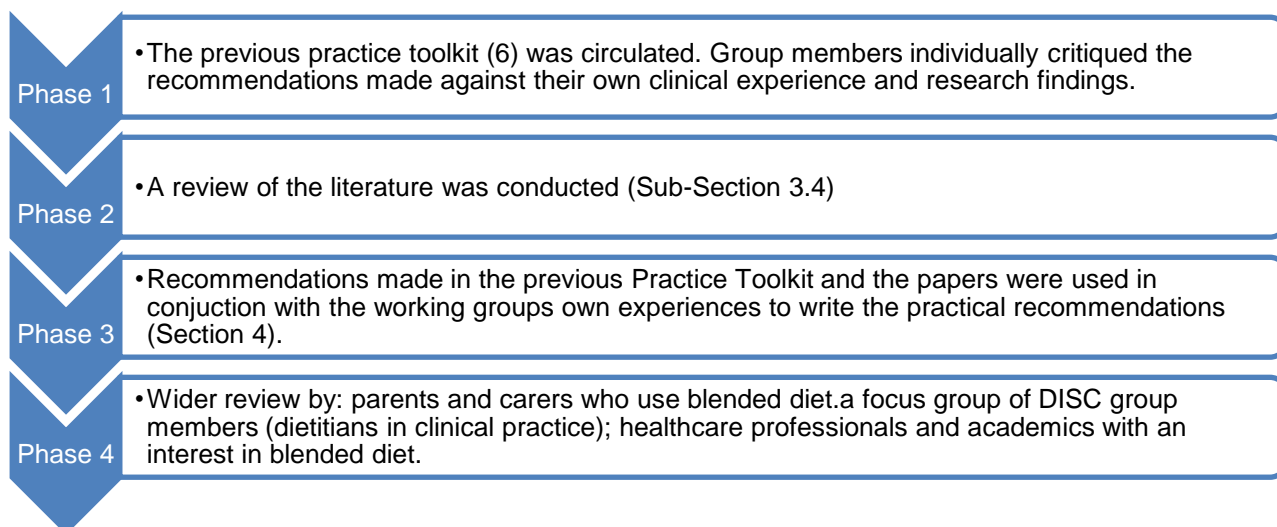


Figure 3.3.1 Illustrates the phases of the development process

3.4 Review of the Literature

A review of the literature was conducted in development of this Practice Toolkit. A search strategy was developed and inclusion criteria were set. The search focused specifically on papers which offered practical guidance. Quality was not used as a threshold for inclusion as lower quality papers could still provide valuable practical insight. In total n=24 papers met the inclusion criteria. The papers could be sub-divided into three broad categories: uncontrolled prospective cohort studies (n=2), professional opinion pieces written by expert clinicians in the field (n=14) and analysis of a particular aspect of blended diet under laboratory conditions (n= 8). Research methods were reported in n=10 papers with the remaining articles focused on professional experience, with individual case studies used as illustration. Articles originated from the UK (n=3), USA (n=17), and Canada (n=2), Brazil (n=1) and Thailand (n=1). A data extraction sheet was developed to record relevant information, identify agreement and controversy. The literature review will be published separately in a peer review academic journal.

4. Practical Recommendations

4.1 Deciding to Start Blended Diet: a Shared Decision

As the expert in enteral tube feeding, the dietitian should lead multi-professional discussions in relation to blended diet, in the best interests of the individual under their care. It is important to note, if a dietitian's employer (Trust or board) has a policy which specifically prohibits the use of blended diet, dietitians should adhere to it. The BDA Policy Statement (1) and this Practice Toolkit cannot supersede an employer's stated policy. However, dietitians may use the BDA Policy Statement (1) and the evidence contained within this updated Practice Toolkit to review policies in place.

Before starting blended diet, it is important to consider if blended diet is appropriate for the tube fed individual and their family. Previously, a risk assessment approach was advocated; the risk assessment tool has been adapted for use in a multitude of settings and is in widespread use across the UK (26). While it has been a useful tool which may have mitigated risk, at the point of publication there is no evidence to suggest these perceived risks are occurring regularly in practice. Furthermore, qualitative research has found the term 'risk assessment' can be a barrier to families receiving adequate support from their dietitian and other professionals (18). For this reason, this updated Practice Toolkit advocates the use of a shared decision-making approach to care, in line with current NICE guidance (27). It is recommended to obtain a copy of your employer's shared decision-making policy and discuss blended diet treatment planning using this approach within your own organisation (28). The shared decision should be justified and clearly documented in the individual's records by the dietitian, and MDT.

The aim of shared decision making is for the person and their healthcare professionals to work together to reach a joint decision and agree a plan of care. It involves ensuring that the tube fed person/parent(s)/carer(s) have a good understanding of the benefits and possible consequences of different options through discussion and information sharing. This means the dietitian has a responsibility to ensure tube fed individuals and their families receive all the individualised information they need to enable them to make an informed decision. This Section of the Practice Toolkit explores the considerations which are needed to inform the decision-making process.

Some types of enteral feeding tube are better suited to blended diet than others and the family may need to consider changing to an alternative feeding route or tube type, for example, gastrostomy feeding instead of nasogastric feeding (Sub-Section 4.2). Families may require additional ancillaries and to purchase equipment to enable them to blend (Sub-Section 4.3). The person(s) preparing the blended diet requires a good understanding of what constitutes a healthy well-balanced diet with age-appropriate portion sizes, or a willingness to learn with the support of a dietitian (Sub-Section 4.5). Also, the person(s) preparing the blended diet require a good understanding of food safety hygiene, or willingness to learn with support of a dietitian (Sub-Section 4.6). It may take several weeks to transition to a blended feeding plan (Sub-Section 4.7) and consideration should be given to how it will be administered (Sub-Section 4.8). A monitoring plan should be developed from the outset (Sub-Section 4.9). Tube fed individuals are often cared for in different

settings outside of the home and it should be contemplated how blended diet will be given in these settings and how staff will be trained; consideration should be given at the outset as to how the feeding plan will be managed in the event of a hospital admission (Sub-Section 4.10.2). Finally, the tube fed individual/parent(s)/carer(s) need to be empowered to plan and monitor the blended diet to meet the individual's nutritional goals. In our experience, families should have realistic expectations of the labour and financial cost involved although it should also be noted many parent(s)/carer(s) of tube fed individuals do find preparing blended diet to be highly rewarding.

The way in which the family plan to use blended diet should also be taken into consideration. As outlined in Section 2 there are many different ways in which blended diet can be used. Table 4.1.1 outlines different approaches that can be taken and the advantages and considerations of each approach. In reality families may use a combination of these approaches, for example, they may give a combination of blended food, commercial enteral formula and the tube fed individual may also eat orally. The way in which they blend may change over time, for example moving away from shop bought baby jars as an infant gets older or moving towards shop bought foods if circumstances change, for example if they have a new job and have less time to prepare a blend from scratch. It is critical that the dietitian works with the family and carers to understand what is desirable and realistic to produce an achievable individualised plan of care. (29) (30) (15) (23) (31) (32).

Table 4.1.1 Different approaches to blended diet with the advantages and considerations

Approach 1: Blended family meals	
Some or all tube feeds are replaced with blended family meals. Meals are portioned as if the tube fed individual were to eat the food orally.	
Advantages	Considerations
<ul style="list-style-type: none"> • The tube fed individual is able to share the same meals as the rest of the family. • Most food recipes can be adapted. • Occasional treats can be incorporated into a healthy well-balanced diet, for example, a portion of birthday cake. • Traditional tools used in dietetic assessment can be easily used to assess nutritional adequacy. • Portion control is easier as a suitable size meal is served out for the individual and then blended. 	<ul style="list-style-type: none"> • Education around balanced meals may be required. • The individual may require adaptations to the family diet due to their medical condition. For e.g. food fortification or avoidance of certain foods due to allergies. • It may take some time to transition fully to a blended diet (Sub-Section 4.7). • Portion sizes of different meals may vary depending on the volume of fluid needed to blend.

Approach 2: Batch cooking and blending of meals	
<p>Some or all tube feeds are replaced with blended meals prepared in advance. Meals are cooked specifically for the tube fed individual, portioned and stored safely in the fridge or freezer for use at a later date.</p>	
Advantages	Considerations
<ul style="list-style-type: none"> • The tube fed individual is able to have a home-prepared suitable meal at any time. • Blends can be made tailored to the individual's needs, for e.g. high calorie. • Occasional treats can be incorporated into a healthy well-balanced diet, for e.g. a portion of birthday cake. • Traditional tools used in dietetic assessment can be easily used to assess nutritional adequacy. • Portion control is managed in advance. 	<ul style="list-style-type: none"> • Education around balanced meals may be required. • Allows easier adaptations to the family diet/recipes due to their medical condition, for example food fortification, avoidance of certain foods due to allergies. • It may take some time to transition fully to a blended diet (Sub-Section 4.7). • Requires dedicated time and planning to achieve, along with sufficient safe storage capacity, for e.g. a freezer. • Safe defrosting and reheating is needed. • Additional fluid to loosen the blend may be needed after defrosting.

Approach 3: A set recipe approach	
<p>A limited set of recipes are used to create a blended diet</p>	
Advantages	Considerations
<ul style="list-style-type: none"> • For the management of disease such as metabolic conditions or ketogenic diet for management of epilepsy or when the variety of foods is restricted due to multiple allergies. 	<ul style="list-style-type: none"> • The variety and choice are much reduced, detailed dietary analysis is required to ensure the recipe(s) meet nutritional requirements.

Approach 4: Blended diet used in combination with oral intake	
<p>The tube fed individual is able to safely eat orally, although is not able to meet full requirement. The remainder of the meal or snack is blended to appropriate consistency and given via the enteral feeding tube.</p>	
Advantages	Considerations
<ul style="list-style-type: none"> • The individual can attempt food orally, a liquid can be added and the remaining meal blended and administered via the enteral feeding tube. • In instances where a pureed texture is required for oral intake, the meal may not require much further dilution for administration via a feeding tube. 	<ul style="list-style-type: none"> • The dietitian should be aware of any recommendation made by a dysphagia-trained speech and language therapist. • The person preparing the blend should be aware of recommended portion sizes for the individual. • The person administering the blend should observe for signs they are too full, for e.g. distention, bloating, retching and discomfort. • Care should be taken to ensure the meal is not at room temperature for periods >2hrs for e.g. when oral feeding is slow.

Approach 5: A blended diet is used in combination with commercial enteral formula

Food is blended together with a commercially prepared enteral formula. Alternatively, boluses of blended food are given through the day and a commercial enteral formula is given at a separate time as a ‘top up’, for e.g. as an overnight feed via a feeding pump.

Advantages	Considerations
<ul style="list-style-type: none"> • Provides ultimate flexibility - best of both. • A small amount of blended food added to commercial enteral formula may be sufficient to see beneficial effect on symptoms of reflux, retching and vomiting and stool pattern. • Commercial enteral formula can be used in different care settings outside of the home. • Specialised products can be incorporated into blends, for e.g. MCT oil in ketogenic diet. 	<ul style="list-style-type: none"> • Some individuals are not able to tolerate commercial enteral formula. • The volume of commercial enteral formula may not be nutritionally complete - it is necessary to calculate how much commercial enteral formula contributes to intake alongside the blended diet.

Approach 6: Shop brought pre-packaged foods are used

This can include baby food jars, fruit pouches, yoghurts, smoothies and milkshakes.

Advantages	Considerations
<ul style="list-style-type: none"> • Allows a trial of blended diet before investing in equipment. • Particularly useful in infants around the age of six months where blended diet is used as complementary feeding (Sub-Section 4.6.1). • Convenience. • May be used as a ‘back-up’ plan on occasion for e.g. in the school or respite care setting (Sub-Section 4.10). 	<ul style="list-style-type: none"> • Products may be high in salt and sugar. • Commercially prepacked blends designed for use with enteral tube feeding are not currently available in the UK. Parents/carer may choose to import these, but this is costly. • Long term reliance may not meet full nutritional requirements. • Some of this food is low in energy so may not be suitable for older children for e.g. baby food pouches.

SUGGESTED GOOD PRACTICE – Deciding to Start Blended Diet: a Shared Decision

Key points to consider:

1. The tube-fed individual's medical condition and any special dietary requirements.
2. Whether the family have support from their wider family/friends.
3. The type of enteral feeding tube used (Sub-Section 4.2).
4. Any additional ancillaries (Sub-Section 4.3).
5. Storage equipment available (Sub-Section 4.4).
6. The person preparing the blends current level of understanding with regard to nutrition (Sub-Section 4.5) and food hygiene (Sub-Section 4.6).
7. How they will move onto blended diet from their current feeding plan (Sub-Section 4.7).
8. How blended diet will be administered (Sub-Section 4.8).
9. How blended diet will be monitored alongside patient/parent(s)/carer(s) (Sub-Section 4.9).
10. How staff in education, respite care and acute settings will feed the individual and the training implication and delegation of practice to non-healthcare professionals (Sub-Section 4.10).
11. The type of approach to blended diet the family intend to use both in the short and medium term (Table 4.1.1).

4.2 Type of Enteral Feeding Tube

This Section explores best practice in the types of tubes used to give blended diet to children and adults. There are many different enteral feeding tubes available in the UK. Blended diet administration is likely to be easier with some enteral feeding tubes in comparison to others (1). Two manufacturers which supply the UK market do specifically state that it is possible to administer a blended diet via their enteral devices. However, the majority of manufacturer's information for use (IFU) guidance states that only enteral feeding products defined as foods for special medical purposes and water should be administered. The impact of not following the IFU would be that manufacturer warranty would not apply in the event of failure. It is of note that medicines are often prescribed to be given via enteral tube route when licenced to be administered as liquid medication to be given orally. Therefore, dietitians should take into consideration individual manufacturer's IFU guidance, but this should not be the only factor in the final shared decision.

4.2.1 Gastrostomy

Blended diet is used primarily in gastrostomy feeding which provides a direct route to the stomach. The majority of papers found when reviewing the literature had a primary focus on blended diet use with gastrostomy feeding.

A mature stoma is recommended by authors in the literature reviewed, (9) (33) (34) (31) (19) (35). Epp (33) provided a rationale for this recommendation: if the tube does become blocked, it can be changed without potential surgical complications. However, no timescale is given for the stoma to be deemed 'mature'. In the Gallagher study (9) an inclusion criterion was that the tube had been in situ for a period of at least three months. Epp (34) also acknowledged that blended diet may be beneficial at initial gastrostomy placement and should be considered on an individual basis. An article centred on the provision of blended diet in three acute US hospitals, offered the opinion that a newly placed feeding tube is appropriate for blended diet. In our experience, most nutrition nurses would not change a gastrostomy in the community setting until the tract has healed, which is usually 8-12 weeks post insertion. Ideally a decision as to when to start blended diet using a new gastrostomy stoma should be multi-disciplinary, involving the surgeon or gastroenterologist who placed the tube and the community or stoma nurse responsible for the ongoing care of the tube. These healthcare professionals are best placed to support the dietitian in assessing the risk/benefit of blended diet versus the complications of gastrostomy tube change due to blockage in a non-mature stoma. Gastrostomy placement might be done in tertiary hospitals away from local community services, and in these cases experienced community dietitians working alongside community nurses are likely to lead care for the stoma and device change. If blended diet has been discussed in advance of a gastrostomy being placed, it may be advantageous for the local dietitian to communicate with the surgical team to ensure the most suitable tube is used.

Gastrostomy tubes are available in a range of diameters measured in French Gauge (Fr). Several papers recommended a tube at least $\geq 14\text{Fr}$. (36) (19) (13) (29) (32) (37) (38) (30) (29). However, there is a lack of explanation into how these opinions have been formed. Three papers suggested that using $\geq 14\text{Fr}$ tubes helped to avoid tube blockage and improved ease of administration (31) (20) (35). Some authors have even

suggested a ≤ 14 Fr tube was a contraindication to blended diet use (39) (40). However, others indicated blended diet use is possible, if not more challenging, using a narrower tube (41) (21) (33) (20). 85% of the participants given blended diet in the study by Gallagher et al. (9) had a 12Fr gastrostomy tube. Additionally, Brown (22) reported the majority of children and young people in receipt of blended diet at the hospice had a 12Fr tube with the smallest tube being 9Fr. A recent laboratory-based study into the prevalence of tube blockages with a single blend administered into 14Fr, 12Fr and 10Fr gastrostomy tubes found that after 27 administrations no blockage occurred in the 14Fr tube and blockages occurred only twice in the smaller tubes. These blockages were cleared with a single water flush (36). A US lab analysis study found narrower tubes required an increased force in comparison to larger bore tube. However, it was not clear if the additional force required caused any damage to the tube (42). In our clinical experience, the majority of tube fed individuals in the UK who use blended diet have a 12Fr tube. If a family are interested in blended diet prior to tube placement it may be beneficial to place a larger diameter tube to facilitate blended diet. However, it is not necessary to increase the diameter of an existing stoma (for example dilating a 12Fr stoma up to 14Fr). If a low-profile device is placed the limiting factor will be the narrowest point of the extension set, so French size is irrelevant. Blended diet can be used with a narrower tube, but the blend needs to be a thinner consistency and this may negate some of the positive effects on reflux, retching and vomiting which are thought to be attributed to the higher viscosity of the blend (Sub-Section 2.2). With finer bore tubes, the dietitian should advise on additional precautionary actions such as the addition of more liquid, which may impact on the overall nutritional content (Sub-Section 4.5), flushing the tube and local policy for unblocking enteral feeding devices.

There is little discussion in the literature as to whether a balloon or disc retained tube should be used. One professional opinion paper which focused on providing practical guidelines for provision of blended diet in a hospice setting, suggested balloon retained gastrostomies are preferable as they can be replaced readily in the community if tube occlusion should occur. However, the author acknowledged that blended diet can be provided via disc retained devices if the person/parent(s)/carer(s) are fully aware of the implications such as the need for hospital admissions for replacement (22). In our opinion, disc retained gastrostomy tubes are not contraindicated if there is a clear plan in place as to how the tube fed individual would receive nutrition, fluid and medication in the event of occlusion. The person/parent(s)/carer(s) should be taught that regular water flushes are essential to prevent occlusion. The medical intervention required to replace the tube in the event of tube occlusion should be made clear, this is good practice in general for HETF as tube occlusion due to medication administration is common.

4.2.2 Nasogastric Tubes

There is limited discussion of blended diet use with nasogastric tubes (NGT) in the literature. Walia et al. suggested blended diet is contraindicated in NGT fed individuals but offered no reasoning for this statement (30). The use of an 8Fr NGT to provide blended diet in the acute setting is referenced by one paper (34). As with a narrow gastrostomy tube, a thinner dilution may negate some of the positive effects on reflux, retching and vomiting which are thought to be attributed to the higher viscosity of the blended diet compared to commercial enteral formula (Section 2). Another consideration is the higher pressure required to deliver blended diet via narrower tubes (42). NGT are both thinner and longer than gastrostomy tubes and any

splitting of the tube above the epiglottis could lead to aspiration. This group has limited experience of using blended diet in nasogastric feeding and would not advocate this practice. Consultation with DISC suggests this is far from common practice. We would caution against using blended diet with nasogastric feeding tubes (27).

4.2.3 Post-Pyloric Feeding

Most authors suggested post-pyloric feeding is a contraindication to blended diet use (40) (21) (39) (43) (44) (20) (19) (30) (29). The majority of these are professional opinion articles and many do not elaborate the reasoning, however, one rationale is the bypassing the gastric phase of digestion and gastric acid which protects against infection. Additionally, post-pyloric feeding is usually delivered at a slow rate per hour as the jejunum does not have the same storage capacity as the stomach. Epp et al. (34) added that the osmolality of blended diet may be too high for post-pyloric feeding. In the same paper, however, the authors make reference to anecdotal reports of tolerance in this group. Bobo and Stone and Escuro both advised that any attempt to give blended diet via the jejunum must have medical approval and administration should be very slow (41) (31). Blockage of a jejunal device will require a medical procedure to replace. This group does not have experience of using blended diet in jejunal feeding and in wider consultation this is far from common practice. We would caution against using blended diet with jejunal feeding tubes.

4.2.4 Gastro-Jejunostomy Tubes

There is limited mention of use of gastro-jejunal tubes in the literature. Only Gallagher et al. mentioned gastro-jejunal tubes as a specific exclusion criterion in their cohort study (9). Gastro-jejunal tubes may provide a means to use a combination of commercial enteral formula via the jejunum and blended diet via the gastric port. In our experience, an increasing number of HETF people are having gastro-jejunostomy tubes to help manage enteral feed and gastric volume intolerance. Some of the authors of this Practice Toolkit have had success in supporting individuals who have gastro-jejunal tube to use blended diet via the gastric port, in addition to commercial enteral formula slowly overnight via the jejunal port. Due to these products having two internal lumens the diameter of the gastric tube is reduced. Therefore, it is beneficial to consider providing blends that are less viscous to help prevent tube blockage. It should be highlighted that these tubes are complex to replace. It is essential the patient/parent(s)/carer(s), as part of the shared decision making process (which should include the medical team), are made fully aware that, if the tube blocks, medical intervention will be required for tube replacement

SUGGESTED GOOD PRACTICE – Type of Enteral Feeding Tube

1. The type of tube the individual has will help form decisions about the suitability of blended diet and the dietitian should check the manufacturer's instructions for use (IFU) with respect to the use of blended diet, however, this is not the only factor in the final decision.
2. A gastrostomy tube is preferable for use with blended diet.
3. The diameter of the tube should ideally be $\geq 12\text{Fr}$. It is possible to use blended diet with a narrower tube but a thinner consistency of blend is likely to be required.
4. A balloon retained gastrostomy tube is preferable as patient/parent(s)/carer(s) can be trained to change these themselves in the community.
5. If a disc retained device is used with blended diet, a plan should be made with the MDT as to how the individual will receive nutrition, fluid and medication if the tube were to be blocked and how it will be replaced.
6. It is possible to provide blended diet via the gastric port of a gastro-jejunal tube although the jejunal extension means the lumen is narrower. A plan should be made with the MDT as to how nutrition, fluid and medication would be provided if the tube were to be blocked and how it will be replaced.
7. It is not common practice to use blended diet with nasogastric or post pyloric tubes and is likely to be less safe than gastrostomy feeding. Alternative tubes should be considered if the family wish to use blended diet.
8. Parents/carers should be advised to flush the feeding tube with water to minimise risk of tube occlusion.
9. A mature gastrostomy stoma, generally 8 – 12 weeks after insertion, is advised due to the risks of changing a blocked gastrostomy tube in an unformed tract.

4.3 Ancillaries

This Sub-Section reviews what additional ancillaries are required for giving blended diet, over and above HETF using commercial enteral formula. In addition to the enteral feeding tube itself, ancillaries such as enteral syringes are needed for HETF. Few authors in the literature make reference to ancillaries. Epp et al. (34) suggested new EnFit connections may result in slower flow rate in comparison to legacy syringes. However, Mundi (42) found this was not a problem with a plunge or pump technique (Sub-Section 4.8). Epp (33) suggested O-ring syringes may be beneficial for families who administer blended diet using a slow plunge technique (Sub-Section 4.8). For those fed via a low-profile device, some of the authors recommended a straight (bolus) extension set as the right-angle set may be more likely to block, in some cases the use of this style of extension set provides an additional safety point as is easily replaced if becomes blocked. Two authors suggested blended diet may result in increased wear of ancillaries as oils can degrade plastic. In our experience, some families do report this; audit of ancillary usage in clinical practice would be beneficial.

SUGGESTED GOOD PRACTICE – Ancillaries

1. Tube fed individuals who are fed using blended diet should be provided with ancillaries as per local policy for bolus fed HETF. Additional syringes or a change to O-ring syringes may be required.

4.4 Equipment

This Sub-Section looks at additional equipment needed to implement a blended diet that is not required for HETF using commercial enteral formula. Blenders are considered an essential piece of equipment in provision of blended diet. It should be highlighted, it is possible to provide a blended diet using shop bought baby food jars and pouches; this can be particularly useful when first starting blended diet, allowing a trial without the expense (15) (16) (31) (38). However, investing in a blender will allow a greater variety of foods to be used in the diet. Several authors advised that a high-powered blender such as a Vitamix® or Blendtec® are preferable; these are expensive (41) (21) (33) (34) (9) (39) (43) (30) (35). Conversely, Novak et al. (19) suggested many families use a '\$50 bullet' with success. Furthermore, Escuro (31) and Zettle (29) both suggested blended diet is possible with a stick blender although Escuro advised a sieve should be used in addition to remove any lumps. Interestingly, in laboratory analysis Madden et al. (36) found the higher powered blender produced the thickest blend and use of a stick blender did not increase the risk of tube blockage. In another laboratory analysis Guha et al. (37) found the powerful blenders did not reduce viscosity but did result in finer particles. The length of time spent blending was considered to be of more importance than the wattage (and also price): the viscosity was reduced with a blend time of at least 2 minutes. Mundi et al. (42) suggested a blending time of between 3-6 minutes. In our experience choice of blender depends on the families' circumstances and the way in which they are choosing to blend. Numerous blenders are available in the UK as Table 4.4.1 summarises. There may be charitable funds available to fund purchase.

Table 4.4.1: Examples of blenders available on the UK market; advantages and disadvantages

Type/Style of Blender	Advantages	Disadvantages
Stick Blender	Inexpensive. Easy to use. Easy to clean.	Typically, low power. Some foods are less easy to blend (e.g. seeds, nuts). Mainly small volumes. May be messy. A good container required to blend in. It may be necessary to use a sieve in addition.
Mid-Range e.g. NutriBullet®, Nutri Ninja®	Mid-price range. Easy to use. Easy to clean. Best for blending meal by meal. Best with small volumes.	Likely not large enough for batch blending. Durability.
Commercial blenders e.g. Vitamix®, Omniblend®, BlendTec®, Oster®	Powerful – will blend most foods. Good for batch blending and large quantities. Many have self-clean settings. Long product guarantees. Durable.	Can be very noisy. High initial cost.

Other equipment may be useful for preparing blended diet. Escuro (31) suggested a sieve is needed if blending using a stick blender. However, Madden et al. (36) found that sieving resulted in loss of nutrients

and wastage; the sieve may also be a source of microbial contamination and is difficult to clean. Brown (22) suggested the use of a metal sieve with holes ≤ 1 mm diameter, particularly when administering blends through finer bore tubes. In our experience, sieves may be useful when first starting blended diet, but are less likely to be needed in the longer term when the person preparing the blend is accustomed to achieving the correct consistency. Madden et al. (36) proposed sieving was unnecessary because the risk of tube blockage was not increased with un-sieved blends; however, only one hypothetical blend was tested. There may be circumstances where a sieve is needed in the longer term, for example when using a stick blender, a fine bore enteral feeding tube (Sub-Section 4.2), an automated feeding pump (Sub-Section 4.8), or when food ingredients such as pips, seeds, grains, fibrous vegetables or tough meats are incorporated in blends.

Additional equipment referenced in the literature which may be useful included storage containers, a food thermometer, additional fridge or freezer space and weighing scales (33) (19) (31). In our experience, these items are not essential but make blending an easier experience.

SUGGESED GOOD PRACTICE – Equipment

1. Blended diet can be trialled first without buying a blender by the use of commercial baby food purees or with an inexpensive stick blender.
2. The purchase of a more powerful blender will increase the variety of foods which can be incorporated in the diet and enable batch blending.
3. The length of time blending is more important to achieve the correct consistency than the wattage (power) and many families manage with a mid-range blender.
4. Sieving gives confidence when starting blended diet, when a finer bore tube is used, or with difficult to blend foods such as foods with pips, seeds and grains. If required a metal, easy to clean fine (holes < 1 mm) mesh sieve should be used. However, use of a sieve in the longer term is usually not needed with experience of blending and can reduce overall nutritional value of the blends.
5. Additional equipment is not essential but may make the experience easier.

4.5 Nutritional Adequacy

In this Sub-Section the various nutritional considerations relating to blended diet are explored. The nutritional adequacy of blended diet has in the past been raised as a concern (Sub-Section 2.4). Commercial enteral formula has a consistent nutritional content in a prescribed volume. The nutritional content of a blended diet on the other hand is variable, depending on the food ingredients used in the blend. The nutritional adequacy of the blend is therefore dependent wholly on the food choices made by the person preparing the blend. Most of the papers included in the review emphasised the importance of support from a dietitian, in particular when first starting blended diet (31) (9) (19) (29). In our experience, when using blended diet, everyday decisions on the food ingredients and quantities used becomes the responsibility of the person preparing the blend usually the parent(s)/carer(s) and not the dietitian. We recommend the dietitian should use their knowledge and skills, as an expert in food and nutrition, to support and advise those preparing blends to enable them to make menu choices which best suit the nutritional needs of the tube fed individual. The level of education and dietetic input needed should be tailored to the individual needs of the family.

4.5.1 Energy Requirements

Estimated energy requirements are usually calculated as part of any dietetic assessment. Most of the included literature emphasised the dietitian should calculate energy requirement, in respect of the tube fed individual's age and medical condition (19) (38) (30) (29). This can be done using prediction equations such as those in the Great Ormond Street Hospital (GOSH) (45) or Parenteral and Enteral Nutrition Group (PENG) handbooks (46). Due consideration needs to be given to non-mobile children or adults as their energy requirements may be much lower than mobile individuals. Walia et al. (30) advised the energy prescription can be divided into 3 meals per day. However, depending on tolerance, it may be more appropriate to offer 4-7 (four meals and two to three snacks). Research has shown that snacking can provide a sizeable proportion of a total energy intake of children (47) (48) (49) and a little and often approach is often used in dietetic practice when there are tolerance issues. In an observational cohort study, Gallagher et al. (9), reported more energy was required to maintain weight on a blended diet (approximately 150% of that of formula). However the authors commented that a reduced energy intake may be a benefit as it results in less excess storage of adipose tissue. Mortenson (20) pointed out that adequacy of energy intake needs to be observed and adjusted following monitoring. In our experience, prediction requirements are a guide and should be used alongside a robust monitoring plan (Sub-Section 4.9). Weight and weight distribution should dictate how the dietitian adapts the dietetic treatment goal to meet the individual's needs. If the individual has been tube fed using a commercial enteral formula previously and has been weight-stable or tracking centiles for age, it may be more practical to match their current intake rather than aim to meet energy prediction requirements, monitoring and adjusting as required moving forward.

4.5.2 Energy Density

It is difficult to calculate the energy density (kcal/ml) of blends, as unlike commercial enteral formula this is not uniform. Commercial enteral formulas have a standardised energy per ml density ranging from 0.6kcal/ml to 2.4kcal/ml with 1.0kcal/ml or 1.5kcal/ml being the most commonly used. Bobo and Stone (41) and Epp (33) estimated blends to range between 0.8 – 1.0kcal/ml. However, there is likely to be more variation than this depending on the different food ingredients and quantity of liquid used. In a laboratory analysis, Weston

and Clarke (50) found between 0-270ml of added liquid was required to achieve a viscosity to administer by tube. Weston and Clarke suggested the International Dysphagia Diet Standardisation Initiative (IDDSI) may be an easy-to-use tool in communicating the required viscosity (50) (Appendix 10). It is suggested to aim for IDDSI level 1 to 3, although sometimes level 4 could be given. In smaller bore tubes it is likely that IDDSI level 1 or 2 would be all that can be administered. Across different care settings, blends ranged from mildly, moderately to extremely thick (50). Brown (22) suggested aiming for a smooth, single cream consistency. Rather than prescribe a given volume of blends, it is more useful to provide a daily energy and protein guide (Sub-Section 4.5.1 and 4.5.4), alongside advice on the required viscosity. In practice, it is usually not necessary to calculate energy density per ml. for the dietitian or the person/parent(s)/carer(s).

Volume tolerance may be a problem for some tube fed individuals embarking on a blended diet, particularly children. Johnson et al. (14) advised if a child or young person is unable to tolerate 900ml in 24 hours they are not a good candidate for blended diet. One way to overcome this is the use of higher energy liquids such as full cream milk or commercial enteral formula. In addition, Weeks (35) pointed out blends can be fortified to increase the overall energy content, they suggested using ingredients such as honey, maple syrup, black molasses or oil as easy supplementation. In our experience, the principles of fortification in blended diet are the same as food fortification for an oral eater. The dietitian can advise on higher energy food ingredients which can be added to boost energy density in a small volume. Several papers have suggested tube fed individuals are able to tolerate a larger volume of blended diet in comparison to the same volume of commercial enteral formula (8) (10) (11) (19) (39) (9). In our experience, poor volume tolerance of commercial enteral formula is not a barrier. Conversely, blended diet can improve volume tolerance when used in combination with commercial enteral formula.

4.5.3 Hydration

Hydration is an important and often overlooked aspect of nutritional adequacy. In the literature, O'Flaherty et al., (38) Zettle (29) and Epp (33) advised to assume blends contain approximately 70–75% fluid and suggested this figure can be used as a guide to estimate total daily fluid intake. Dietitians should calculate the total fluid requirement for the individual based on age and weight, including any individual considerations due to the medical condition, metabolic response and losses (45) (46). Fluctuations in ambient temperature must be taken into account. Water flushes given to keep the tube patent before and after feeding and medication administration should also count toward the daily total. As with energy, prediction requirements are a guide and should be used alongside a robust monitoring plan. The dietitian should advise how to monitor for signs of dehydration, for example, decreased or dark urine output. The water used in blends and as water flushes should be freshly drawn, drinking tap water.

Some parents report giving a bolus of water around 30 minutes prior to giving a blend. This is to improve tolerance of the blend and will also assist with ensuring adequate hydration. For example one of the parents consulted in the development of this Practice Toolkit reported giving 300mls before each feed. We have found no evidence to support this practice, however, accept that in some tube-fed individuals it may improve tolerance and could be a useful way to ensure adequate fluid intake.

4.5.4 Macronutrients

It is important tube fed individuals receive adequate macronutrients (protein, carbohydrate and fat) to meet their needs. In the literature (9) (29) (31), papers recommended setting goals based on current national public health recommendations. In the UK this would be the Eatwell Guide (51). In a laboratory analysis Madden et al. (36) devised a recipe for an adult male which achieved a balance of 48% carbohydrate, 35% fat and 10% protein in 2142kcal. For practicality, the dietitian should look to see if the blends are meeting individual protein, fat and carbohydrate ratios per day (or several days) rather than per blend, which would be more difficult to achieve. An advantage of using blended diet is that macronutrients can be adjusted to tolerance, for example, giving additional fat to provide calories if tolerated or giving additional starchy carbohydrate if thicker blends have helped reduce reflux.

Epp (33) suggested the use of fat, protein and carbohydrate exchanges could be useful tools to ensure all food groups are provided, while giving choice and flexibility in recipe design. O'Flaherty et al. (38) suggested lean sources of protein and unsaturated fat should be the preference, in line with healthy eating advice. Gallagher et al., (9) and Milton et al. (44) pointed out blended diet is an opportunity to increase the protein, and fruit and vegetable content of the diet. In our experience, a healthy well balanced blended diet can be achieved by educating using general healthy eating advice; this can be an opportunity to encourage other members of the household to eat a healthier diet also. The UK Eatwell guide (51) can be used as a starting point to suggest how a blended diet should initially be constructed: a variety of foods should be offered from each of the four main food groups. Dietitians should also advise on portion size appropriate for the age of individual. Healthy eating advice may need to be modified due to a special dietary requirement, for example, high energy requirements, allergies, ketogenic diet for epilepsy, or metabolic conditions where macronutrient ratios may need to be altered.

Practically, start by checking protein intake as it can be easy to under or overestimate the tube fed individual's requirement. Blending starchy carbohydrates can have a significant thickening effect which then requires additional fluid to produce a suitable consistency. Some blends will also thicken on standing or storage. This may limit the quantity of starchy carbohydrates that can be given. Tips from parents and carers include blending cereals dry before adding the liquid, and toasting bread before blending. If additional fats and oils are added to boost energy they may separate out from the blend when stored; some families therefore choose to store blends without oil and add it in just prior to administration to avoid separation. Emulsified forms of fats are less prone to separation.

4.5.5 Fibre

Fibre is important for long term gastro intestinal health. The increased and diverse fibre content of blended diet in comparison to commercial enteral formula has been proposed as a reason why blended diet can have benefit on stool frequency and consistency (Sub-Section 2.2). However, addition of fibre can also cause loose stools and constipation (52). In our experience, individual reactions to changes in fibre intake are variable and unpredictable. Duperret, Trautlein and Dunn Klein (21) highlighted the importance of introducing fibre gradually, to develop tolerance, which is a sensible approach. Therefore, aim initially to match the

individual's previous fibre intake, then gradually increase variety and to recommendations for amount for age if tolerated and not contraindicated by a medical condition.

4.5.6 Micronutrients

It is important to consider the micronutrient content of the diet for long-term health and wellbeing. Several of the papers (23) (29) (31) (41) suggested there could be risk of micronutrient deficiency when using blended diet, highlighting the importance of dietetic assessment but did not advise how often this should be done. Conversely, Gallagher (9) and Novak et al. (19) suggested blended diet can have a better micronutrient profile in comparison to commercial enteral formula if the principles of healthy eating are applied. Novak et al. (19) pointed out it is possible to include more trace minerals and phytonutrients in a blended diet which are missing from commercial enteral formula. Use of commercial enteral formula is not free from risk of micronutrient deficiencies. In another cross-sectional study of 64 children (53), mean age 6.8 years, who received more than 50% of their nutrition enterally as commercial enteral formula, 19% were found to have iron deficiency and 81% low zinc levels in both plasma and erythrocytes.

Micronutrient deficiencies are common in the general oral eating population and therefore it could be argued equally likely for families choosing foods to blend (54). Dietary analysis has been suggested as a way in which the dietitian can check the nutritional adequacy of blended diet. Bobo and Stone (41) recommended families keep a detailed food diary which is analysed by the dietitian using a food composition database. In clinical practice, there is often debate over how frequently this should be done. It would be impractical and time consuming to do this frequently for every tube fed individual using blended diet, especially given its increasing popularity. Detailed dietary analysis using food composition database provides only a snapshot. However, whether the blend(s) were nutritionally adequate over a given period, it does not guarantee subsequent days' blends would also be nutritionally adequate. In our experience, a more subjective approach can be used, dietetic skills such as 24-hour recall can assess if a variety of food from the different food groups are being incorporated, particularly when families have been using blended diet for a long time. In the longer term, detailed quantitative dietary analysis may be of particular benefit if the tube fed individual is following a blended specialised diet for the management of a medical condition, (for example, a ketogenic diet), or is omitting multiple foods due to severe allergies, or as indicated by growth or weight monitoring.

There has been debate as to whether tube fed individuals on blended diet should be routinely supplemented with micronutrients. Epp (33) advised that if a variety of foods are used, a multivitamin is not required. However, other authors suggested certain micronutrients were of particular concern. Vitamin D was low in the laboratory analysis by Madden et al. (36). Zettle (29) also raised vitamin D as a concern and suggested the liquid base of the blend should ideally be enriched with calcium and vitamin D to counter this. In the UK it is generally accepted that it is difficult to achieve a sufficient dietary intake of vitamin D through food, with sunshine being the major source in the summer, so supplementation is recommended in the winter months (55). Other micronutrients discussed in the literature included sodium, potassium, iron, and selenium, although authors commented that correction was relatively straightforward using a multivitamin and mineral supplement. In our experience, routine supplementation of micronutrients is not required for individuals

receiving a blended diet. However, blended diet can easily be supplemented if there is a particular concern for an individual nutrient.

All food processing will have an impact upon nutrient content and bioavailability, but there is no evidence of either increased or decreased requirements amongst individuals on blended diet, beyond changes as a result of their medical condition. Assuming a good variety of food is provided there is no theoretical reason for requiring a higher level of micronutrients generally.

The powerful blenders which are often used to make blends can yield very fine particulates and increase nutrient and phytochemical bioavailability compared to chewing alone. This has been demonstrated for certain nutrients and foods (56) where high performance liquid chromatography was used to look at the effect of blenders on release of total phenolic compounds from carrots and blueberries. Carrots blended released significantly greater beta-carotene than their chopped counterparts, presumably by breaking down cell walls of plants very efficiently. This has been demonstrated (57) in plasma levels in a study of 77 children with severe learning difficulty where serum carotenoid level was inversely related to particulate size of food. Consequences of this have been seen with beta-carotene in practice, where a child who was on a large intake of colourful fruit and vegetables started to demonstrate signs of carotenaemia, including orange colouring on the palms of the hands, soles of the feet and creases around the nose. McGowan et al. (58) reported that carotenaemia is common and benign, they reviewed 31 children who attended a children's hospital and 87% of the cases were diet related. Carotenaemia is easily treated by reducing the intake of beta-carotene (59).

From the evidence and from professional experience, the group do not think routine supplementation of micronutrients is required for tube fed individuals, other than following national recommendations for supplementation in particular age groups. However, it is important that dietitians assess dietary adequacy and consider the need for an increased intake of micronutrients on an individual basis. This could be on a general basis in a restricted diet (multivitamin) or on a more targeted basis (e.g. iron or calcium). Care should be taken to ensure the tube fed individual is not receiving large doses of particular micronutrients, for example carotenoids.

The previous Practice Toolkit (6) referred to theoretical potential health risks of high doses of plant iron on bowel health, and of glucosinolates on thyroid function, caused by breakdown of plant cell walls by high powered blenders. We are not aware of any further research or recorded problems in these areas. For this reason, ensuring an intake of varied plant materials may be best practice in a blended diet, avoiding reliance on any one particular food.

There is no requirement for any 'special' food supplements to be used in a blended diet. Everyday household food ingredients should be used. As a group we have been asked about a wide variety of 'health' supplements, including spirulina, algae, bone broth, coconut water, maca, wheatgrass and royal jelly. Besides being expensive, there is usually little evidence for the health claims made, and there could be risks of toxicity if used in large quantities.

SUGGESTED GOOD PRACTICE– Nutritional Adequacy

1. The dietitian should estimate the individual's energy and protein requirements and provide a daily guide, taking into consideration the individual's age, medical condition and energy expenditure.
2. Delivery of the total energy requirement can be split and may be met using a combination of commercial enteral formula and blends. If meeting full requirements using blended diet the daily guide can be split over 3-7 blends (breakfast, lunch, dinner, (supper) and 2 to 3 snacks, depending on the individual's volume tolerance per feed and at different times of day.
3. Blended diet does not have a uniform energy density unlike commercial enteral formula. Rather than prescribe a volume of blended diet it is more helpful to advise on a daily energy and protein guide and advise on blend consistency (IDDSI can be used).
4. Care should be taken to ensure hydration needs are met. Teach parent(s)/carer(s) about fluid requirements, how to meet this need and how to monitor for adequate hydration.
5. Dietitians should educate parents/carers on healthy eating and age-appropriate portion sizes using government recommendations for the general public.
6. Families should be advised to include a wide variety of foods from each of the four person/parent(s)/carer(s) main food groups.
7. Sudden changes to fibre intake can have an adverse effect on bowel habit. Increase fibre slowly to tolerance and ensure sufficient fluid is given alongside.
8. Routine micronutrient supplementation is not required with the exception of vitamin D. Follow national public health guidance unless there is reason determined by the individual's diagnosis, treatment, blood biochemistry or dietary analysis which indicates supplementation is needed. If parents wish to give vitamin and/or mineral supplements suggest a product with a balanced nutrient profile to avoid giving high dose supplements of any one particular micronutrient.

4.6 Food Safety and Hygiene

Food safety and hygiene are common concerns of professionals in relation to blended diet. The majority of professional opinion papers in the literature highlighted the importance of educating the person who prepares the blended diet on good food hygiene, preparation and storage (41) (40) (22) (34) (31) (20) (19) (35) (29). In two observational cohort studies (9) (38) parents were educated how to safely prepare and store the blends and no incidents of gastrointestinal infection were reported. Walia et al. (30) suggested the family's health literacy and understanding of basic food hygiene will impact the level of education and dietetic input required. Galindo et al. (60) found food handler knowledge to be the main barrier to good food hygiene practice, with a lower level of education coinciding with greater risk of contamination. In a laboratory analysis of blends prepared in the hospital setting Johnson et al. (43) demonstrated hospital procedures for the preparation of food were sufficient to minimise microbial growth in food blends (Sub-Section 4.10.2). This was replicated in the home setting by Milton et al. (44) who tested fifty home prepared blends where the food handler had followed government food safety and hygiene recommendations aimed at the general population. The evidence suggested general food safety and hygiene principals can be applied to minimise risk of food contamination in preparation of blends. As part of the development of this Practice Toolkit the UK Food Standards Agency were consulted to ensure the recommendations made are in line with current UK food safety and hygiene principles for the general public (Appendix 9).

4.6.1 Food Preparation

As with any enteral feeding, good hand hygiene should be advised. NICE guidance (61) on preventing and reducing the risks of infection in relation to enteral feeding emphasised the importance of effective hand decontamination prior to handling any enteral feeds. Hands should be washed frequently and regularly: for example, between touching raw and cooked foods. The NICE guidance also recommended that a clean working area should be used. Foods should be prepared as if they were to be eaten orally: for example, a chicken breast should be thoroughly cooked prior to blending. Duperret, Trautlein and Dunn Klein (21) suggested a food thermometer would be useful to ensure foods are thoroughly cooked prior to blending. The literature advised that any food ingredients used in blends should be appropriately stored and cooked ahead of blending and used within its 'use by' date. Once cooked, any food, including blends, should be in the temperature range where microbial growth is rapid for the shortest time possible. The majority of the papers recommend a maximum of two hours at room temperature. Of note, Lakanaanuruk (62) found 'unacceptable growth' after two hours at a temperature of 32°C and 'acceptable growth' at four hours at 25°C, suggesting there is more risk on warmer days. However, their findings would conflict with the FSA recommendation for the general UK public that food should be at ambient temperature for no more than two hours (Appendix 9). Any equipment used in preparation, such as blenders, bowls, utensils and chopping boards need to be thoroughly cleaned. The method of cleaning equipment used to prepare blends varied in the literature. Johnson et al. (43) and Milton et al. (44) sterilised equipment in bleach. Madden et al. (36) used hot water and supermarket-bought washing up liquid. In our experience, when feeding via gastrostomy, all equipment can be washed in warm soapy water, rinsed and left to air dry.

4.6.2 Storage of Blended Diet

Any blend which is to be used more than two hours after preparation should be stored and transported safely. US papers (30) (38) (39) (41) advised blends prepared in advance can be stored in the refrigerator (1-4°C) for up to 24 hours. In the UK, the Food Standards Agency advises domestic refrigerators should be 5°C or below. Blends should be stored in an airtight container and situated above any raw foods to avoid cross contamination. Escuro (31) suggested blends stored in the refrigerator for more than 24 hours should be discarded. However, Milton et al. (44) found little microbial growth 48 hours after preparation when kept in the refrigerator at 4°C. Other authors recommended that any blend which is prepared in advance and is to be used more than 24 hours later should be frozen (at below -18°C). Temperatures below -12°C prevent growth of bacteria, yeasts and moulds. However, it is important to consider that there may be nutrient losses over time with freezing (63). The literature did not suggest a time frame for which blends can be stored in the freezer. In our experience blends can be stored in the freezer (below -18°C) for between 1-3 months depending on the food ingredients used in the blend. From a practical point of view, labelling blends stored in the freezer with a description, a 'made on' and 'use by date' would be helpful where blends are batch blended in advance. Frozen blends should be thoroughly defrosted in the fridge prior to use. Defrosted blends stored in the fridge should be discarded after 24-48 hours as with freshly prepared blends (22).

4.6.3 Reheating of Previously Prepared Blends

The reheating of pre-prepared blends is not covered in the existing literature therefore the recommendations made in this Sub-Section are based solely on the FSA guidelines for reheating food and advice from environmental health officers (Appendix 9).

A blend may require reheating depending on the food ingredients used, for example a cereal, banana and milk breakfast blend would not need reheating whereas a blend containing meat or fish would. Meat and fish are both high protein and have a high water activity and therefore they are more likely to contain higher levels of microbes to start with. There are other foods that may not have the same characteristics but can still be high risk due to the presence of sporeforms. For example, *Bacillus cereus* can be present in foods such as pasta and rice.

If the food ingredients used in the blend are cooked and chilled appropriately (i.e. at the right temperature for the right length of time, stored in the fridge and consumed within two days) it can be assumed that they are safe to eat and, in this case, reheating would not be necessary for safety reasons.

If any food ingredient used in the blend has been frozen and then defrosted, the blend will need to be reheated. It needs to be heated through until it reaches 70°C for at least two minutes (a food thermometer may be useful), or the food needs to be 'piping hot' or 'steaming hot throughout. This is also important if a microwave is used for reheating. The blend should then be cooled before it is given to avoid risk of burns and discomfort; a guide is to allow the blend to cool until it is at a temperature at which it could comfortably be eaten orally.

Reheating blends stored in the fridge:

1. Blends containing meat, poultry or previously cooked foods:
 - Remove from the fridge, transfer to a suitable container (if not already in one) and microwave until 'steaming hot' or 'piping hot' throughout. If using a food thermometer reach a minimum of 70°C for at least two minutes.
 - Allow to cool before administering, until at a temperature that could be safely eaten orally.

2. Blends not containing meat, poultry or previously cooked foods or a blend made from foods that could be eaten cold (e.g. sandwiches, yogurts, jarred baby food):
 - Option 1 – remove blend from the fridge and stand on a work surface for 30 minutes to allow this to come to room temperature.
 - Option 2 – remove blend from fridge and place the container in a jug of hot water for no more than 10 minutes. Shake or stir before administering.

Blends which are warm generally have a lower viscosity and reduce the likelihood of tube occlusion. If the blend is too thick and it is to be given immediately, a small amount of hot water could be added to reduce viscosity.

4.6.4 Transport of Blends

Time spent in transport and storage at school counts as part of the whole storage period. Therefore, appropriate storage conditions should be maintained throughout. Ideally the blend should be maintained at temperatures less than 5°C during transport and at school until ready to be given. This is in order to prevent fluctuating temperatures that could facilitate microbial growth. Transportation can be facilitated by the use of a cool box and ice or gel packs that are evenly distributed in the box. Schools should have suitable refrigeration capacity to store blends at the right temperature and avoid cross contamination. Temperatures of school fridges should be regularly checked (Sub-Section 4.9).

4.6.5 Domestic Dehydrators

There have been anecdotal reports of dehydrators being used as a way of preserving blends to be used at a later date or transported, for example, to school or on holiday, without the need for fridge or freezer storage. However, none of the papers found when reviewing the literature made reference to the use of dehydrators.

Drying or dehydrating has been used for centuries to preserve some foods by reducing the water content which microorganisms require to grow. However, domestic dehydrators work at a temperature of between 40°C and 70°C, which are temperatures mainly within the 'danger zone' (5°C to 63°C), where bacteria multiply at the maximal rate. This could significantly increase the risk of food poisoning. A systematic review (64) noted that there were many reports of food borne illnesses being caused by dried foods contaminated with various species including *Salmonella* spp., *Cronobacter* spp., *Staphylococcus* spp. and *E. coli* and concludes that dried foods are not inherently safe. Blends normally contain a mixed nutrient profile in a liquid base, which is a 'high-risk food' for food poisoning organisms. Blended foods can take many hours or days to dry effectively in a domestic dehydrator, significantly increasing the potential for growth of food poisoning

bacteria. These would still remain present in the dried product. It is therefore advisable to refrain from using dehydrators and freeze blends if preparing in advance.

SUGGESTED GOOD PRACTICE – Food Safety and Hygiene

1. Effective and frequent handwashing before and during food preparation is important.
2. Raw and cooked food ingredients should be separated during storage and preparation.
3. Food ingredients to be used in blends should be stored appropriately and used within their use by date.
4. Food ingredients should be cooked as if they were to be eaten orally prior to blending.
5. Equipment used to prepare and administer blends should be cleaned in warm soapy water, rinsed and left to air dry.
6. Blends should only be kept at room temperature for a maximum of 2 hours.
7. Blends can be stored in the refrigerator (below 5°C) for up to 24-48 hours.
8. Blends can be stored in the freezer (below -18°C) for 1-3 months.
9. Frozen blends should be defrosted thoroughly in the refrigerator (below 5°C).
10. Blends that contain meat, chicken and previously cooked foods require reheating to 70°C for 2 minutes ('piping hot' or 'steaming hot').
11. Blends are often easier to administer if given warm as the viscosity is reduced.
12. Blends should not be dehydrated at home.
13. Defrosted foods should be discarded after 24-48hrs if not used.

4.7 Starting a Blended Diet

This Sub-Section explores best practice in supporting families when a tube fed individual is transitioning to a blended diet. The way in which blended diet is started will depend on the history of the tube fed individual. For example, the approach taken to introduce blended diet to a child who has been tube fed since birth (Sub-Section 4.7.1) will vary considerably in comparison to an adult or older child who has previously eaten food orally and has a tube placed later in life (Sub-Section 4.7.3). The literature (19) (29) suggested blended diet should be introduced when a tube fed individual is otherwise medically stable. Epp et al. (34) suggested it is best to commence blended diet at home rather than in the acute setting, because that means the individual is likely to be more medically stable. Escuro (31) highlighted that starting a blended diet can be an overwhelming task. In our experience, irrespective of the circumstance, the person preparing the blended diet will require more guidance and support from their dietitian in the first few months, as they grow in confidence, they become self-sufficient in the design and adaptation of blends. Families may find benefit in speaking with others who use blended diet and can be signposted to websites and social media support groups for peer support (Appendix 8).

4.7.1 Infants

Prior BDA guidance recommended blended diet should not be used in children younger than one year old (6). However, the professional opinion pieces (21) (29) (35) (39) identified suggested blended diet can be introduced at weaning age (around six months), in line with public health recommendations for oral complementary feeding. Furthermore, blended diet may have a role in treatment of reflux, retching and vomiting (Sub-Section 2.2). In line with current recommendations for complementary infant feeding, a wide range of foods should be introduced from the beginning (65). Therefore, if clinically appropriate, blended diet can be introduced from six months of age, following up to date complementary feeding principles for infants fed orally. Below is a suggested method of introducing blended diet to an infant:

- Start with a small amount e.g. 5–10ml of a single blended food ingredient mixed in with the infant's current milk or commercial enteral formula.
- Slowly increase the amount of blended food as tolerated. As a rough guide the amount of food in each 'meal' could be increased by an agreed volume each day. The volume would depend on tolerance and parents' confidence.
- Initially include small amounts of vegetables, fruit, starchy foods and protein, giving foods one at a time but increasing the range as tolerated.
- Never add salt or sugar.
- The use of pureed (stage 1) baby food may be a useful first step allowing the family to trial blended diet without the need to invest in a blender (21) (38) (35) (29).
- Aim to introduce the allergenic foods such as eggs, nuts, pasteurised dairy foods, fish and wheat before 12 months of age, one new food at a time. These foods should be given regularly in the infant's diet, unless they cause a reaction. As with oral weaning, consideration needs to be given to infants felt to be at higher risk of food allergy such as those with severe eczema (66).

4.7.2 Children and Young People who Have Been Tube Fed Since Birth

Children and young people who have been tube fed since birth will not have been through a weaning process and exposed to common allergens. The literature suggested blended diet should be initiated slowly in this group, offering a new food every 3 – 4 days (41) (22) (38) (30). Authors advised it is important to monitor for signs of allergies and intolerances when foods are introduced. Novak et al. also suggested blends should be introduced gradually to give the gastrointestinal tract time to adjust (19). Bobo and Stone (41) and Escuro (31) advised using the tube fed individual's current commercial enteral formula as the liquid of the blend. In one cohort study (38), parents were advised to start with a 30ml blend and gradually build the volumes to tolerance.

It has been suggested it is more difficult to transition a child or young person to a blended diet when they have a continuous feeding plan (22). Johnson, Spurlock and Galloway (39) suggested blended diet should only be used when a bolus feeding plan is tolerated. However, it has been noted that tube fed individuals who had poor volume tolerance when fed commercial enteral formula have an improved volume tolerance on blended diet (19) (38). As a way to transition to blended diet, from continuous enteral formula feeds, O'Flaherty (38) suggested small daytime blend boluses in combination with an overnight continuous commercial enteral formula. When the daytime boluses are gradually built up, the total volume, and subsequently, the contribution to nutritional intake increases then the commercial enteral formula can be reduced (38). The suggestions listed here have been used in clinical practice with good outcomes. Additional suggestions from the authors of this Practice Toolkit include starting with breakfast blends so tolerance may be observed over the day. Leave a break between a newly introduced blends and the next commercial enteral formula feed to allow time to observe tolerance to the blend. Additionally, if a child attends school it is preferable to establish blended diet in the home environment before moving it into school. Consider starting with a blend at breakfast, and then an evening meal.

4.7.3 Tube Fed Individuals who have Previously Eaten Food Orally

Some tube fed individuals have previously eaten food orally and therefore can be introduced to foods that were previously tolerated. Enteral feeding tubes are frequently placed because a feeding difficulty develops later in life, for example, in neurodegenerative conditions. In some instances, enteral tube feeding is used to 'top-up' oral intake. The literature primarily focused on the use of blended diet in infants and children and this aspect was not discussed in adults. In our experience, individuals who have been weaned have a known history of tolerance to individual foods. However, blended diet will need to be gradually introduced to assess tolerance and allow adaptation of the gastrointestinal tract, particularly if the individual has been tube fed using a commercial enteral formula for a long time.

4.7.4 Tube Fed Individuals who have Introduced Blended Diet Independently

Some tube fed individuals or their parent(s) or carers(s) may have introduced blended diet at home without guidance from their health care team. In this situation the dietitian should discuss with the tube fed person their parent(s) or carer(s) the reason for introducing this method of feeding and discuss it's suitability in the context of the individual's clinical condition. If the dietitian feels that blended diet is appropriate for the tube fed individual, then they should provide support to ensure safe practice is being followed. If blended diet is

not deemed appropriate for the individual the dietitian should fully explain their concerns and/or the rationale to the tube fed individual/ their parent or carer(s) and negotiate a plan to return to a commercial enteral formula until any barriers to using blended diet can be addressed. The dietitian should update other members of the multi-disciplinary and multi-agency team.

SUGGESTED GOOD PRACTICE – Starting Blended Diet

1. The way in which blended diet is started will depend on the feeding and medical history of the tube-fed individual.
2. Blended diet can be introduced from about six months of age in line with public health complementary feeding guidance.
3. Dietitians who are new to blended diet should seek supervision or advice from someone more experienced in order to gain more knowledge and confidence in supporting individuals and their families using a patient-centred approach.

4.8 Administration of Blended Diet

There are different methods of administration available in enteral tube feeding. Bolus feeding involves giving larger volumes over short time periods throughout the day and can mimic mealtimes. Bolus feeding can be delivered by gravity; by gentle pressure applied to a 60ml syringe, or via an automated feeding pump. Automated feeding pumps can also be used to deliver a larger volume over an extended period of time; this is called continuous feeding and can be 24 hours per day. The literature suggested continuous feeding is not an appropriate method of administration for blended diet as this would mean the blend was at room temperature for more than two hours (Sub-Section 4.6.2).

Brown (22) suggested a gravity bolus method is only possible with a thinner blend. Guha (37) pointed out a gravity bolus method has a much slower flow rate with new EnFit connections which are narrower than legacy tubes. However, the force required to administer a thicker blend using a slow plunge method via an EnFit tube was found to be comparable to a water flush using the same method. Brown (22) described the slow plunge method in detail: a 60ml enteral feeding syringe is used, a rate of 200ml in 15 minutes or 60ml in 4.5 minutes was suggested; a pause at every 5-20ml was suggested to mimic the act of oral eating and swallowing. A slower rate of 60ml in 10 minutes was used by participants in the O'Flaherty study (38). Like Brown, Madden et al. (36) also used a pause at every 5-20ml, to mimic the act of oral eating and swallowing. In our experience, a slow plunge technique is preferable to a gravity bolus technique as it enables thicker blends to be administered, the higher viscosity is thought to be one reason for the positive effect of blended diet on reflux, retching and vomiting symptoms. It is difficult to advise on a rate as tolerance will vary between individuals, it is however sensible to start at a slow rate and gradually build up. It is reasonable to expect a full meal should take approximately the same time as if the tube fed individual was eating orally. Air bubbles should be removed from the syringe either by gently tapping to allow air bubbles to rise or by leaving to stand for a short while prior to administration. One cautionary note regarding the slow plunge method - there have been reports of parent(s)/carer(s) suffering repetitive strain injury. In our experience some families choose to draw up the blend (which can allow for unblended foods to be identified prior to administration) but also other families pour into the large open end of the syringe. Either method can work therefore it is a matter of personal preference.

The use of automated feeding pumps to deliver boluses of blended diet is a matter of some debate. Two papers (33) (34) advised against the use of automated feeding pumps as variability in viscosity can lead to an inaccurate rate of delivery, clogging errors and potential motor failure. On the other hand, opinion pieces by Escuro (31), Walia (30), Weeks (35) and Zettle (29) all advised an automated feeding pump can be used if the bolus is delivered in under 2hrs. In laboratory analysis, Western and Clarke (50) found a thinner viscosity was needed when using an automated feeding pump. There may be additional benefits to using an automated feeding pump to administer blends: as Mundi et al. (42) highlighted, increased flow force due to EnFit connections is unlikely to be a problem if an automated pump is used. Current practice in the UK varies considerably: while some regions have incorporated automated feeding pump delivery into their blended diet policy, other regions have been advised by the pump provider that this is not permissible. The

use of automated feeding pumps for blended diet should be agreed locally; we would advise you clarify the stance of your contracted enteral feed pump provider.

SUGGESTED GOOD PRACTICE – Administration of Blended Diet

1. A gravity bolus method can only be used with a thinner blend.
2. A slow plunge method, using a 60ml enteral syringe, is the method of choice with a thicker blend.
3. The rate of administration will depend on individual tolerance. It is a good idea to start slowly and increase the rate gradually.
4. It should be agreed within your enteral feeding contract as to whether if automated feeding pumps can be used to administer blends (if delivered in less than two hours).

4.9 Monitoring

An effective monitoring plan should be established before starting blended diet; ideally this should be done in conjunction with the MDT if available. The parameters to be monitored and the review frequency should be agreed in advance and can be used as a way of managing family expectations. In the literature, several authors stressed the importance of close follow-up with a dietitian but failed to provide timeframes (41) (31) (39) (19) (35) (20). Several papers suggested the same parameters need to be monitored for HETF individuals on blends as when monitoring HETF individuals on commercial enteral formula. On the other hand, Epp (33) and Walia et al. (30) indicated tube fed individuals may require increased input when starting blended diet but this can be brought in line with local enteral feeding policy for monitoring in HETF once established. For adults receiving HETF, guidance for monitoring is available in Section 6 of the Parenteral and Enteral Nutrition Group Pocket Guide (46). Unfortunately, there is no equivalent guidance for use in Childrens HETF, although professional consensus indicates infants, children and young people are likely to require increased monitoring and input in comparison to adults.

In children and young people, the literature (21) (31) (41) suggested growth trajectory should be monitored in addition to weight. In one observational study, Gallagher et al. (9) designed follow-up to take place 6, 10 and 22 weeks. O'Flaherty (38) on the other hand arranged anthropometric follow-up after a period of three months with telephone contact in the interim. The studies also monitored triceps skin-fold and mid upper arm circumference although it may not be practical to use these measurements in clinical practice routinely.

Weeks (35) recommended blood biochemistry to be monitored at baseline and follow-up to check for micronutrient deficiencies. This conflicts with Epp (33), O'Flaherty (38), Gallagher et al. (9) and Walia (30) who advised blood biochemistry should only be done when relevant to the individual clinical situation, not as routine for all individuals on blended diet. UK guidance on monitoring of HETF in adults exists through the NICE Enteral tube feeding pathway (67), which suggests 3-6 monthly review with a limited number of clinical, nutritional and anthropometric observations. They observe that if '*clinical progress is satisfactory then laboratory tests are rarely needed*'. PENG advised in long term enteral-feeding, limited biochemical monitoring is required unless there is a specific clinical need or change in condition. In children with neurological impairment ESPGHAN (68) recommend anthropometry is checked at least every 6 months, and micronutrients checked annually. They provide a long list of suggested biochemical measures to be used in the assessment of a child's nutritional status. This is not specific to HETF or to the use of blended diet. There are no UK recommendations or guidance on blood biochemistry monitoring in children and young people in receipt of HETF, this is a further topic of debate within the specialism and outside the scope of this Practice Toolkit. Local practice will vary and decisions regarding whether blood tests are needed and if so which ones, should be made in conjunction with the tube fed individual's medical team.

The literature suggested tools commonly used in dietetic practice to assess oral nutrition intake are equally useful to monitor blended diet. For example, three-day food diaries (9) and 24-hour recall (30). As discussed in Sub-Section 4.5 these techniques are likely to be more practical than detailed analysis of individual

blends. Although, depending on the approach used (Section 4, Table 4.1.1) there could be circumstances when detailed dietary analysis is required.

The aim of effective monitoring is to ensure that nutrition support is provided safely and effectively, that any complications are detected and treated and realistic nutritional goals are met. Once the enteral feeding is established an ongoing monitoring plan tailored to the needs of the individual should be established. In our experience, there is wide variation in both the interval and parameters monitored, particularly in paediatric HETF. It is likely, in general, once established on a blended diet, a tube fed individual will require the same level of input provided at a local level to those who use a commercial enteral formula. When starting blended diet some families may require more intense input from the dietitian. The ultimate goal should be to empower the tube fed individual and their parent(s)/carer(s) to take more control and be proficient in providing safe, nutritionally balanced blends.

SUGGESTED GOOD PRACTICE – Monitoring

1. A detailed monitoring plan should be established before starting blended diet.
2. Anthropometric measures should be taken regularly, as required by the age and nutritional status of the individual. These may include weight, height/length (using actual or proxy measures), BMI, mid-arm circumference, triceps skinfold.
3. Monitor clinical symptoms of gut tolerance including nausea, reflux, vomiting, gagging, diarrhoea, constipation, abdominal discomfort or distention.
4. The tube and stoma site should be monitored to ensure patency and health of the site.
5. Biochemical monitoring should be undertaken if there is a reason to believe that there is a likely deficiency based on assessment of nutritional intake and/or clinical condition. Following a blended diet is not in itself an indication that more biochemical monitoring is required than on other forms of HETF.

4.10 Blended Diet in Other Settings

Tube fed individuals frequently access care outside of the home and provision of blended diet in these settings can be a challenge. Several of the papers identified made reference to this and suggested all the relevant care settings should be considered when deciding if blended diet is a good choice for the family (40) (34) (31) (39) (19) (29). In our experience many care settings in the UK are now able to facilitate use of blended diet. The BDA policy statement (1) suggested the dietitian should work with other professionals and agencies to facilitate the implementation of blended diet in all care settings attended by the tube fed individual. However, the statement also highlights that ultimately, the decision to provide blended diet rests with the individual care provider. In Sub-Section 4.10.1, recommendations are made for education and respite care settings. Sub-Section 4.10.2 makes specific recommendations for hospital settings. It is envisaged these recommendations will allow the dietitian to support the care provider to assess if they can provide blended diet safely, demonstrate competence and to aid in the production of local guidelines and policies to aid staff.

4.10.1 Education and Respite Care Settings

Education settings, such as nurseries, schools and colleges may be asked by parents of tube fed children and young people to administer blended diet via enteral feeding tubes, especially where tolerance of commercial enteral formula is poor. Thomas (23) provided an excellent example of how multiagency working can lead to the successful development of local guidance tailored to the facilities available and the individual's needs. In this particular case the child was able to attend school and symptoms of chronic diarrhoea were improved on the blended diet.

Many tube fed individuals have complex health and care needs and are entitled to respite care. Respite care is important to parents and carers but qualitative research (22) has found some parents have difficulty accessing respite care due to their choice to use blended diet. Brown (22) describes in detail how one UK children's hospice successfully developed their own protocol to facilitate the use of blended diet. As with education settings, the respite care setting should work with the individual, their parent(s) or carer(s), dietitian and enteral feeding nurse to develop an individualised care plan.

Like Brown (22) and Thomas (23), members of this working group have successfully supported many education and respite care settings to successfully give blended diet. The following recommendations draw on our collective experience. A statement of best interest can be useful to assure education or respite care staff that parents are using blended diet with the support of the child or young person's healthcare professionals and with clinical justification. Appendix 4 provides an example which can be adapted for use locally and added to the child or young person's education or respite care plan.

Education or respite care facilities who have previous experience of blended diet may be able to adapt previous care plans to meet the specific needs of the tube fed individual in that setting. For education or respite care facilities with no prior experience of blended diet, the dietitian should explain the principles, benefits and potential concerns to staff (Section 2). It would also be helpful for the dietitian and local nursing

service to provide example care plans which can be adapted by education or respite care staff, in collaboration with the individual, their parent(s) or carer(s), to comply with their own procedures. Example care plans which can be adapted for use have been provided in Appendix 5.

Education and respite care providers should agree with the parent(s)/carer(s) as to where blends will be prepared. Some locations, such as in the case outlined by Thomas (23) in which blends can be prepared for the tube fed person on site. This could involve, for example, blending a portioned school meal for the tube fed person. The dietitian and nutrition nurse specialist can advise on the equipment required (Sub-Section 4.4) and the consistency required by the individual (50). It is better to give advice about portion size and a consistency to aim for, rather than advice on a given volume of liquid as the volume required will vary depending on the different food ingredients used in the blend (Sub-Section 4.5.2). Staff who are involved in food preparation and handling should already be trained in basic food hygiene and follow the principles outlined in Sub-Section 4.6.

Alternatively, families can choose to send in blends prepared at home if this is permitted by the care provider. It is good practice for parents to label the blend with the child's name, date made, and use by date and ingredients. Particular consideration should be given to how the blends are stored and transported between different care settings; a cool bag may be required depending on the length of time the blend will be out of the fridge (Sub-Section 4.6.4). Depending on the food ingredients used and previous storage, the blend may need to be reheated (Sub-Section 4.6.3). It should be decided in advance how the care setting staff should reheat blends if applicable (Sub-Section 4.6.3). There may be occasion when it is not possible to blend on site, for example, blender malfunction, trained staff absence or when a blend brought in from home is spoilt. It is good practice to have an alternative to a blend, documented on the tube fed person's care plan. This could be, for example, shop-bought food alternatives such as baby food pouches, smoothies, milkshakes or commercial enteral formula (if tolerated).

Training education and respite care staff to give blended diet can be problematic, in some regions enteral feeding training is provided by commercial enteral company employees, some of whom have been advised by their employers not to provide training on blended diet. This should not be a barrier to the tube fed individual having blended diet if it is deemed to be of benefit to them by the healthcare team. In other areas, training is delivered by the specialist or community nurse employed by the Health Board/Trust. Due to variation in how families use blended diet it is considered good practice to involve the tube fed individual/parent(s)/carer(s) in training education or respite care staff. For example, the dietitian and nurse trainer could arrange to visit the education/respite care facility with the staff to be trained and observe the parent(s) or carer(s) administer blended diet. The dietitian and nurse trainer should ensure the blended diet is being given as per the guidance in this Practice Toolkit, offering advice if needed to ensure best practice is followed. The parent(s)/carer(s) should advise staff of any signs or indications of intolerance unique to the tube fed individual having the blended diet. An example Competency Training Checklist and Multiagency Care Plan have been provided (Appendix 5 and 6) which can be adapted to fit local needs.

Staff being trained can then give some blended diet with the dietitian, nurse trainer and the parent(s)/carer(s) observing. This step may need to be repeated until the staff member feels confident and the parent(s)/carer(s), dietitian and nurse trainer consider that they are competent. Care plans should be reviewed regularly by education or respite care staff and the tube fed individual, their parent(s) or carer(s) with guidance from the dietitian and nurse trainer to ensure it still meets the needs of the tube fed individual. It may be useful to do this as part of the Education and Health Care Plan (EHCP) if applicable. Competency should be reassessed (annually if possible), and consideration should be given to training new staff.

4.10.2 Hospitals

HETF individuals often have complex conditions for which they may occasionally require admission to hospital. Four of the US papers discussed blended diet use in the hospital setting (34) (31) (19) (29). Two of the professional opinion papers (19) (31) suggested blended diet may not be a suitable option for individuals who are frequently admitted to hospital, but the papers lacked additional details as to why this is the case. Zettle (29) highlighted that often processes are not in place in hospitals to support blended diet provision. However, it is possible to put policies in place to facilitate the use of blended diet in the inpatient setting. In the case reported by Johnson et al. (39), blended diet was initially outside the scope of the hospital's feeding policy and so, the manager and feeding team met to establish safe guidelines to allow the patient to continue receiving blended diet in the hospital setting.

In one US professional opinion paper (34), looking at the provision of blended diet in three hospitals, the authors highlighted that the increased use of blended diet at home is likely to lead to an increased demand for provision in the inpatient setting too and healthcare providers were encouraged to review policies. It was acknowledged this is a complex process involving collaboration with service users, catering representatives, dietitians and management (34). Perceived barriers were reported to be kitchen processes, staffing hours and food safety concerns. In a recent study comparing microbial loads of commercial enteral formula to blended diet, Johnson et al. (43) found with sensible recipe selection and adherence to food safety standards, blended diet could be provided safely to patients in a clinical setting.

It may not be possible to permit blended diet in all wards in a hospital. Epp et al. (34) suggested blended diet is not routinely used in the Intensive Care Units (ICU) due to a USA clinical consensus that fibre should not routinely be used in critically ill patients; most blended diet is high in fibre. Additionally, critically ill patients are more likely to be fed continuously rather than by bolus, meaning the hang time is more than 2hrs (33).

Epp et al. (34) suggested four methods which can be used to provide blended diet in the hospital setting. These methods are summarised and critiqued in in the Table 4.10.2.

Table 4.10.2 Methods hospitals can use to provide blended diet; dependent on the catering facilities and systems available. Adapted from Epp et al. (34).

Method 1: Commercial Baby Food		
Mixing stage 1 baby jars or pouches with formula or milk to desired consistency. Additional ingredients such as baby rice can also be added (29).		
Advantages	Disadvantages	Additional Comments
Research Findings		
Facility does not need to purchase a high-powered blender. Known nutritional content. Consistency is uniform and therefore reduces risk of tube blockages. Less labour intensive than blending. Often these products are readily available in hospitals.	Often minimal nutritional values in stage 1 food, therefore, may only be suitable if the individual has reduced requirements.	Nil
Working Group Experience		
Known nutritional content, can make nutritional analysis more reliable	Hospital may have a limited range of suitable jars or pouches available. Some people may not wish to consume processed foods.	Can be useful when initially commencing or trialling blends. Short term solution as unlikely to provide sufficient nutritional balance longer term.

Method 2: Hospital kitchen produce blended diet from scratch		
<ol style="list-style-type: none"> 1. Dietitian, in consultation with parents, produces suitable recipe for desired consistency. 2. Recipe is recreated in kitchen. A label is attached to the blended diet with relevant patient information, expiry date and time of blend. 3. Blend is transported to the fridge where it can be kept for 24 hours at suitable temperature. 4. Dietitian documents in the medical notes: ingredients, allergens, nutritional provision of the blended diet along with the feeding plan. 5. The blend is administered as per feeding regimen by gravity/ slow plunge bolus, within two hours of it being removed from the fridge. 		
Advantages	Disadvantages	Additional Comments
Research Findings		
Non documented	<p>Time consuming – frequent recipe manipulation by a dietitian is required to meet individual nutritional needs and for catering staff to prepare the food. This can be overcome by providing a range of standardised recipes to cater for specific nutritional needs.</p> <p>Difficult to match home volume and viscosity of blend recipes which can lead to infusion issues.</p>	<p>Experienced staff are best placed to develop recipes to ensure foods being used are suitable and won't cause blockages.</p> <p>Seattle Children's Hospital reduced the risk of lumps and tube blockage by:</p> <ol style="list-style-type: none"> 1. Ensuring recipes were blended for 3 minutes using commercial blender in the kitchen. 2. Flushing tube with 5-10ml water prior to administration. 3. Educating catering staff to improve knowledge of consistency needed for blended diet. <p>To reduce the risk of microbial contamination, general food safety principles and individual trust food hygiene policy need to be considered and adhered to.</p>
Working Group Experience		
<p>Dietitian can produce specific menu to cater for individual needs.</p> <p>Using frozen or tinned foods may help with ensuring certain food is readily available.</p> <p>May be able to use normal hospital menu</p>	<p>If using a limited number of standard recipes, the individual's nutritional requirements are unlikely to be met. Individual nutritional analysis will be required along with micronutrient additives or further food fortification.</p> <p>May not be an issue during a short admission.</p>	<p>If blends are cook/chill or cook/frozen and regenerated at ward level, there is potential for them to dehydrate and no longer be at correct texture or consistency. Consideration of how to reduce or assess this risk is needed.</p>

Method 3: Parent(s)/Carer(s) bring own blends in from home		
<p>A method employed by an American children's hospital is summarised below as documented in a professional opinion paper, sharing their experience of blended diet provision in an acute setting:</p> <ol style="list-style-type: none"> 1. Medical approval for home blended diet provision is sought and documented. 2. Labels are produced documenting relevant patient information, recipe expiration date and ingredients with measurements. 		
Advantages	Disadvantages	Additional Comments
Research Findings		
<p>Non documented</p>	<p>Not always possible for parent(s)/carer(s) to provide blended diet from home as increases time away from patient, especially in a paediatric setting.</p> <p>Carers may not have access to suitable kitchen facilities if they are not local to the hospital.</p>	<p>Patients and carers are required to administer blends provided from home if nurses are not comfortable administering home-prepared blends.</p> <p>If a patient/parent/carer is unable to administer and a caregiver is unavailable for a scheduled blend, then an appropriate alternative commercial product is administered by nursing staff.</p>
Working Group Experience		
<p>Patient/parents and carers are often more experienced at producing blended diet than health professionals and therefore they may feel more comfortable with this.</p> <p>Less time-consuming option for hospital staff.</p>	<p>Nutrient content is largely unknown for the blends. It is a significant responsibility for patient/parent or carer to recall or provide recipes of blends accurately in often stressful or emotional situations.</p> <p>Due to the blend needing to be transported, there is a potential risk of microbial growth.</p>	<p>Consideration needs to be given as to how to ensure that food is stored, transported and heated appropriately.</p>

Method 4: Using existing hospital puree menu		
Food chosen from pureed menu which is further blended for 3 minutes		
Advantages	Disadvantages	Additional Comments
Research Findings		
Non documented	Non documented	Non documented
Working Group Experience		
<p>Can usually easily obtain nutritional information about the products from manufacturers including allergens.</p> <p>Often variety of meal options available.</p>	<p>If patient has allergies or specific dietary treatment, it may be difficult to meet their nutritional needs.</p> <p>If meals are regenerated, potential for meals to dehydrate and no longer be at correct texture and may contain lumps. Consideration of how to assess and reduce this risk is needed when using this method.</p>	<p>Some meals may contain husks or foods that when diluted become difficult to pass through a gastrostomy. It is therefore recommended that each meal is assessed by a suitable member of staff prior to implementing this process of supplying blended diet to ensure suitability.</p> <p>Due to these meals being developed for adult patients, if used in paediatric population it is prudent to check nutritional content to ensure suitability.</p> <p>It may be of benefit to produce ward guidelines on the amount of additional fluid needed to be added to each meal.</p>

A recent cross-sectional survey (69) which purposefully sampled eighteen UK children’s hospitals found the majority allowed blended diet use in the hospital setting (n= 11) although only half had this documented in a Trust policy. The authors pointed out this has led to inequalities in provision and frustration from tube fed individuals their parent(s) or carer(s). The BDA Policy Statement 2019 (1) advised that families should be made aware that the provision of blended diet in the inpatient setting is dependent on the individual Trust’s policy and food preparation facilities and that blended diet is less likely to be permitted in the ICU or High Dependency (HDU) setting, although this varies between trusts. The policy recommended that individuals who are fed blended diet in the community should have a plan in the case of admission. This could be for commercial enteral formula if tolerated. It is recommended that these patients are reviewed on admission by a hospital dietitian to develop a plan which meets their clinical requirements during the acute admission.

The prospect of developing systems to achieve blended diet provision can be daunting, with many obstacles and barriers which need to be overcome. However, with evidence of clinical benefit and growing popularity, it would be advantageous for a hospital to assess if it is able to accommodate blended diet as a method of feeding.

There are various methods that hospitals can implement to provide blended diet to patients (Table 4.10.2). The choice will depend largely upon the hospitals own catering facilities and systems. When looking at how to provide blended diet in hospital, setting up a working group which consists of representatives from dietetics, catering, nursing and infection prevention and control may be valuable to provide insight and support into all aspects of procedures. Considering the following points may be of benefit when devising which method is the most feasible for an institution and when producing trust policy:

- Standardise each step by ensuring clear Trust guidelines or protocols are available on how to request and provide blended diet and who is responsible for each step including physically administering the blended diet.
- For blended diet provision, consider how to reduce microbial contamination at each step and ensure it adheres to FSA guidelines and individual Trust food hygiene standards and protocols. It is beneficial to involve representatives from infection prevention teams and catering at the decision-making stage to achieve these goals.
- If any aspect of the blended diet needs to be prepared at ward level, it is important to consider how to clean equipment in line with existing Trust guidelines.
- Consider how the provision of blended diet will be in line with other Trust policy and guidelines.
- Consider if any additional training is needed for ward or catering staff and who will oversee this.

If blended diet is to be prepared in the hospital catering facilities, it should be done using safe food handling techniques as set out by the FSA and should adhere to individual trust food hygiene standards and protocols.

It may not be appropriate for patients to receive blended diet throughout their entire hospital admission depending on their clinical condition. Therefore, suitability of blended diet needs to be assessed by the inpatient dietitian involved in a patient's care and discussed with the patient/parent(s)/carer(s) and medical team. Once the patient's condition stabilises, it may be possible for blended diet to be re-introduced.

SUGGESTED GOOD PRACTICE – Blended Diet in Other Settings

1. Multiagency working can lead to the successful development of local guidance tailored to Education and Respite care facilities available and the individual's needs.
2. Clear trust guidelines or protocols should be in place to support the provision of blended diet in the hospital setting. Infection prevention and control teams and catering departments should be consulted.
3. Dietitians in the acute setting should ensure the blended diet continues to meet the needs of the individual during their acute admission. The use of blended diet should be reviewed and discussed with medical team, patient and their parent(s)/carer(s).

5. Conclusion

Since the original BDA Policy Statement and Practice Toolkit (6) were published in 2013 and 2015 respectively, the concept of blended diet has evolved and the practice grown significantly in the UK. This is particularly the case for children and young people in receipt of HETF. Dietitians working collaboratively with these families have developed a wealth of experience and expertise on this topic and blended diet can now be considered a specialism within children's HETF. It has been suggested that a similar increasing trend toward blended diet is now emerging among the adult HETF population. The authors envisage this Practice Toolkit will enable UK registered dietitians with limited experience of blended diet to feel more confident in supporting tube fed individuals and their families to safely use blended diet and offer it as an option where there could be particular benefit. Alongside this Practice Toolkit please do seek support and advice from other more experienced dietitians in clinical practice as you would do when faced with any new speciality.

The practical recommendations made in this Practice Toolkit are based on limited literature and the experiences of the group in clinical practice. It is clear that blended diet is a phenomenon that continues to gain popularity in the HETF population. Robust research is needed to investigate why blended diet can have beneficial effects for some tube fed individuals. A multicentre NIHR HTA funded project led by York University is currently underway and it is hoped the findings will add significantly to the available evidence. Subsequent work should consider why blended diet in comparison to commercial enteral formula has positive physical benefit for some HETF individuals and examine which patient groups experience the most benefit.

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Appendices

Appendix 1: Good Practice Checklist

Points to Consider before starting blended diet:

What are the Potential Benefits to the individual?

Tube Type/Site

- The type and of site of feeding tube
- Is the stoma healed? (8-12 weeks post insertion)
- Can the tube be replaced in the community if it becomes blocked? If not, what is the plan?

Feeding History

- Are there any specialised dietary requirements as a result of their medication condition or state?
- Have they eaten food previously or have they been tube fed for life, have they been exposed to common allergens (i.e. have they been weaned)?
- Do they currently tolerate bolus feeds or only continuous feeds?

Tube fed individual/Parent/Carer Expectations

- Awareness of the time, work and cost involved for families.
- Will commercial enteral formula be used in addition to blended diet?
- Will the school, day centre, nursery be expected to prepare, store and administer blended diet?
- Will the hospice or home carers be expected to prepare, store and administer blended diet?
- What will happen if the tube fed individual is admitted to hospital?

Training needs

- How will blended diet be administered?
- Family's knowledge of basic food hygiene and level of education required.
- Understanding of the components of a healthy well-balanced diet or dietary modifications needed due to medical condition and level of education required.

Plan to start

- What is the best way to start blended diet?
- What will be the monitoring plan? (Anthropometrics, Biochemistry, Clinical, Nutritional Assessment).

Appendix 2: Example Patient Information Leaflet

Source: The Newcastle upon Tyne Hospitals NHS foundation Trust



The Newcastle upon Tyne Hospitals
NHS Foundation Trust

Information for Patients

Blended Diet via Feeding Tubes

What is a feeding tube?

Some people have feeding difficulties and require another route for nutrition. A gastrostomy, surgical opening, made through the abdominal wall into the stomach, is used in the longer term. A feeding tube can be passed through the opening (stoma) to provide special liquid feed to help your child meet their nutritional needs.

What is a blended diet?

Every day foods are blended with liquid to a thin, smooth consistency which can be administered via a gastrostomy. Blended diet is also sometimes known as liquidised or blenderised diet.

What are the benefits of starting a blended diet?

Prescribed liquid enteral formula is usually used in the first instance to meet your child's nutritional needs. Occasionally though the prescribed enteral formula isn't very well tolerated, and your child may have symptoms such as:

- Persistent vomiting
- Tummy pain
- Increased reflux

Blended diet can sometimes improve these symptoms. Some families also enjoy being able to prepare food and meals for their child and feel that a blended diet provides this opportunity.

What needs to be considered before starting a blended diet?

Starting a blended diet needs to be a shared decision between you, your child and the healthcare professionals involved in your child's care to ensure that it is suitable option. To help with this process, a shared decision-making tool will be completed with your child's dietitian.

There may be alternative feeding options that need to be considered before commencing a blended diet, which will be discussed with you.

It can often take several weeks for your child to be switched on blended diet. Your dietitian will make a plan with you on how to start and increase the blended diet.

Using blended diet via gastrostomy can involve extra work and cost more, for example buying and preparing food, especially when you first start using a blended diet.

What feeding tubes can be used?

Blended Diet is used with gastrostomy feeding tubes. Some manufacturers of gastrostomies tubes do not support blended diet being given through their product. Blended diet can still be used even if this is the case. Feeding into the jejunum (small bowel) bypasses the protective gastric acid therefore it is recommended that blended diet isn't given into the jejunum. Nasogastric tubes are thin and long which make it very difficult to use blended diet.

There are lots of different types and sizes of gastrostomies that can be placed. For a blended diet, the size should ideally be 12Fr or larger, however if a smaller tube has been placed, blended diet can still be given but it may need to be a thinner consistency to prevent the gastrostomy from blocking.

If the gastrostomy tube does become blocked and cannot be cleared, your child may need to undergo an operation for a replacement to be inserted depending on the type they are using.

What should I do if the tube becomes blocked?

If the tube becomes blocked, only water (cold or warm) can be used to try and unblock it. Administer a flush of water using a push/pull action with a 60ml syringe to try and unblock the tube.

If the 60ml syringe hasn't cleared the blockage, a smaller size syringe can be used to try and unblock the tube using the same push/pull action. This needs to be done carefully to prevent any tube damage.

If you are unable to unblock the tube, contact your children's community nurse for advice.

What equipment do I need?

Syringes:

Blended diet is usually delivered using a 60ml syringe. A slow plunge technique is recommended. Feeding pump manufacturers in the UK have advised against the use of blended diet using a feeding pump. Your dietitian can discuss this in more detail with you.

Blenders

There are many different types and brands of blenders available to purchase. The choice depends on the size and power of the motor and cost.

Commercial blenders (e.g. Vitamix®, Omniblend®, BlendTec®)

This type of blender can blend a greater variety of foods e.g. fruit and vegetables, seeds and nuts. They are also a good option for batch blending. However, they are often very expensive to buy.

Mid-Range (e.g. NutriBullet®, Nutri Ninja®)

These blenders are considered easy to use and clean. They are often smaller than the commercial blenders and therefore are unable to blend such large quantity of food in one go. Therefore, they are ideal for blending each meal separately and for smaller volumes.

Basic jug / stick blenders

This blender can cope with soft-cooked foods or pre-pureed foods (e.g. yoghurts, baby foods etc.) but not with all fruits, vegetables, nuts and seeds. A sieve may be needed to ensure the blend is lump free (If using a sieve a metal sieve with holes of 1mm or less diameter is ideal as it is easy to clean). These blenders are considered ideal for blending each meal separately and for smaller volumes

Extension sets:

If your child has a gastrostomy button, extension sets will still need to be used to administer blends. These will still be provided for your child by either the community nurse or your monthly delivery from the feed company, depending upon your local area.

Other:

You may also find the following equipment useful.

- Labels or markers (to date containers)
- Cool bags and ice blocks to transport blends
- Food safe containers with lids to store and reheat blends

Food Safety and Hygiene

It is important that good food and hand hygiene methods are followed when preparing, storing and administering a blended diet to avoid and minimise the risk of bacterial contamination. Bacterial contamination and growth can result in food poisoning, leading to symptoms such as diarrhoea, vomiting and abdominal pains. How to minimise this risk is listed below.

Washing Hands

Bacteria are spread very easily from your hands to food and work surfaces and equipment. It is therefore very important that your hands are washed thoroughly with soap and warm water before handling any food and especially after touching raw food.

Storing and preparing food:

- Clean your work area before starting to prepare any food
- Raw meat, especially poultry can contain harmful bacteria that can be easily transferred, therefore keep raw food separate from cooked foods. It is recommended that raw meat or fish is stored in a sealed container on the bottom shelf of the fridge
- Use a different chopping board for raw and ready-to eat foods
- Make sure foods are used before their 'use by' date
- Blends should only be kept at room temperature for a maximum of 2 hours
- Blends can be stored in a fridge for 24-48 hours
- Blends can be stored in the freezer for 1-3 months depending on the ingredients used
- Frozen blends should ideally be defrosted thoroughly in the fridge if they are not used within 24-48 hours they should be thrown away.

Cooking food

- Make sure you cook food at the right temperature (see guidelines on the packaging) as this will kill any harmful bacteria
- Cook the food to be used in the blend as if it was to be eaten orally (before blending it with liquid)
- Check that food is steaming hot and fully cooked before blending.

Equipment

- All equipment used such as a blenders, should be cleaned with warm soapy water and left to air dry after use or according to manufactures guidelines
- Ensure all extension sets and syringes are cleaned thoroughly according to manufactures guidelines after use.

Further information on food hygiene and how to store food safely can be found at the following websites or ask your child's dietitian.

www.nhs.uk

www.food.gov.uk

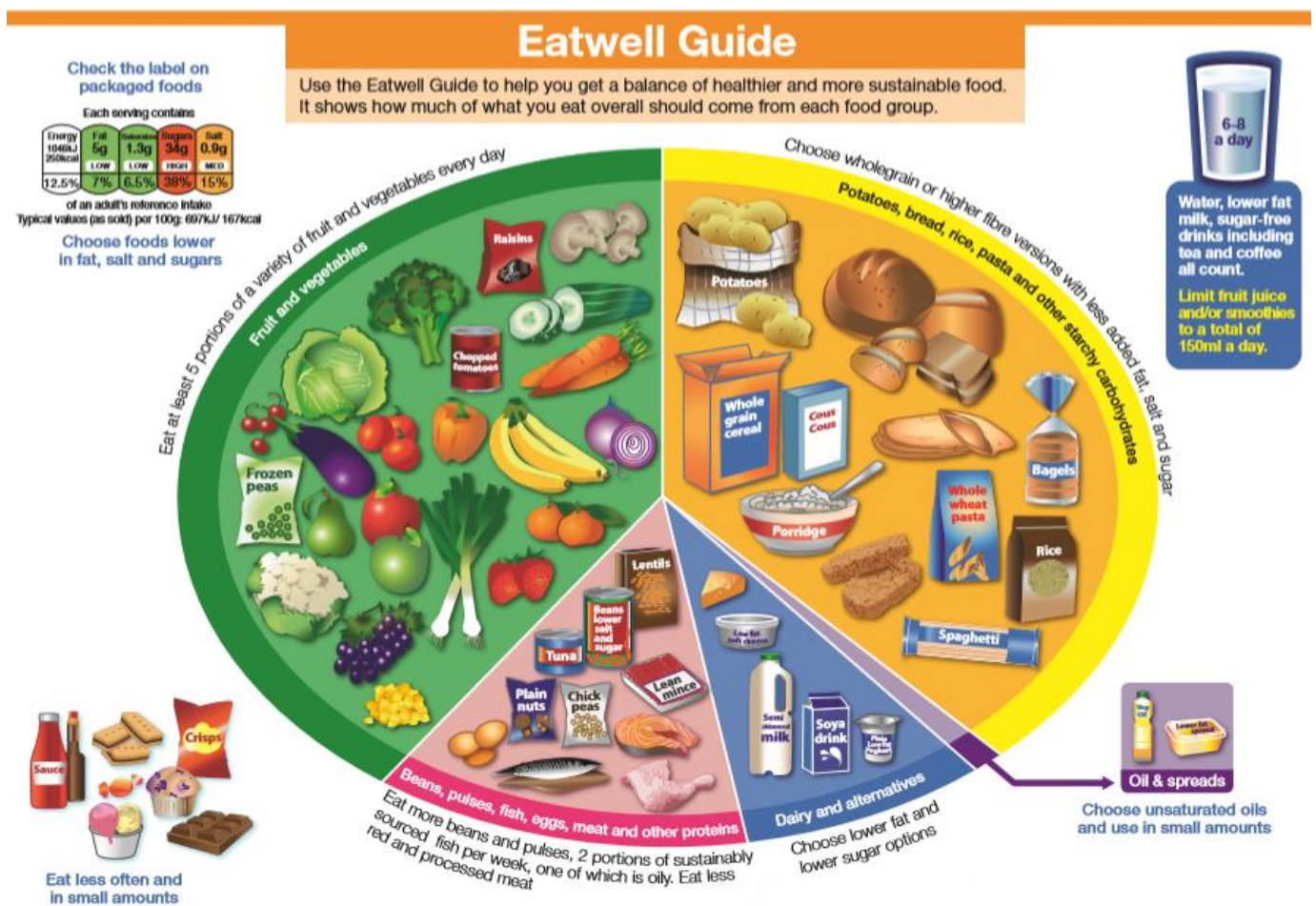
What foods should I blend?

Most food can be blended however you may need to pass the blend through a sieve to remove seeds and husks depending on how powerful your blender is (A metal sieve with 1mm holes is ideal). You may prefer to blend each meal separately just before giving it, or alternatively you may want to cook a large amount of food and freeze into individual portions. This is entirely up to you.

It is important to provide your child with a balanced diet, making sure they get enough energy, protein, vitamins and minerals to stay healthy. Your dietitian can give you/your child's estimated daily requirements as a starting point. This can then be divided between their daily blends.

Food can be split into four main groups:

- Carbohydrates
- Protein
- Fruit and vegetables
- Dairy (and alternatives)



Source: Public Health England in association with the Welsh Government, Food Standards Scotland and the Food Standards Agency in Northern Ireland

The Eatwell Guide shows how these foods should ideally be proportioned in your child's diet. This doesn't need to be achieved with each blend, but the balance should ideally be

achieved each day. Including a wide variety of foods from each group will help ensure that your child is meeting their nutritional needs.

If your child needs a special diet for their condition which doesn't follow The Eatwell Guide, your dietitian will provide you with more guidance as to how to tailor your child's blended diet to meet their needs.

Your dietitian can make recommendations to increase or decrease the energy and protein in the blend to promote a healthy pattern of growth. It is important that your child's weight and height are monitored. Your dietitian will also ask for a blended diet food diary to be completed to ensure all nutritional requirements are being met. It is possible to use prescribed enteral formula and blended diet in combination to ensure your child receives all the nutrition required for growth. Your child's dietitian will be able to give you advice about appropriate vitamin and mineral supplementation if required.

How do I prepare a blend?

There are different ways that blended diet can be used, your dietitian will work with you to identify the best approach. The main ways of using blended diet are listed below. You may find that your method changes over time or you use a combination, it's about what works best for you and your child.

- Batch cooking
- Blending individual/family meals
- Using set recipes
- Using in combination with oral intake

All ingredients should be prepared and cooked as per pack/recipe instructions. The foods should be blended until a smooth single cream consistency is achieved. You may need to add more liquid to the food to achieve a thinner consistency once it has been blended. If you find it difficult to smoothly draw up the prepared blend through a 60ml syringe, it may need blending for longer or more liquid added to make it a thinner consistency.

How do I transport and store the blend?

Blended food can be stored in appropriate food containers in the fridge for 24-48 hours or in the freezer for 1-3 months depending on the type of food used. It is recommended that these are clearly labelled with the date food was made and what the food is (you may need to put your child's name on the label if it is to be sent to school or other places).

Blended diet should be kept at room temperature for a maximum of 2 hours. If you are going out, cool bags (with an ice pack) are ideal to store the containers of blended food to keep them at an appropriate temperature for short periods of time.

How do I administer a blend?

Blended diet should be cooled to a temperature which could comfortably be eaten orally before administering it into a gastrostomy. The duration of a feed should take the same amount of time as it would to eat a meal. Once your blend is ready to be used:

1. Use a 60ml syringe and draw up or pour in the blended food into the syringe. If food is difficult to go through the syringe, it may be too thick or lumpy, in which case add more fluid and try blending it again.
2. Wipe the outside of the syringe with a clean cloth to get rid of any excess.
3. Attach the 60ml syringe to the gastrostomy.
4. Apply small gentle pressure on the syringe plunger – making sure that the blend will go gradually and smoothly through the syringe.
5. The blend should be given at a slow and steady rate 5-20 ml at a time, pausing in between to mimic the rate a person would eat food orally.
6. Repeat steps until the desired amount of blended diet has been given ('feeding plan' for amounts recommended).
7. Flush with enough water using a clean enteral syringe to clear the blend out of the gastrostomy tube.

Alternative feeding plans

It is the Newcastle Upon Tyne Hospitals Trust guideline to support blended diet when they are felt to be appropriate for your child. However, some care settings such as other hospitals, hospices and schools are unable to support blended diet. In this situation an alternative feeding regimen will need to be considered.

If your child is due to attend a care setting where blended diet is not supported, please inform your community dietitian to allow an alternative feeding plan to be developed. This should be reviewed regularly.

If your child is unwell and admitted into hospital, their nutritional needs can change. Therefore, it is important that a hospital dietitian assesses your child, even if blended diet can be provided.

Appendix 3: Example Shared Decision Making Tool

Source: The Newcastle upon Tyne Hospitals NHS foundation Trust)



It is important that you are fully aware of not only the benefits of blended diet, but also any considerations and what is entailed when commencing a blended diet so you can make an informed decision. These are discussed in more detail throughout this leaflet and should be discussed in person by you and your child’s dietitian.

Factor	Details
Enteral feeding device/tube	<ul style="list-style-type: none"> • Use of feeding device/tube (potentially outside of the manufacturers guidance) • Blockage of device by inappropriately blended food • Gastrostomy ideally ≥ 12 Fr • May require operation to replace blocked gastrostomy device • Not suitable to be given into jejunum or via NG
Equipment	<ul style="list-style-type: none"> • Cost of blender • Extra syringes may be required • Continuous feeding using a pump isn’t recommended for blended diet
Food safety and hygiene	<ul style="list-style-type: none"> • Wash hands thoroughly • Food ingredients and blends stored and transported appropriately • Food prepared and cooked appropriately • All equipment cleaned after use
Dietary aspects	<ul style="list-style-type: none"> • Blended diet is based around healthy eating (unless require specific dietary intervention) • Blends may have lower energy content than commercial enteral formula (larger volume may be needed) • Agree frequency of dietary analysis with your dietitian
Blends in other settings	<ul style="list-style-type: none"> • Are other care settings able to accommodate blended diet?
Outcome of decision:	

Appendix 4: Example Multi-Disciplinary Team Best Interest Statement

Re: Tube fed individual's name and Date of Birth

Tube fed individual's name is now fed using a 'blended diet' via their Enteral Feeding Tube

A blended diet means every day foods are blended with a liquid to a consistency which can be administered via an enteral feeding tube. Blended diet is known to have both physiological and social benefits for some tube fed individuals, particularly those who are long-term tube fed at home. The reason why it has positive effects for some tube fed individual is not fully understood. However, the British Dietetic Association has advised this type of enteral feeding can be offered as an option when there are physical or social benefits to the tube fed individual (BDA 2019). A decision was made with name(patient)/parent(s)/carer(s) and the healthcare professionals involved in their care to trial blended diet at home, this trial started on date. Since starting blended diet tube fed individual's name has experienced the following benefits.....

Provision of blended diet in education or respite setting would maintain consistency of care and minimise potential discomfort and distress. I am happy to support education or respite care setting and patient/parent(s)/carer(s) to plan how blended diet can be safely provided in this setting. Staff will need appropriate training on preparation, storage and administration of food blends.

Appendix 5: Example Blended Diet Competency Training Pack

To be signed off by the registered nurse (RN) responsible for the training of delegated tasks

Trainee Name: **Blended Diet (BD): Make up and Administration via Enteral Feeding Ttl**

Initial Competency Sheet (minimum of 3 assessments)

Trainer Name: **Annual review competency**

Date of Blended Diet Theory Session:

Date of Enteral Feeding Theory Session:

Number and Action	Date:		Date:		Date:		Date:		Comments
	RNs sign	Trainee sign	RNs sign	Trainee sign	RNs sign	Trainee sign	RNs sign	Trainee sign	
1	Trainee can explain the reasons why a blended diet may be requested								
2	Trainee can explain: <ul style="list-style-type: none"> • process of preparing a blended diet • process of administration of the blended diet via a feeding tube • importance of food safety and good kitchen hygiene • troubleshoot any difficulties 								
3	Trainee can identify and explain specific safety steps needed when preparing of a blended diet								
4	Trainee can identify and explain specific safety steps needed when administrating blended food via a feeding tube								
5	Trainee can confidently and safely prepare and administer a blended diet <ul style="list-style-type: none"> • ensures consent prior to intervention 								

Practice Toolkit: The Use of Blended Diet with Enteral Feeding Tubes (2021)

	<ul style="list-style-type: none"> explains procedure privacy and dignity to be upheld at all times appropriate equipment prepared individual correctly positioned 									
6	<p>Correct procedure carried out as identified in the care plan</p> <p>To include an explanation and demonstration of the requirement to flush the tube before and after the feed.</p>									
7	<p>Trainee is aware of standard precautions of infection control and can demonstrate:</p> <ul style="list-style-type: none"> hand washing disposal of any waste cleaning of all equipment aseptic non-touch technique process 									
8	<p>Trainee records all care in the appropriate documentation, including handover (as appropriate to care environment)</p> <p>Informs RN of any issues</p>									
<p>Action Plan:</p>										

COMPETENCE TO PRACTICE (to be signed off when identified carer has been deemed competent to undertake the task alone)

I can confirm that I have observedundertaking the administration of blended diet via a syringe through a gastrostomy device and that she/he completed the task according to local protocols and procedures. I am satisfied that she/he has demonstrated the underpinning knowledge required.

Nurse Trainer signature:

Nurse Trainer (printed):

I can confirm that I have been observed undertaking this task. I understand that I am accountable for the maintaining my competencies in this intervention and I feel confident to carry out this procedure autonomously. I will access refresher training if there are significant changes or long time lapse.

Learner signature:

Learner Name (printed):

Appendix 6: Example Multiagency Care Plan

Multi- disciplinary care plan for schools/hospice/respice centres

Administration of Blended Diet via Low Profile Gastrostomy Device (LPGD) - Syringe Method

Name:
Address:
D.O.B:
School:

Need	Outcome	Person responsible:
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<p>Preparation of blended diet</p> <ol style="list-style-type: none"> 1. Ensure all catering staff have received training in preparation and storage of blended diet. 2. Blend a standard portion of the school meal using an industrial (catering) blender, e.g. Vitamix, to achieve a mildly thick/liquidised/puree consistency compliant with IDDSI LEVEL 2/3/4 (please reference the blended diet training for more information). 3. The blended diet can be passed through a metal sieve (with holes of 1mm) to ensure there are no lumps. 4. To ascertain correct consistency, the IDDSI fork drip test and/or IDDSI spoon tilt test can be used. 5. A small volume of milk/gravy/fruit juice may still need to be added to obtain the correct consistency (actual quantity may vary depending on the type of food used). 6. Pour into a clean, sealed, labelled container. The label should indicate the child’s name, date/time of preparation, main ingredients and portion size. 7. Add extra ingredients if advised by dietitian. 8. Clean the blender after each use; fill blender with hot water and washing up liquid and turn on blender; then wash up as normal. 	<p>To blend food to correct consistency to avoid tube blocking</p> <p>To minimise cross contamination</p> <p>To ensure safe storage, minimise cross contamination and prevention of food borne infection.</p>	<p>Catering staff</p>
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<p>9. Blender jug will be sterilised using a sterilising liquid/tablet (e.g. Caterclean 50) at least once a month (and on the last day of every half term for schools).</p> <p>Storage of Blended Diet</p> <p>10. Blended diet should be prepared as close to the administration time as possible and should not remain at room temperature for longer than 2 hours (this includes the time for administration of feed).</p> <p>11. Blended diet may be stored in clean, sealed, labelled container on the top shelf of a fridge (below 5°C) until the end of the day.</p> <p>12. To bring to room temperature, remove from fridge or blast chiller thirty minutes before to enable the food to return to room temperature.</p> <p>13. Check the blended diet consistency as per the IDDSI fork drip test/ spoon tilt test (extremely thick).</p> <p>Administration of Blended Diet</p> <p>14. Ensure all appropriate staff in the school have received training and are assessed as competent in the administration of blended diet via syringe and management of LPGD.</p> <p>15. Blended diet will be collected from the kitchen and taken to the child by identified staff member (who is assigned to administer the blended diet to the child). Ensure that the label is correct and corresponds to the child i.e. name, date/time of preparation, and volume.</p>	<p>For safe administration of blended diet as per feed plan.</p> <p>To ensure process is clean and all precautions are taken to avoid contamination.</p> <p>To ensure blended diet is administered in a timely manner.</p>	<p>Catering staff</p>
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<p>16. Prepare child and ensure they are seated appropriately and maintain the child's dignity.</p> <p>17. Effective hand washing prior to preparing for administering the blended diet.</p> <p>18. Gather all necessary equipment ready and place on a clean surface:</p> <ul style="list-style-type: none">• 60ml enteral feeding syringe• Clean bowl• Extension set• Clean container of water for flushing• Enteral syringe for flushing (according to feed plan)• Blended diet <p>19. Shake the container of blended diet and pour container into the bowl.</p> <p>20. Prime the extension set with drinking water and place clamp on.</p> <p>21. Detach syringe, open cap on LPGD and connect extension set to LPGD.</p> <p>22. Draw up volume of water as per feed plan using syringe.</p> <p>23. Attach syringe to extension set, open clamp and administer water flush, close clamp. Detach syringe.</p> <p>24. Using a clean 60ml syringe, draw up 60ml of blended diet from the bowl.</p>		<p>Identified staff member administering the blend</p>
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<p>25. Attach syringe to extension set and unclamp.</p> <p>26. Administer blended diet using a slow steady motion. This should be at a pace that is comfortable for the child and the person administering the feed.</p> <p>27. Clamp the extension set and detach the syringe from extension set.</p> <p>28. Draw up another syringe and continue points 12 – 14 until no blended diet left in bowl/total volume is administered.</p> <p>29. Clamp the extension set and remove syringe.</p> <p>30. Administer water flush, close clamp and detach syringe.</p> <p>31. Disconnect extension set and replace cap on LPGD, ensuring the child is comfortable.</p> <p>32. Wash extension set, bowl and syringes in hot soapy water, rinse under running water and air dry. Store in a clean, dry container with the clamp open.</p>	<p>To ensure tube patency and avoid administering unwanted air.</p> <p>To enable re use of equipment whilst minimising cross contamination</p>	
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<p>Individuals Agreement:</p> <p>Does person/parent/carer agree with the care plan? Yes / No If no, please state why</p> <p>Person/Parent/Careragrees with this plan</p>	<p>Information Sharing Agreement:</p> <p>Has consent been obtained to share information contained within this care plan, with Health and Social Care agencies as necessary? Yes / No</p> <p>If NO, please state why not:</p>
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Date Care Plan Agreed:

Parent:	Sign:	Date:
1-1 Carer:	Sign:	Date:
School/Hospice/Respite centre - Staff Lead:	Sign:	Date:

Enteral Feeding/Community Nurse:	Sign:	Date:
Dietitian:	Sign:	Date:

Appendix 7: Updating Local Policy on Blended Diet

The BDA Policy Statement (1) and this Practice Toolkit cannot supersede an employer's stated policy. If a dietitian's employer (trust or board) has a policy which specifically prohibits the use of blended diet, dietitians should adhere to it. However, dietitians should use these documents and the evidence contained within them to encourage a change in any trust or board policy that prohibits the use of blended diet. Some of the working group members have experience changing local policy. Having a clear local policy in place can be beneficial for the dietitian, the trust and the tube fed person as it ensures equitable and quality care.

How to approach changing local policy:

1. Understand your Trust's clinical governance framework and seek support from this team

This team works to ensuring the Trust is accountable for continually improving the quality of our services and safeguarding a high standard of care. All staff are responsible for Governance in the Trust but, this team has specific staff to help manage the process.

2. Use this Practice Toolkit and evidence base to create your blended diet documents:

A good starting place would be three documents:

- A shared decision making tool
- Supportive literature on blended diet for parents based on summaries of good practice
- Information on offering blended diet in the acute setting

You must be happy with your documents when you send them to governance. Spelling or grammar mistakes will not be picked up in this process, but may mean the documents come across as unfinished throughout the governance process so you may like to ask a colleague to proofread them first.

3. Send document(s) to Governance for approval

If possible, identify the date where they will be meeting to discuss the document(s). It is beneficial to attend these meetings to support with answering any queries and offer context. It is also helpful to understand any changes that the Trust would like you to make before approval.

4. Don't be disheartened if you don't get approval first time

This is not unusual, often several governance meeting are required to approve literature especially in an area which is considered to be a new.

An example of when local policy has been supportive was recalled by a member of this group who had a young person on their caseload who was fed blended diet and became unwell with salmonella. As salmonella can be contracted through various sources, the cause could not be clearly linked to this individual's blended diet, but the incident was reported to Public Health England as per protocol. Public

Health England reported that they would review the serotype and ensure it was not linked to an outbreak, but otherwise decided not investigate the situation further. At the time of this incident the local policy, paperwork and documentation gave the dietitian and the wider multidisciplinary team confidence and reassurance that they had worked within a safe scope of practice

Appendix 8: Useful Sources of Information

BOOKS

Dunn Klein M and Evans Morris S (2017) Homemade Blended Formula Handbook

O’Gorman E A (2012) Complete Tube Feeding

WEBSITES

Dietitians Interested in Special Children (DISC)

<https://www.facebook.com/groups/489869594729989/?ref=share>

Stevens K - Blended diet for tube fed children in the UK <https://renacahill.wixsite.com/blended-diet-online>

Facebook – Blended Diet UK <https://www.facebook.com/groups/278702472183551/?ref=share>

Feeding Tube Awareness <https://www.feedingtubeawareness.org/blended-diets/> (US based site)

The Oley Foundation <https://www.oley.org>

INFORMATION ON SAFETY

Guidance and examples – International Decision Aid Standards (IPDAS) collaboration

<http://www.ipdas.ohri.ca/>

Advice on handwashing: <https://www.food.gov.uk/sites/default/files/media/document/handwashing.pdf>.

Children’s Food: safety and hygiene:

<http://www.nhs.uk/Conditions/pregnancy-and-baby/Pages/food-safety-hygiene.aspx>

How to store food and leftovers:

<http://www.nhs.uk/Livewell/Homehygiene/Pages/Homehygienehub.aspx>

Brown S. syringe plunge administration method YouTube demonstration:

<https://www.youtube.com/watch?v=fFA-AkZ4EEc>

More information on cleaning and cross-contamination can be found at:

<https://www.food.gov.uk/safety-hygiene/cleaning>

<https://www.food.gov.uk/safety-hygiene/avoiding-cross-contamination>

Appendix 9: Advice on Food Hygiene from Food Standards Agency

This advice received from the Food Standards Agency in relation to Blended Diet given via enteral feeding tubes. General public health advice on food hygiene and safety can be found at www.food.gov.uk.



Dear Denise Kennedy,

RE: Blended diet as enteral feeds

Thank you for your recent enquiry as regards food safety considerations for blended diet that are given as enteral feeds. Following our phone call on Tuesday 24/11/20, the FSA has considered this issue and the potential risks. Our view is that our usual FSA guidance for consumers should be followed when preparing, handling, and storing blended foods. All of our guidance can be found at www.food.gov.uk

We considered the question "Are blended foods covered by standard FSA advice for food preparation or are there any extra risks that need to be considered?" In addition, we have considered the questions you raised in your email on Friday 20/11/20. I have enclosed our comments for your consideration as part of this letter, and I hope this will assist you in the development of the food safety aspects of your Practice Toolkit.

The FSA cannot provide a view on the safety or efficacy of such diet from a clinical viewpoint, including the nutritional aspects and infection prevention considerations associated with the mode of delivery. We have instead focused solely on the safe preparation, storage and transport of food, which in this context is blended. Nevertheless, we have given consideration to the additional steps required to achieve the correct consistency, and how this might change advice on food handling/cooking.

As the majority of the guidance BDA are producing on blended diet for enteral feeds falls outside of FSA remit, we are unable to endorse the guidance or collaborate on its production. However, our own guidance as mentioned above is available in the public domain, which you may refer to, and we are happy to consider food safety questions you may have.

Kind regards,

Tara French

Foodborne Disease Control, Food Policy Division, Food Standards Agency, Floors 6 and 7, Clive House, 70 Petty France LONDON SW1H 9EX.

[Are blended foods covered by standard FSA advice for food preparation or are there any extra risks that need to be considered?](#)

Definition of blended diet:

The use of blended food administered into an enteral feeding tube is commonly referred to as following a 'blended diet'. Alternative descriptions exist including liquidised tube-feeds, blenderised food, liquidised diet and pureed table food. Such foods are being blended at home, by the caregivers.

Hazard Identification

Blended foods as defined above can include every possible combination of ingredients and cooking processes that can be used in a home setting. Therefore, it is not possible to identify a single hazard to focus a risk assessment on. A HACCP would be a more appropriate approach in such cases in commercial settings, but it is not a realistic expectation in a home setting. Therefore, the different stages of food preparation, cooking and storage were considered instead, and general advice is provided below. Processes unique to this type of food were considered wherever possible.

Food preparation

Most foodborne pathogens grow best at temperatures near the human body temperature with a window of favourable temperatures between 8 and 60 °C. However, some microorganisms can survive and even grow outside that range, notably *Listeria monocytogenes* which can grow at low temperatures (less than 5 °C), albeit at a slow rate. It is also important to remember that the time a microorganism spends at an ideal growth temperature also affects whether growth will occur.

By using temperature and time appropriately, microbial pathogens in food can be controlled effectively. Therefore cooking, cooling, freezing and general storage conditions are critical in controlling foodborne illnesses.

Cooking

Cooking foods until they have reached 70°C and stayed at this temperature for at least 2 minutes is usually sufficient to kill bacteria including foodborne pathogens such as *Listeria monocytogenes* and *Salmonella*. Other cooking and time combinations can be found at <https://www.food.gov.uk/safety-hygiene/cooking-your-food>. Food properties such as water, fat, salts, carbohydrates, pH and proteins affect the heat resistance of microorganisms. Typically, foods high in moisture reduce heat resistance. For liquid and homogenous foods, such as some types of soups, that are stirred frequently during cooking, a thermometer can be used to check that the recommended temperature has been reached and it can be assumed that this temperature is the same everywhere in the pot. However, more care is needed to check that foods are cooked right through if different sized solid pieces are present. Depending on whether blended foods are homogenised before or after cooking is completed, using a thermometer may be an option to ensure food safety.

Storage

Although cooking can kill pathogenic microorganisms present in foods, some bacteria such as *Clostridium botulinum* and *Bacillus cereus* produce spores, which survive high temperatures. Also, if parameters in foods, such as fat/oil content and pH, are favourable some vegetative cells may survive cooking temperatures. Given the right length of time under favourable conditions, e.g., temperature and availability of water, bacteria can re-grow. Appropriate storage conditions such as chilling and freezing are necessary to prevent or restrict microbial growth in foods.

Chilling

Room temperatures are ideal for the growth of most foodborne pathogens. Foods high in moisture also offer ideal conditions for microbial growth. For this reason, foods with water activity (a_w), higher than 0.85, require refrigeration (less than 5 °C). Such foods include fresh meat, fish, fruit and vegetables, milk, sausages, cheese, most cooked foods and even bread.

The time it takes for bacteria to start growing is called the lag phase. Cooked foods should be cooled down as quickly as possible and in less than 1 hour, because this is how much time many bacteria need to get from the lag phase to the growth phase (log phase). Cooled foods can then be placed in the refrigerator. It is best practice to avoid placing hot foods in the refrigerator as this can reduce the temperature and encourage bacterial growth.

Freezing

Once cooled down, foods can also be frozen to increase shelf-life. Freezing temperatures can kill some bacterial species but will only stop the growth of others without affecting their viability. When foods are defrosted, moisture and temperature gradually reach ideal values for bacterial growth and microorganisms or spores present in the food can potentially resume growth. Defrosting in the fridge reduces the likelihood of food temperatures reaching favourable values for growth. If food is defrosted at room temperatures, microorganisms on the outer layers that are defrosting faster may start growing while the core is still frozen. More information on chilling and freezing can be found here: <https://www.food.gov.uk/safety-hygiene/chilling>

Storage related questions

- How should blended meals be stored during transport to school?
- How should these be stored in school?

Time spent in transport and storage at school counts as part of the whole storage period for the foods. Therefore, appropriate storage conditions should be maintained throughout. Ideally the food should be maintained at temperatures less than 5 °C during transport and at school until ready for feeding. This is in order to prevent fluctuating temperatures that could facilitate microbial growth. Transportation can be facilitated by the use of a cool box and ice or gel packs that are evenly distributed in the box. Considerations such as whether schools have the right equipment to store the foods safely in terms of temperature, e.g.

fridge, and steps to avoid cross contamination may affect the decision on how the food is transported to school.

- Food is usually given via syringe, but some would like to use a feeding pump to give it more slowly over a longer period. What period of time can a blended meal be hung for (at room temperature)?

Cooked foods should not be stored at room temperature for longer than 2 hours and this applies in the case of feeding pumps as well. As explained above, this is in order to prevent or minimise bacterial growth. An additional consideration in this case would be the germination and growth of spores of anaerobic bacteria such as *Clostridium* spp. if there is a lack of oxygen inside the pumps. This would also have implications for the cleaning of the equipment.

Reheating

If chilled or defrosted stored food needs to be reheated, it needs to be heated through until it reaches 70°C for at least 2 minutes (or an equivalent time/temperature), or the food needs to be steaming hot throughout. This is also important if a microwave is used for reheating.

Reheating related questions

- Do foods have to be re-heated? Is it different for a meat/fish containing meal versus a non-meat/fish containing meal? Reheating is a constant subject of debate on a parents Facebook group.

If blended foods are cooked and stored appropriately (at the right temperature for the right length of time, e.g. stored in the fridge and consumed within 2 days) it can be assumed that they are safe to eat and, in this case, reheating would not be necessary for safety reasons.

Meat and fish are both high protein and high-water activity foods and therefore they are more likely to contain higher levels of microbes to start with. However, there are other foods that may not have the same characteristics but can still be high risk due to the presence of sporeforms. For example, *Bacillus cereus* can be present in foods such as pasta and rice. Any food that has been cooked and stored properly should be safe to eat whether meat and fish are ingredients or not.

- One school is asking parents to send food in 60ml syringes and for it not to be reheated in school.

We cannot comment on the suitability of syringes for food storage. Microbial growth, as well as chemical migration from the plastic, should be assessed for such a conclusion to be reached. Additionally, if syringes are being reused, cleaning regimes should be appropriate to ensure microorganisms are not given the opportunity to grow between uses.

Cleaning and Cross contamination

Proper hand washing, cleaning and disinfecting of surfaces, utensils and equipment before food preparation is important to prevent microorganisms from the environment to transfer into foods.

Preparing and storing foods hygienically is important in order to prevent bacteria from transferring from one surface or type of food to another. This is especially true when preparing raw meat and fish.

More information on cleaning and cross-contamination can be found in the links below:

<https://www.food.gov.uk/safety-hygiene/cleaning>

<https://www.food.gov.uk/safety-hygiene/avoiding-cross-contamination>

Precautions in the case of immunosuppressed individuals

When an individual who is considered more vulnerable to foodborne infections, e.g. immunocompromised, needs to be fed a blended foods diet, this should be reflected in the selection of foods to be included in the blend. This is unless further processing, e.g. cooking, will mitigate the risk. As an example, foods like unpasteurised milk and cheese, as well as cold deli meats, can sometimes harbour *Listeria monocytogenes*, which is known to cause more severe illness in such individuals compared to the general population.

Business related questions

- Is there a requirement for teaching/healthcare assistants to be trained in food hygiene if they are giving blended diet?

EU Regulation (EC) No 852/2004 sets down the general hygiene requirements for food business operators (FBO). It covers the hygiene requirements for premises and facilities through to the personal hygiene of staff and requires food businesses to notify the relevant competent authority (local authority food safety team) who will determine the need for registration. Where the local authority determines that the activities carried out by the business require registration, the requirements of 852/2004 apply. The legislation requires in particular that FBOs put in place, implement and maintain a permanent procedure, or procedures, based on HACCP principles (EC 852/2004, Article 5) and be able to demonstrate that any staff handling food were supervised and instructed and/or trained in food hygiene matters commensurate with their work activity (EC 852/2004, Annex II, Chapter XII). It is not mandatory for anyone working in, or managing, a food business to have attended a formal course or gained a qualification in food hygiene. It is possible to demonstrate the knowledge in other ways, such as prior knowledge or on-the-job training. The need for registration will depend on the level of continuity and degree of organisation involved in the activity. The supply of food, whether by a registered food business operator (FBO), or in a situation where the activity is not deemed registerable, must be safe.

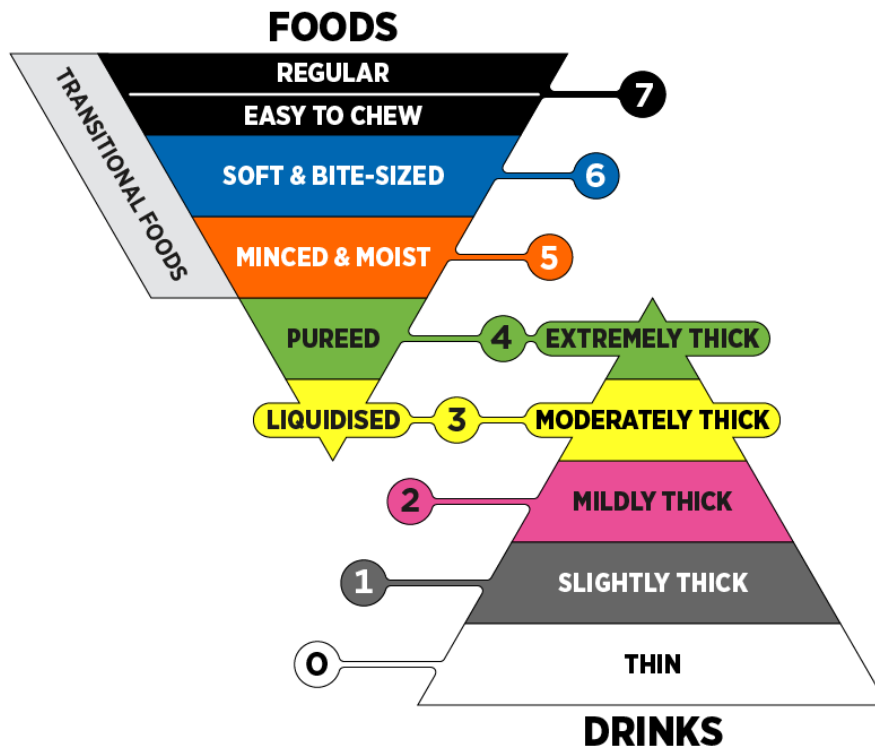
Appendix 10: The International Dysphagia Diet Standardisation Initiative (IDDSI)

The IDDSI was developed to standardise the recommendations and food consistency in the management of dysphagia. IDDSI has been proposed as a way in which the required viscosity of blends can be communicated across different care settings (50). Blends will range between 0-3. The full IDDSI framework is available from:

https://www.iddsi.org/IDDSI/media/images/Complete_IDDSI_Framework_Final_31July2019.pdf

The IDDSI Framework

Providing a common terminology for describing food textures and drink thicknesses to improve safety for individuals with swallowing difficulties.



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Derivative works extending beyond language translation are NOT PERMITTED.

Author Biographies

Dr Sarah Durnan (Co-Chair, Blended Diet Working Group)

Honorary Assistant Professor, Centre for Children and Young People's Health Research (CYP-HR), Faculty of Medicine and Health Sciences, University of Nottingham. In her role as Clinical Lead Dietitian for Children's Home Enteral Tube Feeding at Nottingham University Hospitals NHS Trust Dr Durnan has supported many families to use blended diet. Dr Durnan's doctoral research explored individual parents' experiences of choosing a blended diet for their tube fed child; this work has been presented at the British Association for Parenteral and Enteral Nutrition (BAPEN) annual conference in 2018 and The European Society for Paediatric Gastroenterology Hepatology and Nutrition (ESPAGHAN) International Conference in 2019. Dr Durnan continues to focus on blended diet in her post-doctoral studies. Prior to her PhD, Dr Durnan undertook a three-month Roosevelt travelling scholarship to the USA investigating the topic of blended diet and sharing best practice. Member of British Dietetic Association (BDA) Paediatric group and the Parenteral and Enteral Nutrition Group (PENG).

Ailsa Kennedy (Co-Chair, Blended Diet Working Group)

Ailsa is a Team Lead Dietitian at MerseyCare NHS Trust Community Division. Ailsa is the dietetic lead for transition of paediatric tube fed patients from Alder Hey to Liverpool community adult services. She is a BDA/PENG Committee member co-leading on adult Home Enteral Tube Feeding, and contributes to the clinical update Masters module. She is the BDA representative on the industry Enteral Plastic Safety Group, hosted by the British Specialist Nutrition Association (BSNA). She has been the BDA PENG representative on matters relating to the administration of blended diet via enteral feeding tubes, and co-authored the original public facing BDA Policy Statement. Ailsa co-authored the original Practice Toolkit, leading on the risk assessment element of the document.

Denise Kennedy

Denise is an experienced children's community dietitian working for First Community Health and Care CIC, an organisation providing community NHS services in east Surrey and the north part of West Sussex. The team covers a community caseload including a large cohort of children with complex needs and neurological disability who are gastrostomy fed, many of whom are supported by the team for the whole of their childhood. Denise is a member of the BDA Paediatric Group, and is currently Chair of DISC (Dietitians Interested in Special Children) – a support group for dietitians working with children in the community with complex needs and requiring home enteral tube feeding. She has an active interest in blended diet and has supported children and their families to move fully onto a blended diet, witnessing some of the life-changing positive impacts that this has had.

Ruth Stanley

Ruth is the Lead Paediatric Gastroenterology Dietitian at the Great North Children's Hospital in Newcastle upon Tyne. She has been successfully providing support to a large number of patients with a variety of medical conditions using blended diet for over five years. Recognising the clinical benefits that blended diet

can provide to a number of her patients, Ruth has been actively involved in improving the blended diet experience for patients during their hospital admissions. Ruth co-produced her NHS Trust guidelines for the use of blended diet via gastrostomy for inpatients, which has also been adapted in a number of other centres. Following this, she has produced standard blended diet recipes for her NHS Trust which can be used during a patient's admission to hospital.

Sarah Donohoe

Sarah Donohoe is the lead paediatric community dietitian at South Tees NHS Foundation Trust in Middlesbrough. She developed her NHS Trust policy for blended diet with the support of a Consultant Paediatrician colleague. She has also facilitated the introduction of blended diet into local schools and Children's hospices. Sarah has been actively involved in educating dietitians and multidisciplinary colleagues about the potential physical and the emotional benefits of a family trying a blended diet.

Sian Thomas

Sian is a Consultant Nurse in Child Health at Aneurin Bevan University Health Board (ABUHB). She has supported children and young people to receive blended diet in the school setting and co-produced the Health Boards protocol for administration of blended diet. Her clinical and research interests focus on the administration of blended diet via enteral tube and she has conducted research and published in this area. She is a Florence Nightingale Foundation Scholar and in 2019 undertook a travel scholarship to the United States to explore the use of blended diets at Seattle and Boston Children's Hospitals. She is a Trustee of Ty Hafan Children's Hospice.

Lucy Constable

Lucy is an experienced paediatric dietitian working across acute and community settings for the Royal Devon and Exeter NHS Foundation Trust. Within this role Lucy has provided support for a number of tube fed children and their families who have opted to use a blended diet. As a result of working with families who have chosen blended diet over the years, Lucy has recognised the clinical benefits and overcome practical barriers which they presented. This has led to a clinical interest in the area and the development of blended diet policies and literature both locally and across the South West of England.

Wider Expert Consultation

Special thanks to the parents/carers, clinicians and academics who contributed to the review and development of this Practice Toolkit. *In alphabetical order:* Kiran Atwal, Samantha Buck, Dr Su Bunn, Dr Anne Breaks, Suzanne Brown, Steve Brown (PINNT), Linda Cantwell, Professor Jane Coad, Sally Collett, Liz Collyer, Stacey Durham, Louisa Fogg, Louise Heywood, Judy Hughes, Robert Ives, Dr Susie Lapwood, Dr Angela Madden, Katherine McCormick, Susan Meredith, Debbie Miller, Gemma Philips, Amy Pratt, Hannah Queenan, Carly and Andrew Roberts, Rachel Snelson, Amanda Stobbs, Danel Tainton, Kayleigh Wantling, Marie Watson and Professor Kevin Whelan.