High Protein Tube Feeding in the Community

Do we need to do more?

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In recent years evidence has demonstrated the need for an increase in protein requirements in enterally-fed critically ill and acute patients.[1] This has led to protein requirements for long-term community enterally-fed patients being questioned, as evidence in this specific patient cohort is lacking.

Within the last five years, the Gloucestershire Hospitals NHS Foundation Trust (GHT), Home Enteral Feeding Team (HEFT) has increased the use of high protein (defined as at least 20% of energy from protein)[2] enteral tube feeds, including tube-administered oral nutritional supplements (ONS), with 25% (n = 74/294) of the adult caseload receiving these types of products as all or part of their feeding regimen. Key factors for this change in practice include a high proportion of both learning disability and neurological patients who typically require low volume feeds, alongside an ageing cohort with both poor mobility and skin integrity.

Since consciously increasing our use of high protein formulations we have anecdotally recorded improved outcomes for our patients.

Malnutrition has a significant impact on healthcare provision with malnourished patients requiring 82% more hospital admissions, >30% increased length of hospital stays, and greater community healthcare use.[3, 4, 5] In addition, the ageing population and the impact of chronic long-term conditions on nutritional status have all been recognised by ESPEN (2014)[6] and PROT-AGE (2013)[7] as key factors in the drive to consider higher protein requirements.

Historically, acute dietitians would typically start an enterally-fed patient on a standard polymeric feed (1 kcal/ml and 4 g protein per 100 ml, as depicted in **Table One**), with the HEFT continuing this in the community. But with the latest evidence from the acute setting,[1] the focus on providing optimal energy has been surpassed by prioritising protein requirements. This is reflected in a change of practice towards the use of higher protein formulations. Currently there is a gap in the research in community enterally-fed patients and their optimal long-term nutritional requirements. This emerging evidence from the acute setting was used to update and re-focus our dietetic goals with our long-term home enteral feeding (HEF) cohort.

With this is mind, the HEFT in Gloucestershire now makes a conscious effort to improve the protein provision in all patients in line with the ESPEN guidelines, as outlined in **Table Two**. We define a high protein intake as more than 1.2 g/kg body weight/day or where protein provides over 20% of the total daily energy intake, and we have recently increased our high protein feed prescription use to over 25% of our adult patient caseload.

Table One: Enteral Tube Feed Composition

Type of feed	Energy kcal/ml	Protein g/100 ml
Core standard feeds	1.0	4.0
High protein feeds	1.25/1.28	6.3
High protein critical care feed	1.28	7.5

Table Two: Recommended Protein Requirements

Patient type	g/kg body weight/day
Healthy older people >65 years[6]	1.0-1.2
Older people, malnourished or at risk of malnutrition[6]	1.2-1.5
Older people with severe illness or injury[6]	even higher
People at risk of developing or those with pressure ulcers[8]	1.25-1.5
Sarcopenia[9]	>1.0

Following our change in practice, the team has observed a wider range of benefits highlighted in **Table Three**.

However, we note that simply administering a high protein enteral tube feed should not be interpreted as a high protein intake, as a high protein enteral tube feed may simply be aiding patients to meet their minimum protein requirements. For example, Patient C (**Table Four**) was delivered 25-36% of their calorie intake from protein, but this only provided 1.0-1.1 g/kg/day and is therefore not considered a high protein intake.

Other considerations should also be taken into account, as while the recommendations on protein requirements have increased, a high protein intake is not clinically suited for all patient groups. As an example, drug absorption rates may be affected by protein levels and therefore patients receiving Levodopa treatment for Parkinson's disease require timing of high protein feed to be arranged around their medication.[10] Therefore, we ensure other treatments are considered when optimising protein delivery.

To guide our practice alongside the acute evidence, we acknowledge evidence of improved outcomes using ONS in longer term community patients who better represent our patient cohort. A systematic review by Cawood *et al.* (2011)[11] in a range of patients with a variety of conditions, including COPD, hip fractures, pressure ulcers and acute illness, demonstrated improved outcomes when high protein ONS were used in the management of disease-related malnutrition. The benefits showed improved clinical, financial, and nutritional outcomes as well as improvements in anthropometric measurements, including handgrip strength (HGS), suggesting functional improvements for patients.

In our patient cohort we have observed improvements in anthropometric measures correlating with increased protein intake, demonstrated by Patient A (**Table Four**). This patient suffered with recurrent aspiration pneumonia, struggled with both bolus and pump feeding, as well as declined carer input. His oral intake was minimal and further declined with progressive swallow deterioration. Frequent HEFT reviews and anthropometric measures were conducted, including HGS,

Table Three: GHT HEFT Clinical Outcomes of Using High Protein Enteral Tube Feeds and Long-term Implications for Patients with Inadequate Protein Intake

Outcomes of patients on high protein feeds	Long-term implications for patients with inadequate protein intake
Evidenced in our cohort – refer to Table Four • Improved anthropometric measurements • To aid wound healing • Pressure sore prevention • Maximisation of rehabilitation potential • Improved QOL • Achieving minimum protein requirements in patients who have lower calorie needs Other • Reduced strain on other NHS and Care services (Tissue Viability teams, acute services and respite beds) • Reduced mortality	• Development or delayed healing of pressure sores and wounds, impacting on the Tissue Viability services • Delayed recovery from infections • Delayed rehabilitation and limiting rehabilitation potential • Increased admissions to acute and respite settings following complications • Fatality

Table Four: GHT HEFT Patient Examples (A-E) and Outcomes Using High Protein Feeds

	Diagnosis & mobility	Weight & BMI	Kcal per day	Protein (g/day, g/kg/day and % of kcal from protein)	Regime rationale	Clinical outcomes
A	Acquired brain injury following fall (hit by slow-moving car) Mobility: able to walk slowly with aid of zimmer frame	44.4 kg aiming for weight gain BMI: 15.0 kg/m^2	2000	• 100 g/day • 2.2 g/kg/day • 20% of kcal from protein	• Prevent pressure sores • Ensure optimal immune function • Rebuild and maintain muscle mass • Encourage weight gain as severely underweight • Create a regime suitable for patients social situation	Intentional weight gain, improved MAMC, maintenance of skin integrity, increased energy and strength to facilitate ongoing physiotherapy at home
B	Spinal injury (C4 and C5 dissertation fracture ASIA B) Mobility: bedbound	63.2 kg BMI: 22.0 kg/m^2	1325	• 74 g/day • 1.17 g/kg/day • 22.3% of kcal from protein	• Prevent and treat pressure sores	Pressure sore improved from grade 2 to grade 1, improved satiety
C	Multiple sclerosis (secondary progressive), Grade 4 pressure sore Mobility: bedbound	83.6 kg aiming for weight loss BMI: 34.3 kg/m^2	1000-1200 (depending on daily oral intake)	• 77 g/day from feed (0.92 g/kg/day) + oral intake estimated at 10-15 g/day • 1.0-1.1 g/kg/day • 25-36% of kcal from protein	• Prevent and treat pressure sores • Encourage gradual weight loss	Pressure sore improved from grade 4 to healing grade 4 within 3 months whilst weight has reduced by >1.4 kg. After increased protein intake and respite admission for wound healing, patient was able to return home
D	Multiple sclerosis, Bi-lateral below-knee amputee Mobility: wheelchair/ bedbound	67 kg BMI: 21.5 kg/m^2	1590	• 104 g/day • 1.6 g/kg/day • 26% of kcal from protein	• Aid healing of ulcers • Aid healing of wounds following leg amputation	Wounds healing correctly and in a timely expected manner
E	Cerebral palsy Mobility: bedbound, involuntary arm movements	48.8 kg aiming for weight gain BMI: 13.8 kg/m^2	1800	• 75 g/day • 1.5 g/kg/day • 17% of kcal from protein	• Aid healing of pressure sore • Prevent additional pressure areas	Pressure sore healing, patient off bed rest and now able to sit out in specialised chair

mid-upper arm circumference (MUAC) and triceps skinfold (TSF). **Figure 1** shows the trend of the anthropometric measures compared to protein intake and weight. Between March and May 2016, increased mid-arm muscle circumference (MAMC) and HGS were observed, indicating increased muscle strength following implementation of a high-protein feeding regimen. The gradual decline between August 2016 and Feburary 2017 was brought on by a combination of social and health factors. The drop in HGS and weight in early 2017 can be attributed to catabolism caused by acute illness prior to, and during, a lengthy hospital admission. Dietetic intervention with increasing protein delivery up to April shows a positve influence on weight recovery and MAMC.

In addition to improvements in anthropometric measures, high protein formulas have been shown to reduce the incidence and improve healing of pressure ulcers and wounds.[11, 12]

A meta-analysis by Stratton *et al.*[12] states prevalence of pressure ulcers can be up to 54% in the community. This study included five randomised control trials and demonstrated benefits of oral high protein supplementation in both the prevention and management of pressure sores. NICE Clinical Guideline 179[13] for pressure ulcers does not currently advise supplementation for patients whose intake is 'adequate'; however, it is advised for the management of an established pressure ulcer in individuals who do not have adequate intake. While an adequate intake is not defined, in our experience, an enhanced protein intake promotes both pressure sore and wound healing, demonstrated by patients B, C, D and E (**Table Four**) – all patients experienced pressure sores due to positioning or had wounds following major surgery.

In addition to challenges with meeting our patients' protein requirements, our team also face other logistical challenges and limitations working in the community. Alongside increasing patient complexity, due to hospital bed constraints, patients are often discharged earlier whilst still recovering from their presenting condition. This often increases their protein requirements when they are being treated for infections or wounds are still healing (patient D, **Table Four**). This can further be compounded by loss of muscle mass as a result of their hospital admission, which further increases their protein requirements in the community. Some of our patient cohort is both orally and enterally tube-fed. Long-term food record charts are often not practical and determining the protein content of their oral intake can be challenging if documentation is incomplete or reporting on diet history is vague.

As guidelines[14] have removed protein bio-markers, including albumin and pre-albumin due to their response to inflammation, and focus instead on meeting both macro- and micro-nutrient requirements, the HEFT use a range of anthropometric measures, demonstrated in **Figure 1**, to enhance our assessment. These measures are particularly important for our long-term community patients where we face these logistical challenges, in addition to clinical concerns over recurrent illness or where a patient is not meeting protein requirements due to feed volume restrictions.

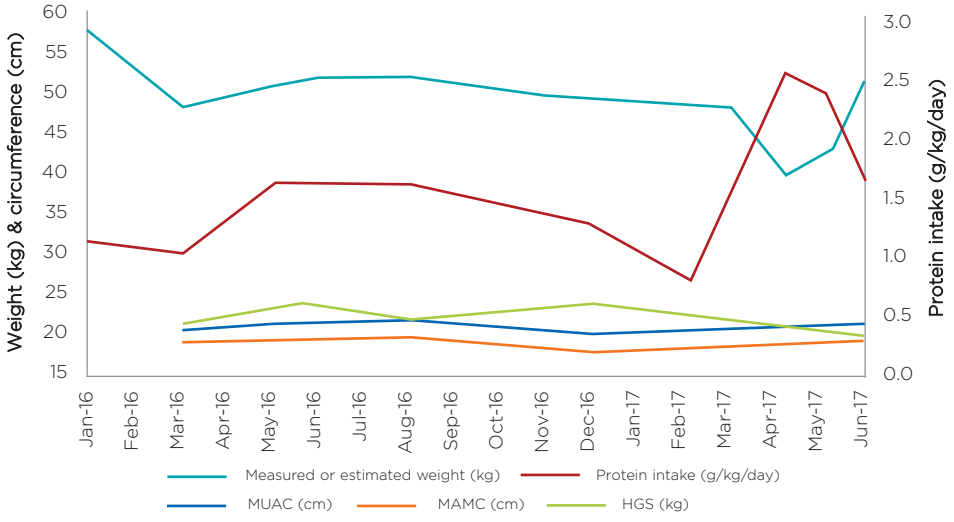
We are delighted that feed manufacturers have taken on board new evidence to produce formulations that better meet the demands of our changing population. Some patient groups though, particularly our large cohort of learning disability and neurology patients, often experience unintentional weight gain due to physical disability, immobility or clinical stability. For long-term community patients, and particularly those with low body weight or low energy requirements, we feel that there is also an opportunity for a lower energy, high protein, low volume feed (e.g. 800 kcal, ≥65 g protein). The prioritisation of protein intake in these patients means we can strive to optimise outcomes to maintain or even improve quality of life.

A combination of the ageing population and medical advances in treatment has led to increases both in the number and medical complexity of patients needing community dietetic intervention. Because of these factors, our experience has shown that patients are routinely requiring protein-enriched feeds following enhanced dietetic input, including frequent HEFT reviews, additional anthropometric monitoring where possible, and nutritional biochemistry as clinically indicated.

Anecdotal experience and evidence shows increasing protein awareness has promoted wound healing, skin integrity, improvement in general wellbeing and quality of life for our HEF patients. As mentioned in **Table Four**, we have received feedback from relatives and carers that they have seen noticeable improvements in skin condition and satiety. Many of these individuals request that the protein is not decreased if future feed prescription changes are needed, as they can see the beneficial effects of a higher protein intake on their wellbeing.

In order to standardise dietetic practices with HEF patients to improve patient and clinical outcomes, research is now needed to demonstrate the longer-term benefits of higher protein regimens on rehabilitation, facilitating independence and reducing the need for carer support in this patient group.

Figure 1: Patient A Protein Intake *vs.* Anthropometric Data



The gradual decline between August 2016 and Feburary 2017 was brought on by a combination of social and health factors. It is not attributed to the protein intake.

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