

NUTRITIONAL RESEARCH IN COLLABORATION WITH THE NHS

ENTERAL TUBE FEEDING

Generating new evidence to demonstrate the role of nutrition support in optimising patient and health economic outcomes

Intended for Healthcare Professional use only

EFFECTS OF A PLANT-BASED HIGH ENERGY AND PROTEIN ENTERAL TUBE FEED IN HOME ENTERALLY TUBE FED PATIENTS: RESULTS FROM A 6-MONTH SINGLE-ARM INTERVENTION TRIAL

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Introduction:

Many home enterally tube fed (HETF) patients require a high energy and protein enteral feed due to increased nutritional requirements or to reduce daily feed volume, due to fluid restrictions and poor volume tolerance, or to reduce time spent tube feeding, which has adverse effects on quality of life (QoL). Recent data highlights a multifaceted need for plant-based medical feeds in clinical practice¹; however, evidence of long-term (≥6-months (6M)) use in HETF patients is limited. This single-arm multi-centre intervention study evaluated the effects of a plant-based (vegan suitable) multi-nutrient, high energy, high protein enteral tube feed (PBTF) for 6M in HETF patients.

Method:

Following a 1-day baseline (BL), 17 adult HETF patients (age: 49±22years; BMI: 22.1±3.5kg/m²) received ≥500ml/day of the PBTF (2.0kcal/ml; 10g protein/100ml; +/- 1.5g fibre/100ml; Nutrison PlantBased 2.0kcal HP/HP Multi Fibre, Nutricia Ltd., UK) for 6M. Gastrointestinal (GI) tolerance (%patients reporting no symptoms), compliance, daily feed volume, estimated time feeding/day, nutrient intake and body weight were assessed at BL, 4-weeks (4W) and 6M. Data were analysed by one-way repeatedmeasures ANOVA with Bonferroni adjustment for pairwise comparisons.

Results:

Compared to BL, at 4W and 6M, %patients reporting no GI symptoms increased (BL: 59±19%; 4W: 74±12%; 6M: 66±17%, p<0.04) with no difference between feed variants (p=0.55); compliance was similar (BL: 96±13%; 4W: 99±3%; 6M: 99±3%, p=0.72); and daily feed volume (BL: 999±514mL/d; 4W: 774±284mL/d; 6M: 774±284mL/d, p<0.03) and estimated time feeding/day (BL: 9.9±4.4hrs/d; 4W: 8.4±4.2hrs/d; 6M: 8.4±4.2hrs/d, p<0.05) decreased. Protein intake increased (BL: 1.2±0.3g/kg/d; 4W: 1.4±0.4g/kg/d; 6M: 1.4±0.5g/kg/d, p<0.03), whereas energy intake (BL: 1724±500kcal/d; 4W: 1814±512kcal/d; 6M: 1798±538kcal/d, p=0.55) and body weight (BL: 59.0±11.1kg; 4W: 59.8±11.2kg; 6M: 59.3±12.1kg, p=0.55) were maintained. All mean micronutrient intakes (excluding electrolytes) met the UK Reference Nutrient Intake (RNI) at all timepoints.

Conclusion:

This study provides novel longer-term data that a PBTF is highly tolerated and complied with, increases protein intake, maintains body weight, and decreases daily feed volume and estimated time feeding/day, which might have important implications for QoL in HETF patients.

References:

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A PLANT-BASED HIGH ENERGY AND PROTEIN ENTERAL TUBE FEED IS HIGHLY TOLERATED, COMPLIED WITH AND ACCEPTED, AND DECREASES FEEDING TIME PER DAY IN HOME ENTERALLY TUBE FED PATIENTS

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Introduction:

Plant-based (vegan suitable) high energy and protein enteral tube feeds (PBTF) available to home enterally tube fed (HETF) patients are limited. This one-arm multi-centre intervention study evaluated the effects of a PBTF.

Method:

Following a 1-day baseline, adult HETF patients (n=41; age: 51±23years; BMI: 21.5±5.0kg/m²) received ≥500ml/day of a PBTF (2.0kcal/ml; 10g protein/100ml) either with or without added fibre (1.5g/100ml) (Nutrison PlantBased 2.0kcal HP +/- Fibre, Nutricia Ltd., UK) for a 28day intervention period. Gastrointestinal (GI) tolerance (%patients reporting no symptoms), daily compliance, prescribed daily feed volume, estimated time feeding/day, acceptability, nutrient intake and body weight were assessed at baseline and end of intervention.

Results:

Compared to baseline, with the PBTF, the proportion of patients with no GI symptoms increased ($63\pm11 \text{ vs. } 70\pm10\%$, p=0.006) with no difference between feed variants (p=0.87); compliance was greater ($91\pm17 \text{ vs. } 97\pm16\%$, p=0.04); and prescribed daily feed volume ($1126\pm503 \text{ vs. } 861\pm354\text{ml/d}$, p<0.001) and estimated time feeding/day ($10.0\pm4.6 \text{ vs. } 8.2\pm3.9\text{hrs/d}$, p<0.001) reduced. Patients scored the PBTF highly (mean score >8.4/10) for all acceptability outcomes. Protein intake increased from baseline to end of intervention ($1.3\pm0.5 \text{ vs. } 16\pm0.6\text{g/kg/d}$, p<0.001), and energy intake ($1864\pm512 \text{ vs. } 1950\pm559\text{kcal/d}$) and body weight ($60.2\pm15.3 \text{ vs. } 60.6\pm15.5\text{kg}$) were maintained (p>0.08). All mean micronutrient intakes (excluding electrolytes) met the UK reference nutrient intake (RNI) at baseline and end of intervention.

Conclusion:

In adult HETF patients, a PBTF is highly tolerated, complied with and accepted, increases protein intake, and decreases prescribed daily feed volume and estimated time feeding/day.

APPROPRIATE HANDLING AND STORAGE REDUCE THE RISK OF BACTERIAL GROWTH IN ENTERAL FEEDING SYSTEMS REUSED WITHIN 24 HOURS

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Introduction:

Enteral tube feeding can require considerable amounts of plastic equipment including delivery sets and containers, often disposed of after a single feeding session because of bacterial contamination concerns. The aim of this research was to assess whether reuse of delivery sets and containers for up to 24h is safe from a microbiological perspective.

Method:

Four enteral tube feeding systems (FS) were tested under hygienic controlled or repeated inoculation challenge conditions using key foodborne pathogens, to assess bacterial growth over time (FS1: ready-to-hang, closed 1-Lsystem with delivery set reused, stored at room temperature [RT]; FS2: a prepared, powdered, open 1-L system with delivery set and container reused, stored at RT; FS3 and FS4: prepared, powdered, open 200-ml bolus systems with delivery set and container reused, stored at RT [FS3] and refrigeration[FS4]). Feed samples were cultured at 0.5, 6.5, 12.5, 18.5, and 24.5 h with >2 Δ log considered significant bacterial growth.

Results:

Under hygienic control, FS1, FS3, and FS4 were below the level of enumeration (<5 CFU/g) for all bacteria tested, at all time points. In FS2, significant bacterial growth was observed from 18.5h. Under repeated bacterial inoculation challenge, no significant growth was observed in FS1 and FS4 over 24.5h; however, significant growth was observed in FS2 after 6.5h and in FS3 after 10–12h.

Conclusion:

With hygienic handling technique, there is limited bacterial growth with reuse of delivery sets and containers over 24h. Refrigeration between feeding sessions and using boluses of reconstituted powdered feed reduce bacterial growth risk.

COMPLIANCE AND TOLERANCE OF A READY-TO-USE, LOW CALORIE, LOW VOLUME, HIGH PROTEIN MODULAR FEED IN PATIENTS WITH INCREASED PROTEIN NEEDS

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Introduction:

Many clinical conditions warrant high protein intakes with recommendations ranging from 1.0-1.5g/ kg BW-1. It can be challenging to provide adequate protein, especially where caloric overfeeding and/ or fluid restriction are a concern¹ and additional protein from modular feeds may be beneficial². Protein modular feeds are mostly composed of hydrolysed collagen and require preparation, increasing the risk of contamination, incorrect preparation and inadequate provision of volume that could impact nutritional status, clinical and functional outcomes.

Method:

After a 1-day baseline, 15 patients (61±13 years; 87.5±26.9kg, 60% male) with increased protein needs (93.3g/day) recruited across UK healthcare centres received a whey- and collagen-based, low calorie, low volume, high protein liquid modular feed (Nutrison Protein Shot: 45kcal and 11g/40ml; Nutricia Ltd, UK) provided in a novel, ready-to-use 40ml pot alongside routine care for up to 28 days. Compliance, tolerance, nutrient intake (energy and protein), and body weight were observed before and after the study product and ease of use was also assessed.

Results:

At baseline, 10 patients were receiving a liquid protein modular feed. All patients had complex conditions and 93% (n=14) presented with multiple diagnoses. The mean prescription of the study product was 64ml/day (SD: 25ml/day; range 40 – 120ml/day). Compliance was excellent versus prescription (93%), providing 18.7% of estimated protein requirements. For patients receiving a liquid protein modular feed at baseline, contribution of the study product to protein intake remained unchanged (24%). Tolerance was good and remained stable or improved, though not significantly. Body weight (-0.4kg, p=0.695), energy (1429kcal/day (SD 366) vs. 1508kcal/day (SD 352), p=0.344) and protein intake (79g/day (SD 14) vs. 83g/day (SD 18), p=0.386) remained stable. Patients and healthcare professionals (HCPs) reported the study product was easy, quick and highly convenient to use and posed low contamination risk.

Conclusion:

This study shows that a new, convenient, whey- and collagen-based, ready-to-use, modular protein top-up feed can be introduced with excellent compliance and tolerance without impacting body weight or energy intakes, giving HCPs flexibility to tailor tube feeding regimens without overfeeding in patients with increased protein needs.

References

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CRITICALLY ILL PATIENTS WITH AND WITHOUT SARS-COV-2 BETTER ACHIEVE ENERGY AND PROTEIN TARGETS WITH A HIGH-ENERGY, HIGH-PROTEIN PEPTIDE-BASED ENTERAL TUBE FEED; INSIGHTS FROM A MULTICENTRE CLINICAL AUDIT PERFORMED DURING THE COVID-19 PANDEMIC

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Published in Clinical Nutrition ESPEN (2022), Vol. 4: p506-507 (Abridged)

Introduction:

Meeting energy and protein requirements in critically ill patients is important for prognosis, yet difficult to achieve as a consequence of disease, management and/or altered nutritional intake¹. Improvements in achieving energy and protein requirements with a high-energy, high-protein peptide-based tube feed were observed in community patients². To establish whether this remained true in the critical care setting, where feeding intolerance is observed frequently⁴, a retrospective multicentre audit was performed.

Method:

Adults (> 18years), admitted to critical care across 6 UK hospitals between May 2020 and December 2020, were retrospectively included if they received a peptide-based enteral tube feed (Nutrison Peptisorb Plus HEHP®, Nutricia Ltd), containing 1.5kcal/ml and 7.5g protein/100ml (herein referred to as HEHP). Data were collected from 15 critically ill patients (52±12y; 87% male), with mean length of hospital stay being 26days (range: 7-49days). Of these, 10 were SARS-CoV-2 positive, with the remainder having pancreatitis (n=3), delayed gastric emptying (n=1) or unconfirmed diagnosis (n=1). HEHP was used second line (after whole protein) and indications for use included tolerance issues (n=10), elevated energy and protein requirements (n=5) or primary diagnosis (n=2). Estimated energy and didition, Dietitians were asked whether HEHP allowed patients to better meet their nutrient target.

Results:

Mean intake of HEHP was 2008±461kcal/day and 100±23g protein/day provided over a mean of 12days (range: 3-29days). The percentage of estimated energy and protein targets achieved increased albeit non significantly with the use of HEHP (from 76% before vs 87% during use of HEHP for both) and the direction of effect remained true regardless of SARS-CoV-2 status. Two thirds (67%, n=10 of 15) of Dietitians reported HEHP helped patients better meet their nutrient targets and 87% (n=13 of 15) perceived the high protein content of HEHP as beneficial.

Conclusion:

Enteral tube feeding in critically ill patients poses numerous difficulties, especially in SARS-CoV-2. This audit in critically ill patients demonstrates that a high-energy, high-protein, peptide-based enteral tube feed can help complex patients better achieve energy and protein targets.

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EVALUATION OF A NEW ENTERAL FEEDING TUBE NURSE CLINIC AT THE WESTON PARK HOSPITAL RADIOTHERAPY DEPARTMENT

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Introduction:

Approximately 300 patients each year receive radiotherapy for head and neck cancer at Weston Park Hospital, approximately 50% of these patients have enteral feeding tubes placed. Historically, Dietitians provided support for all patients with enteral feeding tubes receiving radiotherapy treatment and the local nursing service provided by the enteral tube feeding contract provider provided community clinical support. Due to increasing patient numbers and increased Dietetic workload, a new "enteral feeding tube nurse clinic" was introduced, run by the local enteral tube feeding homecare nurse. This clinic has been running since 2019 and is a "drop-in clinic" which both staff and patients' can access for support, including troubleshooting advice. This is a unique service built in conjunction with the Dietetic tearn, designed to meet local patient's needs.

Method:

In 2020 a review took place to evaluate the level of patient satisfaction with the enteral feeding tube nurse clinic, to establish the confidence of patients in caring for their feeding tubes and to explore feedback to develop the service. A questionnaire was given to patients during the last week of their radiotherapy treatment over a 6-week period assessing: the patient's satisfaction with the support and service, how confident they felt after receiving the support (both assessed using a 5-point scale: where 5 was 'very satisfied'), and their experience overall.

Results:

The questionnaire was completed by 12 patients. For satisfaction with the support and service 10/12 (83%) patients scored 5: very satisfied, with the remaining 2 patients scoring 3: neutral. Comments from patients included: "excellent nurses, great, quick, professional job-no fuss", "help available whenever it is needed", "every time I have requested their help, I have had a prompt reply and always each problem has been addressed". For confidence with enteral tube feeding procedures, 100% of patients scored 5: very confident. Comments from patients included: "I feel much happier with the tube", "very confident in cleaning and rotation, and excellent instructions from nurses". When asked about their experience overall, patient comments included "Thank you for all your support", "expert care, friendly, informative", "fantastic prompt treatment", "grateful that I have had the support", "friendly, professional staff are always willing to help and always have said 'if you need me, just ask, at any time". Due to Covid-19 the clinics were stopped, suggesting that the clinic was also highly valued by the healthcare professionals. In August 2021 the clinics started again and there are plans to expand the service later this year.

Conclusion:

In summary, the enteral feeding tube nurse clinic was positively evaluated by the patients attending the radiotherapy clinic. The overwhelming feedback was that the service provides patients with rapid access to support, advice, reassurance, and training if their feeding requirements changed. Due to the success of this clinic, development of similar clinics in other areas should be considered.

INCREASED PROTEIN INTAKE IS ASSOCIATED WITH IMPROVED HAND GRIP STRENGTH AND QUALITY OF LIFE IN HOME ENTERALLY TUBE FED ADULTS USING A HIGH-ENERGY, HIGH-PROTEIN FEED

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Introduction:

Increased energy and protein requirements are frequently observed in disease and can be difficult for patients to achieve with standard tube feeds. This is especially true for patients who present with tolerance issues and impaired quality of life with larger volume tube feeds. A lower volume, nutrient-and energy-dense feed may therefore offer compositional, clinical and functional advantages.

Method:

After a 3-day baseline period, 22 home enterally tube fed patients (63±12y; 68% male, BMI 23.8±3.8kg/m²) recruited across the UK healthcare centres received a mean of 764±308mL/d of a high-energy (1.5kcal/ml), high-protein (7.5g/100ml) tube feed (Nutrison Protein Plus Energy, Nutricia Ltd, in addition to other feeds and oral intake) for 28 days. Energy and protein intake, anthropometry, hand-grip strength and quality of life (EQ5D visual analogue scale) were recorded at baseline (day 0) and at the intervention endpoint (day 31).

All patients had complex clinical conditions and most presented with multiple diagnoses. Twenty patients completed the study and were subsequently included in the final analysis. Tolerance with the experimental feed was good and compliance was excellent (98.5%).

Results:

Weight and BMI remained stable (p>0.05) from day 0 to day 31, as did total energy intake (day 0: 1851±703kcal/d vs. day 31: 1874±688kcal/d, p=0.738), yet total protein intake increased significantly (day 0: 72±19g/d [1.0±0.3g/kg·BW-1] vs. day 31: 81.1±21g/d [1.2±0.4g/kg·BW-1], p=0.013 [p=0.011]). Total protein intake as a percentage of requirements also increased significantly from 88% at day 0, to 106% at day 31 (p=0.004). The change in total protein intake was positively associated with change in hand-grip strength (r=0.433, n=16, p=0.047). Protein intake at day 31 from the high-energy, high-protein tube feed, and when expressed as percentage of protein requirement, were both positively associated with change in quality of life (EQ5D: r=0.478, n=20, p=0.033 and r=0.532, n=20, p=0.016, respectively).

Conclusion:

This study demonstrates that a high-energy, high-protein tube feed effectively increases protein intake to better meet requirements without impacting on energy intake or anthropometric measures. Furthermore, increased protein intakes were positively associated with improved hand grip strength and quality of life, and corroborates previous meta-analysis findings, which together present important clinical implications. Whether long-term intake translates to improvements in quality of life and muscle strength remains to be determined.

COMPLEX ENTERALLY TUBE-FED COMMUNITY PATIENTS DISPLAY STABLE TOLERANCE, IMPROVED COMPLIANCE AND BETTER ACHIEVE ENERGY AND PROTEIN TARGETS WITH A HIGH-ENERGY, HIGH-PROTEIN PEPTIDE-BASED ENTERAL TUBE FEED: RESULTS FROM A MULTI-CENTRE PILOT STUDY

BP Green, K Sorensen, M Phillips, L Green, R Watson, A McCallum, S Brook, S Oldham, M Barry, L Tomlinson, A Williams, S Crease, C Wills, R Talbot, R Thomas, J Barker, A Owen, J Davies, C Robinson, A Lumsdon, S Morris, C McMurray, N Cunningham, L Miller, C Day, K Stanley, S Price, S Duff, A Julian, J Thomas, C-A Fleming, GP Hubbard, RJ Stratton

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Introduction:

This pilot study evaluated a high-energy, high-protein, peptide-based, (medium-chain triglycerides) MCT-containing enteral tube feed (Nutrison Peptisorb Plus HEHP®, Nutricia Ltd., Trowbridge, BA14 0XQ, UK.) containing 1.5kcal/mL and 7.5g protein/100mL.

Method:

Fifteen community-based, enterally tube-fed adults (42 (SD 16.3) years) received the intervention feed daily for 28 days, with gastrointestinal tolerance, compliance and nutrient intake assessed at baseline and after the intervention period.

Results:

Incidence and intensity of constipation (p = 0.496), nausea (p = 1.000), abdominal pain (p = 0.366) and bloating (p = 0.250) remained statistically unchanged, yet the incidence and intensity of diarrhoea improved significantly after receiving the intervention feed (Z = -2.271, p = 0.023). Compliance with the intervention feed was significantly greater compared to the patient's baseline regimens (99% vs. 87%, p = 0.038). Compared to baseline, use of the intervention feed enabled patients to significantly increase total energy (1676kcal/day (SD 449) to 1884kcal/day (SD 537), p = 0.039) and protein intake (73 g/day (SD 17) to 89 g/day (SD 23), p = 0.001), allowing patients to better achieve energy (from 88% to 99%, p = 0.038) and protein (from 101% to 121%, p < 0.001) requirements.

Conclusion:

This pilot study demonstrates that a high-energy, high-protein, peptide-based, MCT-containing enteral tube feed maintains gastrointestinal tolerance and improves compliance, energy and protein intake in complex, enterally tube-fed, community-based adult patients, though more work is recommended to confirm this.

A SURVEY OF BOLUS TUBE FEEDING PREVALENCE AND PRACTICE IN ADULT PATIENTS REQUIRING HOME ENTERAL TUBE FEEDING

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Introduction:

Anecdotal evidence suggests the use of bolus tube feeding is increasing in the long-term home enteral tube feed (HETF) patients.

Method:

A cross sectional survey to assess the prevalence of bolus tube feeding and to characterise these patients was undertaken. Dietitians from ten centres across the UK collected data on all adult HETF patients on the dietetic caseload receiving bolus tube feeding (n 604, 60% male, age 58 years). Demographic data, reasons for tube and bolus feeding, tube and equipment types, feeding method and patients' complete tube feeding regimens were recorded.

Results:

Over a third of patients receiving HETF used bolus feeding (37%). Patients were long-term tube fed (4.1 years tube feeding, 3.5 years bolus tube feeding), living at home (71%) and sedentary (70%). The majority were head and neck cancer patients (22%) who were significantly more active (79%) and lived at home (97%), while those with cerebral palsy (12%) were typically younger (age 31 years) but sedentary (94%). Most patients used bolus feeding as their sole feeding method (46%), because it was quick and easy to use, as a top-up to oral diet or to mimic mealtimes. Importantly, oral nutritional supplements (ONS) were used for bolus feeding in 85% of patients, with 51% of these being compact-style ONS (2·4kcal (10·0kJ)/ml, 125ml).

Conclusion:

This survey shows that bolus tube feeding is common among UK HETF patients, is used by a wide variety of patient groups and can be adapted to meet the needs of a variety of patients, clinical conditions, nutritional requirements and lifestyles.