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The use of high energy peptide feed to aid feed intolerance and promote growth in a paediatric oncology patient.

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Introduction.

This case study presents a four year old child, newly diagnosed with acute lymphoblastic leukaemia (ALL), who experienced significant intolerance to feeds as a result of his intense treatment regimen, largely chemotherapy.

ALL is a cancer of the blood. It is the most common cancer in children, accounting for around one third of cases. Five hundred children are diagnosed with leukaemia every year in the UK. More than half are under the age of five. ALL accounts for approximately 80% of leukaemia cases. ALL can affect a child at any age but is more common in the 1–4 age group.[1]

The treatment usually involves a combination of chemotherapy and steroid therapy. As the treatment kills cancer cells, normal cells are also affected. The following are the main side effects;

- Hair loss.
- Nausea and vomiting.
- Diarrhoea (gastrointestinal disturbances).
- Loss of appetite and weight.
- Reduction of blood cells, causing anaemia, increase bruising, bleeding and infection.[2]

Background.

Child B was admitted to his local district general hospital at the end of February 2012 aged 3 years and 11 months.

He presented with a three month history of multiple trips to his GP and A&E. The GP diagnosed a viral illness and A&E's findings were inconclusive. He had the following symptoms;

- Recurrent and prolonged nosebleeds.
- Abdominal pain.
- Tiredness (prolonged periods).
- Loss of appetite.
- Sweating.
- Vomiting.
- Spiking temperatures over the past seven days.
- Weight loss of 11kg over a five week period.
- Lymphadenopathy (cervical and axilla).
- Hepatosplenomegaly.

Child B had previously been a well and active child with no previous medical history. He lived with both his parents and two other younger siblings all fit and well, with the exception of his father who prematurely developed a heart condition within the last year. Child B was born term by normal vaginal delivery. All his immunisations were up to date. He had no known allergies and was not on any regular medications prior to his presentation.

Blood tests suggested a possible blood disorder with the presence of pancytopenia and he was transferred to Birmingham Children's Hospital within 24 hours.

He underwent a bone marrow examination which confirmed the diagnosis of acute lymphoblastic leukaemia and he commenced treatment as per UKALL 2003 Interim Guidance, immediately.

He continued to have abdominal pain, nose bleeds and reduced appetite but developed tachynoeic episodes due to a metabolic acidosis with low platelets and significant nausea in response to the chemotherapy.

He was under daily review of the PICU doctors and started on a regimen of anti-emetics. His poor appetite and weight loss were not addressed in the early stages of diagnosis.

When first diagnosed Child B was 29.5kg (well above the 99.6th centile) his height was just above the 99.6th centile at 122cm. He had always been a proportionally large child, if not slightly overweight and followed the upper centiles. His BMI was 19.8 on the 98th centile.

Medical and nutritional problems identified.

Child B was eating small amounts which varied widely during the initial period of his treatment as an inpatient. There were some conflicting views on what was an appropriate intake for his age between staff and parent. Initially he was started on oral supplements but he did not tolerate adequate volumes due to the taste. Over this initial period his weight fell slightly to 24.55kg (98th centile).

In the first month of treatment he developed a neutropenic sepsis, which appeared to be recurrent throughout March. An increased temperature is thought to increase nutritional requirements which were not being met. There were various discussions to site a nasogastric tube (NGT) but the severe nausea delayed this.

An NGT was sited at the end of March for medications. The NGT remained in situ and Child B appeared to tolerate this well, unfortunately Child B's intake had not improved, so the decision was made to start feeds.

Nutritional assessment.

Child B's nutritional requirements were based on EAR for age = 1230–1715 (approximately 1500 kcal/day) as a starting point. These figures are based on the DOH dietary reference values for the UK 1991.

His protein requirements based on the same DOH reference values were 1.1g protein/kg, calculated as 26.4g per day. His fluid requirement was calculated as 85ml/kg = 2080ml/d. It was felt his full fluids did not need to be met by his NG feeds due to the high level of hydration often given alongside the chemotherapy administered.

There are no set nutritional guidelines for oncology patients but it is well documented that this patient group can have above the normal range requirements.[3]

Nutritional goals/recommendations.

The main nutritional goals were to meet his estimated nutritional requirements (EAR) based on his oral intake and making the deficit up with NG feeds, to ensure an adequate intake to promote normal growth, prevent further weight loss and ensure tolerance of feed with minimal side effects.

Administration route.

Child B was meeting a small percentage of his nutritional needs orally but this was highly variable throughout this period. His calorific intake varied from 300–800 kcal per day.

On 2nd April an NGT was passed to aid the administration of medication as well as improving his nutritional status. His weight was 25.3kg. Feeding via an NGT was thought to be the safest and most suitable route. Child B's need for enteral feed was thought to be temporary in order to help him get through the initial stages of his intensive chemotherapy regimen.

Volume administered.

He was eating about a third of his intake so his feeds needed to provide approximately 65% of his EAR. Initially he was to have 700ml Nutrini® Energy Multifibre, which would be providing 1050kcal and 28.7g protein. His regimen aim was 60ml/hr for 12 hours overnight. Due to his increased nausea it took 5 days to increase the rate to 40ml per hour. Child B developed a persistent cough, sore throat and his oral intake depleted significantly.

His requirements via his NG feeds were reassessed as his weight was beginning to fall. His feeding regimen was revised to provide his full estimated requirements of 1500kcal per day and therefore aimed to give 1000ml of Nutrini® Energy Multifibre.

Five days later we were struggling to get his feeds beyond 40ml per hour due to abdominal pain, vomiting and very loose stools (x6/day). His weight had fallen to 24.4 kg. The decision was made to change his feed to Peptamen Junior® (1kcal/ml) to start and aim for 70ml/hr for 20 hours continuous feeds, providing 1400kcal/day and 42g protein/day (1.72g/kg).

A further five days later, the feed was being tolerated well and it was running at 50ml/hr x 20hr (1000ml). His nausea had improved and he had not vomited in this time. The feed, being in powder form, was concentrated to 1.2kcal/ml Peptamen® Junior (26.5%). He tolerated this extremely well and we were able to increase the concentration to 1.35kcal/ml Peptamen® Junior (30%).

Two days later Child B contracted clostridium difficile and experienced significant diarrhoea and vomiting. However his feeds were to run at 45ml/hr for 20 hours, providing 900ml and 1215kcal at 1.35kcal/ml concentration.

For a further two days the feeds continued at 45–50ml/hr and plans were made to swap his feed to Peptamen® Junior Advance as his symptoms had improved and there were plans for possible discharge. A supply of Peptamen® Junior Advance was organised to use at home.

Rationale/reason for utilising/switching to Peptamen® Junior Advance.

Although there is very little researched evidence to suggest the need to use a peptide feed in oncology patients suffering from the side effects of their treatment,[4] evidence through practice shows this group of patients often tolerate a semi–elemental, peptide–based, MCT containing feed in comparison to the whole protein, 100% LCT standard feeds available. The increased tolerance to the peptide based feeds such as Peptamen® Junior may be multifactorial as these feeds are thought to be more digestible, and empty from the stomach at a faster rate, which would reduce nausea, vomiting and occasionally diarrhoea.[5]

This particular group of patients do not tolerate large volumes nor high rates of feed. So an energy dense feed is preferable, where their requirements can be met in much smaller volumes. Oncology patients are often immunocompromised so a ready to feed formula is ideal as it limits bacterial contamination, which is a huge benefit.

Although a powdered form of Peptamen® Junior is available and it can be concentrated to make a 1.5kcal/ml equivalent, it can increase the vitamin and mineral profile disproportionately. Making up any feed is open to human error, and the incidence of bacterial contamination is significantly increased during the making and decanting of the feeds – all of these factors increase the risk of infection in this susceptible patient group.[6] Initially Child B was started on Nutrini® Energy Multifibre aiming to give 700ml starting at 10ml/hr and increasing as tolerated to 60ml/hr providing 1050kcal/day providing 60% of his estimated requirements.

Nutrini® Energy Multifibre is our standard high energy formula used at BCH. It is generally tolerated well and provides complete nutrition for 1–6 year olds in a relatively small volume. It contains a small amount of insoluble and soluble fibre which usually aids normal gut function. Unfortunately the whole protein feed was not tolerated in this patient due to the adverse effects of chemotherapy e.g. increased nausea, vomiting, abdominal pain and gastrointestinal disturbances. This leads to a decline in wellbeing, poor growth, weight loss and reduced body stores, increased susceptibility to infection and reduced cell recovery. Whole protein feeds are often not well tolerated and are associated with delayed stomach emptying, which increases the nausea and vomiting, as well as an increase in diarrhoea (due to a larger residue content).[7]

The powdered form of Peptamen® Junior was chosen as there was flexibility to concentrate the feed gradually over a period of time as tolerated.

These patients historically appear to tolerate a peptide based, MCT containing feed due to its increased absorption, which is associated with reduced vomiting and nausea. This helps improve their nutritional status and response to treatment as well as aiding optimal growth. The 1.5kcal preparation ensures a smaller volume is required to meet full nutritional requirements, which is also associated with a better tolerance of feeds alongside improved nutritional status and optimal growth and well-being.

When using Peptamen® Junior Advance Child B was able to receive his estimated nutritional requirement in 1000ml of feed. The vomiting and diarrhoea caused by his treatment were vastly improved, and he was able to tolerate his required 1000ml overnight. This allowed him to build up an appetite and re-establish eating during the day.

As Child B was receiving and tolerating good nutrition enterally his hospital stay was reduced. Although it is not possible to quantify, it is likely that his improved nutritional status reduced his infection rate and helped him to tolerate his treatment.

Conclusion.

This case study demonstrates the necessity to trial a variety of different feeds and the effectiveness of using Peptamen® Junior Powder and Peptamen® Junior Advance in an oncology patient, due to the side effects of the medical treatment they were receiving. Oncology patients are a high risk group for malnutrition and those who are well nourished are better able to resist infection and tolerate treatment.[6,8] The ready to feed, high calorie, peptide–based feed was ideal for this patient group who are immune compromised, do not tolerate high rates or large volumes of feed and their nutritional needs can be above the average requirement for their age group. The high energy preparation was also ideal to provide a large percentage of nutrition within an overnight feed, Peptamen® Junior Advance (1.5kcal/ml) feed was an ideal feed for this and many other oncology patients receiving treatment.

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