Management of Faltering Growth in an Acutely Unwell Infant

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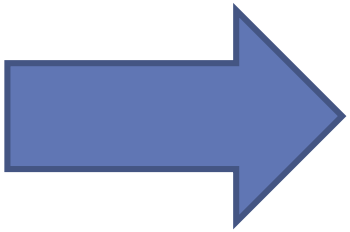
5 week old girl with newly diagnosed infantile acute lymphoblastic leukaemia referred for poor oral feeding and growth faltering.

Case Study	Findings
1. **Reason for referral and relevant medical/surgical history**	History of bruising, fatigue and extreme pallor for 3/7. Presented to GP. Transferred to PICU from A+E Coombe Hospital. Vomiting with feeding since birth. Diagnosed with infantile ALL and commenced on chemotherapy. Fluid overloaded due to hyper-hydration. Fluid allowance 150ml/kg. Awaiting broviac insertion and lumbar puncture.
2. **Relevant biochemistry**	Electrolytes: N, Urea: 7-12.6 Hb: 48, Plt: 41, WBC: 1161
3. **Medications**	Furosemide, Midazolam, Oxycodeine, Esomeprazole, Dexamethasone.
4. **Nutrition focused physical findings**	Apyrexial. PU well. BO x 2-3 daily. No vomits.

5. Anthropometry and requirements	Birth Weight: 3.3kg (25th-50th centile) Weight on admission = 3.34kg (2nd centile) Length = 84cm (25th centile) Estimated requirements: -150mls/kg -96-120 kcal/kg -2.6g protein/kg *UK-WHO Growth Chart Neonatal and Infant Close Monitoring Growth Chart
6. Food and Nutrition History	Poor feeder since birth - vomiting and fatigue. Trialled with various infant formulas. Minimal weight gain since birth and falling centiles. Intake on admission: 7-8 x 10ml -20ml bottles Enfamil AR i.e ~70ml – 160mls/day; 21-48mls/kg/d 15-33kcal/kg/d <1g/kg/d protein =>Not meeting est. nutritional requirements.

Nutrition Support Goal



Considerations for Plan

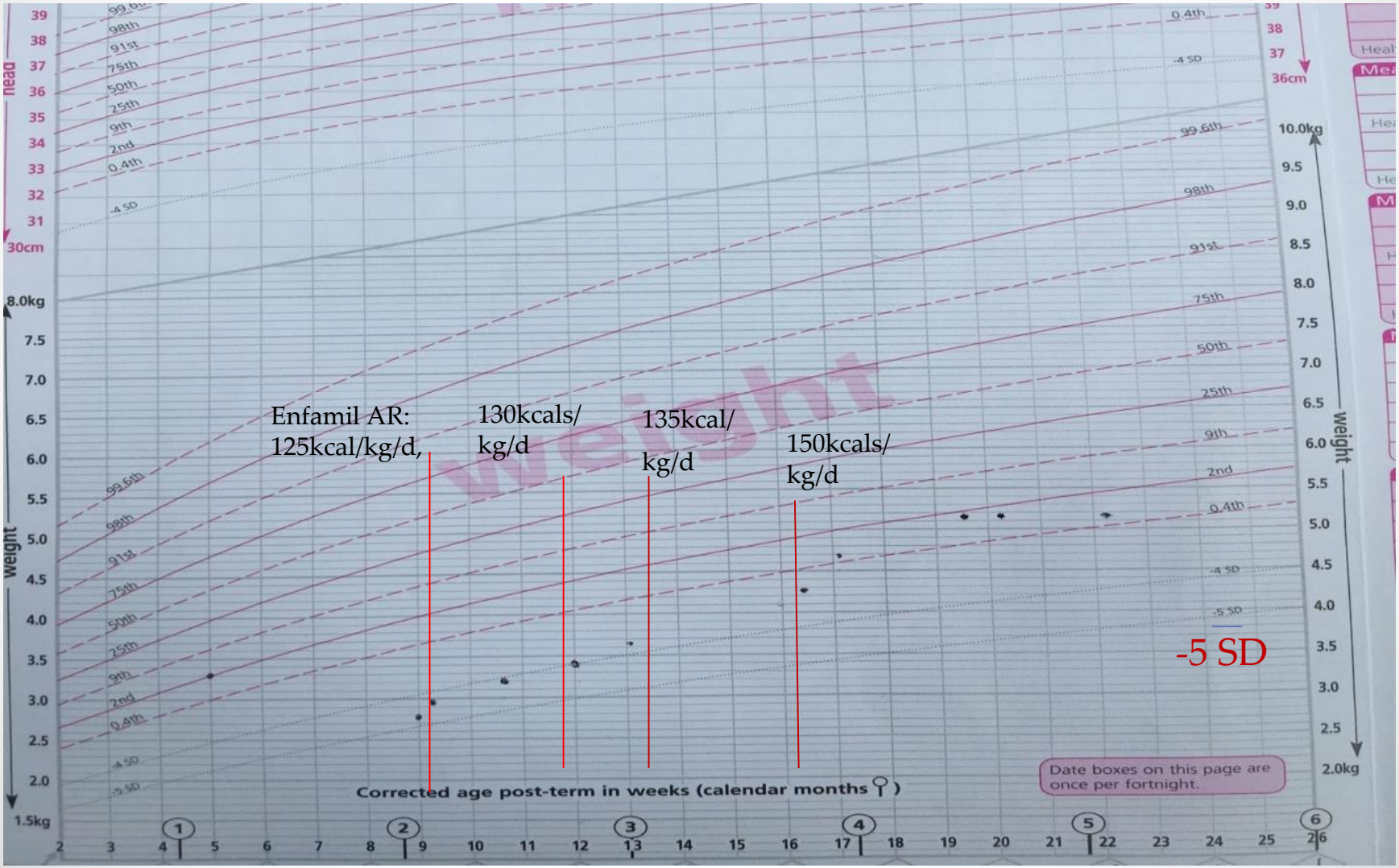
- Oral Aversion ?
- At risk of refeeding ?
- Fluid allowance
- Route of feeding
- Calculating regimen
  - Nutritional requirements
  - Feed type
  - Bolus / Continuous

Case Study	Finding
7. Summary of Nutritional Issues	5 week old girl with newly diagnosed infantile ALL with inadequate oral intake related to decreased ability to consume enough secondary to clinical condition.
8. Plan	Fluid Allowance: 150ml/kg. Commence trophic feeds 5ml/hr. Enfamil AR via nasogastric tube: • ↑ rate as tolerated. Agreed 2ml/hr bd with team. Commence parenteral nutrition (PN). Nutritional intake via PN to meet full estimated nutritional requirements initially. • Titrating PN as ↑ NG tolerance.

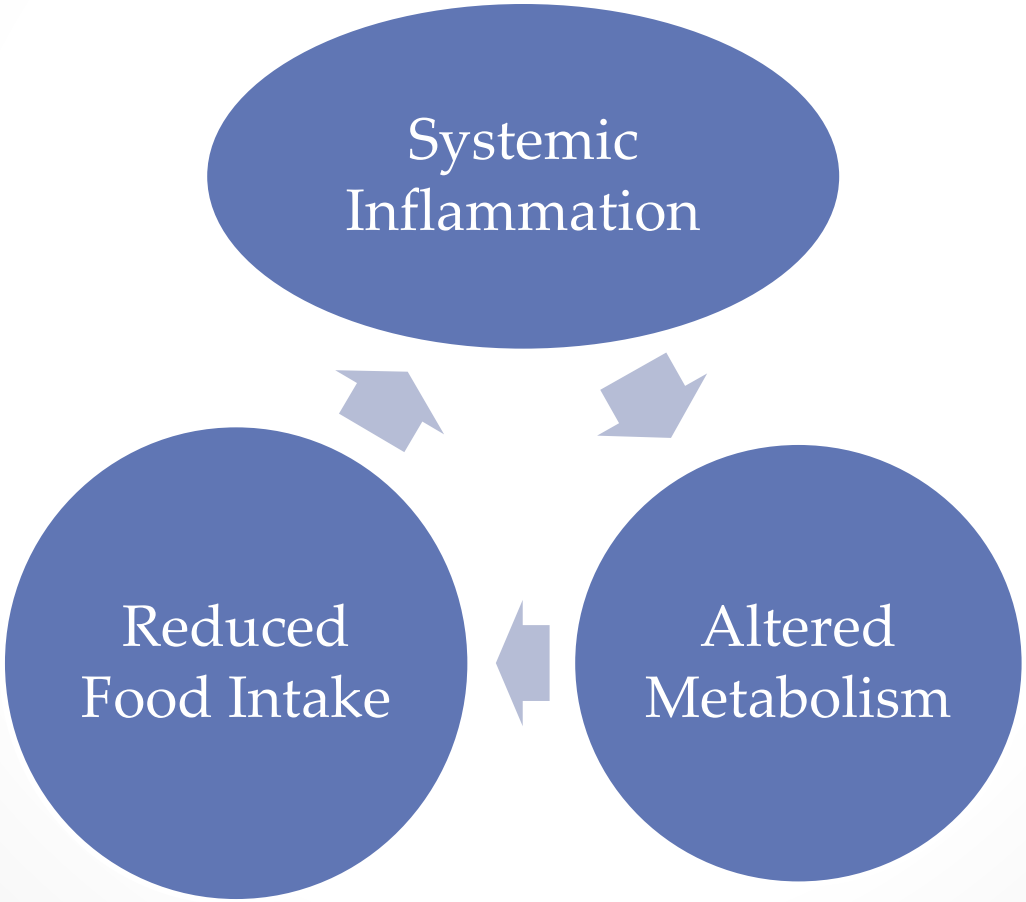
Dietetic Review – approx. 7 weeks of age

Case Study	Findings – 2 weeks post diagnosis
1. Reason for referral and relevant medical/surgical history	Awaiting lumbar puncture and bone marrow aspirate. Clinically improved
5. Anthropometry and requirements	Working wt: 3.34kg (2nd centile) Actual wt: 2.94kg (<<0.4th centile) i.e. 12% weight loss
6. Food and Nutrition History	Tolerating 15.5% Enfamil AR cyclical feeds 30ml/hr x 16 hours = 460ml total – 155ml/kg/d, 125kcal/kg/d, 3g/kg/d protein. PN stopped.
7. Summary of Nutritional Issues	7 week old girl on chemotherapy for infantile ALL with illness related paediatric malnutrition related to disease causing prolonged catabolism and increasing needs.
8. Plan (as inpatient for next ~ 4 weeks)	Tolerating approx. 150mls/kg/d but requiring increased calorie intake 1. Inadequate weight gain seen on intakes of 130kcals/kg/d and with further increase to 135kcals/kg/d. 2. Change to nutrient dense infant formula (Infatrini Peptisorb) with increase in calorie intake to 150kcals/kg/d showing positive weight gain velocity. 3. Link with SLT re: oral stimulation and soother dips.

UK-WHO Growth Chart



Aetiology of Malnutrition



Dietetic Review – approx. 20 weeks of age

Case Study	Findings – 14 weeks post diagnosis
1. Reason for referral and relevant medical/surgical history	Admitted for chemotherapy. ↑ vomiting post last cycle. Inpatient for ˜4 weeks secondary to poorly controlled vomiting.
5. Anthropometry and requirements	Weight: 5.15kg (0.4^{th}-2^{nd} centile) Length: 59.5cm (2^{nd}-9^{th} centile) Fluid requirements: 150ml/kg = ˜770ml

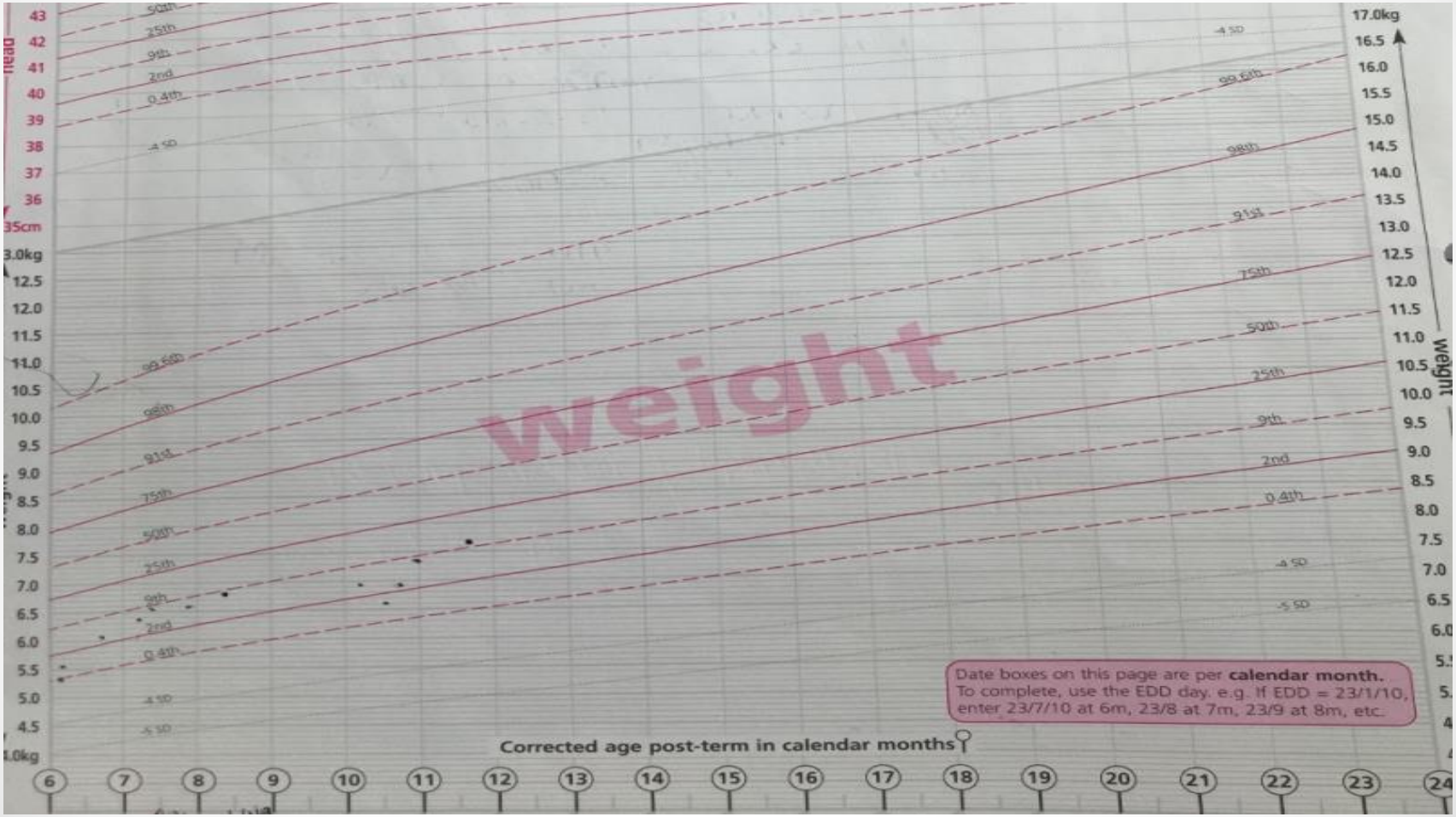
6. Food and Nutrition History

NG feeds 75ml x 7 feeds daily Infatrini Peptisorb via pump over 1 hour =102kcal/kg/d, 102ml/kg/d, 2.7g/ kg/d.

Time++ given to NG feeding.
Mum keen+ to commence spoon feeds.

Case Study	Findings
8. Plan	1) As an in-patient - ↑ NG rate slowly. Aim 540ml over 24 hours i.e 90ml x 6 feeds Infatrini Peptisorb Offer orally initially and top-up via pump. Tastes of spoon feeds and messy play. Joint reviews with SLT. ↓ bolus feeds as ↑oral intake. 2) On discharge, tolerating ˜50ml orally x 6 feeds per day and topping up to 90ml. Provides 105ml/kg/d, 105kcal/kg/d, 2.7g/kg/d protein. Still little interest in taking solids. 3) On review in 4/52, progressed to taking 2-3 spoon-feeds purée daily. Change to continuous supplementary overnight feed (~220ml-240ml Infatrini Peptisorb depending on oral intake).

UK-WHO Growth Chart



Dietetic Review- 1 yr of age.

Case Study	Findings
1. Reason for referral and relevant medical/surgical history	Review in Bone Marrow Transplant clinic D+88. Clinically well.
5. Anthropometry and requirements	Weight: 7.62kg (9^{th} centile) Length: 68.5cm (2^{nd} centile) Centiles are now proportionate.
6. Food and Nutrition History	NGT removed 2/52 ago and sustaining appropriate weight gain targets. Food diary = oral diet with good range of food groups and appropriate textures. Taking family meals and often self feeding. Meeting micronutrients requirements – taking Ca, Fe rich foods. Fluids = back on a standard first infant formula and drinking H_20.
8. Plan	Encourage+ and praise+ positive dietary changes made. Continue exposure to different tastes and textures. Suggested changing to full fat cow's milk. Discharge from dietetic service.

Summary

- Nutritional support of acutely unwell paediatric patients
  - Unique nutritional needs – infancy to adolescence in the context of significant medical issues.
  - Psychosocial aspects – child + family.
  - Requires intensive dietetic counselling to achieve nutritional goals whilst supporting the patient and their parents.

Thank You

- Any Questions?