

# MMed and DCH Lectures

Weekly by Zoom

Prof Trevor Duke

# MMed and DCH Lectures

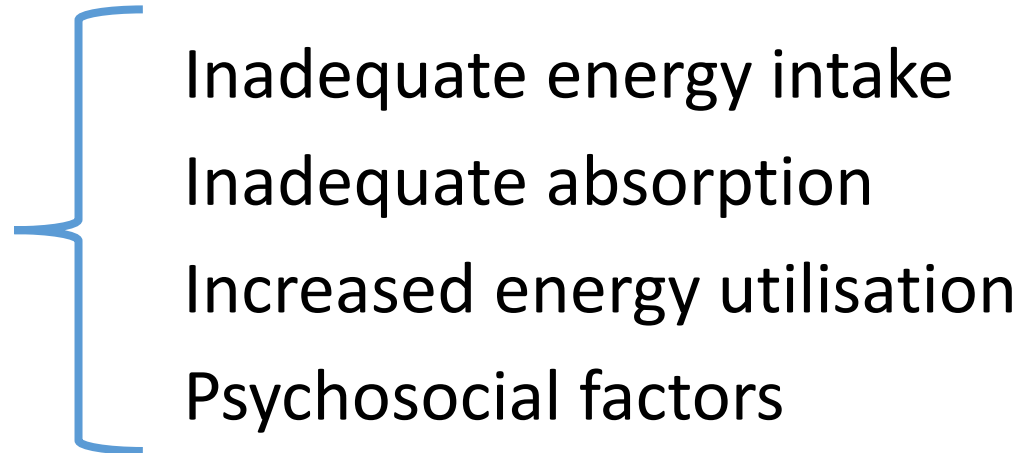
## Failure to thrive

September 14th, 2020

Prof Trevor Duke

# Failure to thrive

Primary malnutrition  
Chronic illness  
Genetic / syndromic



Often multiple contributing causes to failure to thrive

Most FTT is non-organic

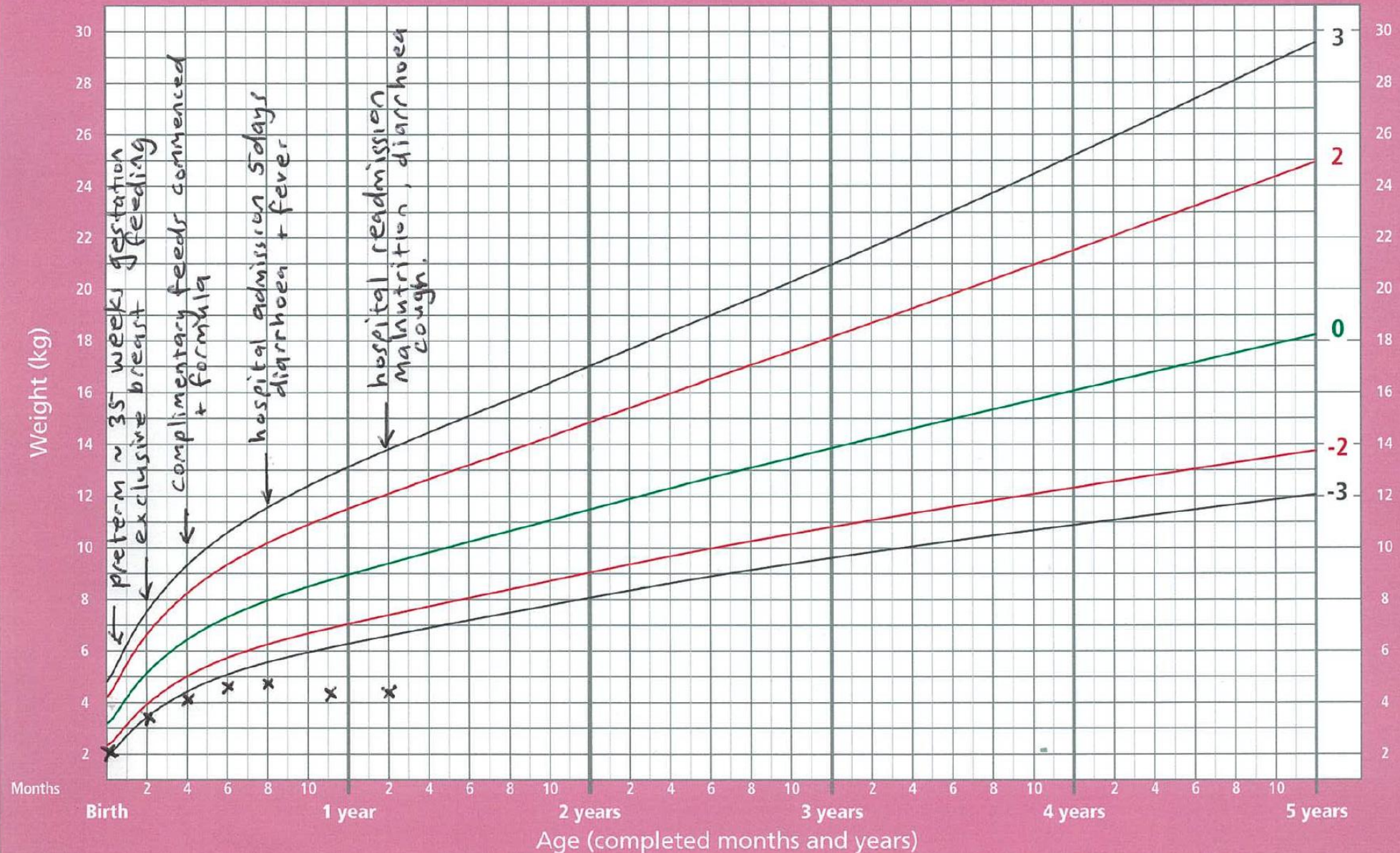
| Inadequate energy intake                            | Inadequate absorption              | Increased energy utilisation            | Genetic / syndromic                     | Psychosocial factors                  |
|---|------------------------------------|---|---|---------------------------------------|
| Breast feeding difficulties                         | Chronic diarrhoea                  | Chronic illness, e.g. tuberculosis, HIV | Skeletal dysplasia, e.g. achondroplasia | Adoption                              |
| Inadequate complementary feeding                    | Environmental enteropathy          | Urinary tract infection                 | Chromosomal abnormality                 | Neglect                               |
| ↓Volume of feeds                                    | Helminth infestation               | Congenital heart disease                |   | Domestic violence                     |
| ↓Number of feeds                                    | Coeliac disease                    | Diabetes mellitus                       |   | Orphan                                |
| Lack of dietary diversity                           | Cow milk protein intolerance       | Hyperthyroidism                         |   | Chronic illness in parents            |
| Prolonged exclusive breast feeding                  | Chronic inflammatory bowel disease |   |   | Maternal depression                   |
| Anorexia of chronic disease, e.g. tuberculosis, HIV | Antibiotic associated diarrhoea    |   |   | Poor carer understanding of nutrition |
| Structural causes e.g. cleft palate                 | Immunodeficiency                   |   |   | Poverty                               |
| Error in infant formula dilution                    |                                    |   |   | Attachment issues                     |

# Red flags

- When a child is failing to thrive...
  - **weight gain** is affected first, but if the problem persists
  - **length** is also affected
  - **head circumference** only affected if FTT very severe and prolonged
- **Weight for age crossing centiles**
- ***Losing weight***

# Weight-for-age GIRLS

Birth to 5 years (z-scores)





# Head circumference-for-age GIRLS

Birth to 5 years (z-scores)



# A nutritional history

- Longitudinal (time-line)
  - From birth
  - Frequency, duration of breast-feeding
  - Age complimentary feeds were introduced
- Cross sectional
  - “In a typical day / week what does your child eat”
  - A 3-day feed diary
- Systems review (nutritional)
  - Vomiting, diarrhoea, malabsorption
  - Cough, fever, lethargy, irritability





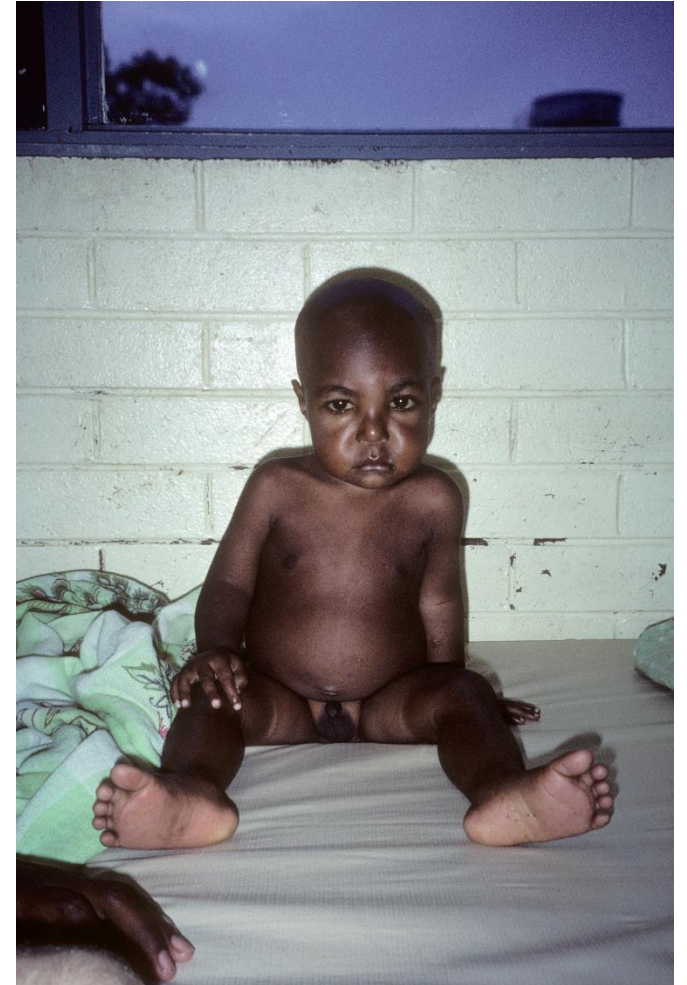
# Examination

- **Signs of malnutrition** – wasting (muscle bulk of buttocks, thighs), oedema, prominent ribs, MUAC, sparse hair, bony face
- **Dysmorphic features**
- **Mental state** – interaction with mother, eye contact, withdrawn behavior, hypervigilance, anxiety
- **Evidence of chronic disease**
- **Candidiasis** – immune deficiency
- **Direct observation of feeding** – intensity of demanding food, techniques of feeding, coordination of suck and swallowing (video feeding)
- **Developmental assessment**



# Developmental delay a part of FTT

- Gross motor
  - Poor muscle bulk and tone → generalized weakness, immature truncal posture, head lag
- Mental state
  - Apathy, irritability, anxiety, depression
  - Withdraw from social contact
  - Gaze aversion, lack of interest in social overtures







# Domains of development

- Gross motor
  - Head and truncal control
  - Rolling
  - Sitting
  - Crawling
  - Walking
- Fine motor
  - Arm and hand control
- Vision
- Hearing
- Socialisation



| PHYSICAL DEVELOPMENT   | Average age skills begin           | 3 months                            | 6 months                               | 9 months                                 | 1 year                               | 2 years  | 3 years  | 5 year                              |
|------------------------|------------------------------------|-------------------------------------|--|--|--------------------------------------|--|--|-------------------------------------|
| Head and trunk control | <br>lifts head part way up         | <br>holds head up briefly           | <br>holds head up high and well        | <br>holds up head and shoulders          | <br>turns head and shifts weight     | <br>holds head up well when lifted                                 | <br>moves and holds head easily in all directions                |                                     |
| Rolling                |                                    | <br>rolls belly to back             | <br>rolls back to belly                | <br>rolls over and over easily in play   |                                      |  |  |                                     |
| Sitting                |                                    | <br>sits only with full support     | <br>sits with some support             | <br>sits with hand support               | <br>begins to sit without support    | <br>sits well without support                                      | <br>twists and moves easily while sitting                        |                                     |
| Crawling and walking   |                                    | <br>begins to creep                 | <br>scoots or crawls                   | <br>pulls to standing                    | <br>takes steps                      | <br>walks  | <br>runs   | <br>can walk on tiptoe and on heels |
| Arm and hand control   | <br>grips finger put into hand     | <br>begins to reach towards objects | <br>reaches and grasps with whole hand | <br>passes object from one hand to other | <br>grasps with thumb and forefinger | <br>easily moves fingers back and forth from nose to moving object | <br>throws and catches ball                                      |                                     |
| Seeing                 | <br>follows close object with eyes | <br>enjoys bright colors/shapes     | <br>recognizes different faces         | <br>eyes focus on far object             | <br>looks at small things/pictures   | <br>Sees small shapes clearly at 6 meters (see p. 453 for test).   | <br>Sees small shapes clearly at 6 meters (see p. 453 for test). |                                     |
| Hearing                | <br>moves or cries at a loud noise | <br>turns head to sounds            | <br>responds to mother's voice         | <br>enjoys rhythmic music                | <br>understands simple words         | <br>hears clearly and understands most simple language             |  |                                     |

# The child's socialization and the parent-infant interaction are closely linked

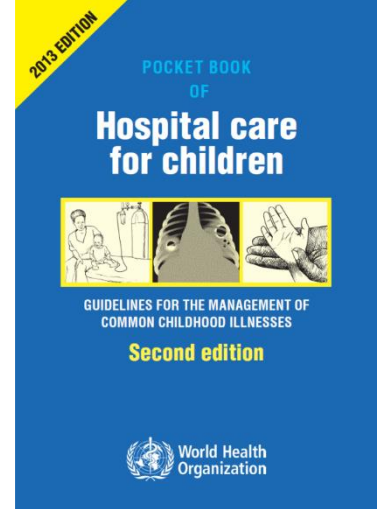
- Parent – infant interaction
  - Does the parent appear to enjoy caring for the child?
  - Are they engaged or disengaged?
  - Are they coercive (force feeding)?
  - Do they appear frustrated or upset?
  - Do they handle the child gently or roughly?
  - Do they have eye contact, and play?
- “In-depth psychosocial evaluation is important in all cases of failure to thrive.”

# Investigations

- If no specific signs or symptoms of organic disease, then investigations have a low yield
- Most FTT is non-organic
- Rule out TB / HIV by clinical signs and symptoms
- Investigations for severity or complications of severe malnutrition

# Management of all sick children

- Triage
- Emergency treatment
- History and examination
- Laboratory investigations, if required
- Main diagnosis and other diagnoses
- Treatment
- Supportive care
- Monitoring
- Plan discharge
- Follow-up



# Management of severe malnutrition

*Table 20. Time frame for the management of the child with severe malnutrition*

|                           | Stabilization |          | Rehabilitation |
|---------------------------|---------------|----------|----------------|
|                           | Days 1–2      | Days 3–7 | Weeks 2–6      |
| 1. Hypoglycaemia          | →             |          |                |
| 2. Hypothermia            | →             |          |                |
| 3. Dehydration            | →             |          |                |
| 4. Electrolytes           | →             | →        | →              |
| 5. Infection              | →             | →        |                |
| 6. Micronutrients         | → no iron     | →        | → with iron    |
| 7. Initiate feeding       | →             | →        |                |
| 8. Catch-up growth        |               |          | →              |
| 9. Sensory stimulation    | →             | →        | →              |
| 10. Prepare for follow-up |               |          | →              |



# Refeeding syndrome

First described among people released from concentration camps after WWII

- Oral feeding of grossly malnourished people → diarrhoea, heart failure, coma, convulsions



# Chronic or severe malnutrition

Hypokalaemia

Hypomagnasaemia

Hypophosphataemia

Thiamine deficiency

Salt & water retention

Arrhythmias

Hypotension

Weakness

↓ Cardiac function

→ Oedema  
Renal failure

↓ Insulin

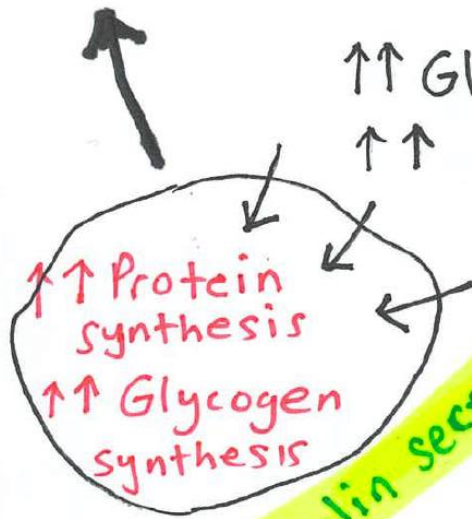
↑ Glucagon

↑ Cortisol

Glycogenolysis  
Gluconeogenesis

Protein catabolism  
in muscle

Catabolism



↑↑ Glucose uptake  
↑↑  $K^+$ ,  $Mg^{2+}$ ,  $PO_4$   
uptake by cells

↑↑ Insulin secretion

Refeeding

(switch to anabolism)  
Carbohydrates  
++

Protein depletion  
Muscle atrophy  
Hypoalbuminaemia  
↓ Immunoglobulins  
Lipolysis - Loss of fat stores  
Electrolyte depletion  
Vitamin depletion

# Refeeding

- Under conditions of anabolism (insulin)
  - Glucose,  $K^+$ ,  $Mg^{++}$ ,  $PO_4^{--}$  moves into cells
  - Protein synthesis occurs (ATP and 2-3 DPG produced  $\uparrow\uparrow$ , uses phosphate)
  - Thiamine moves into cells as a co-factor for carbohydrate metabolism
- Prevention
  - Follow WHO guidelines for management of severe malnutrition
  - F75 (75 kcal / 100ml) – low carbohydrate to begin with
  - Supplemental  $K^+$ ,  $Mg^{++}$ ,  $PO_4^-$
  - Avoid fluid overload

Stroke volume & Cardiac output

Normal heart muscle function

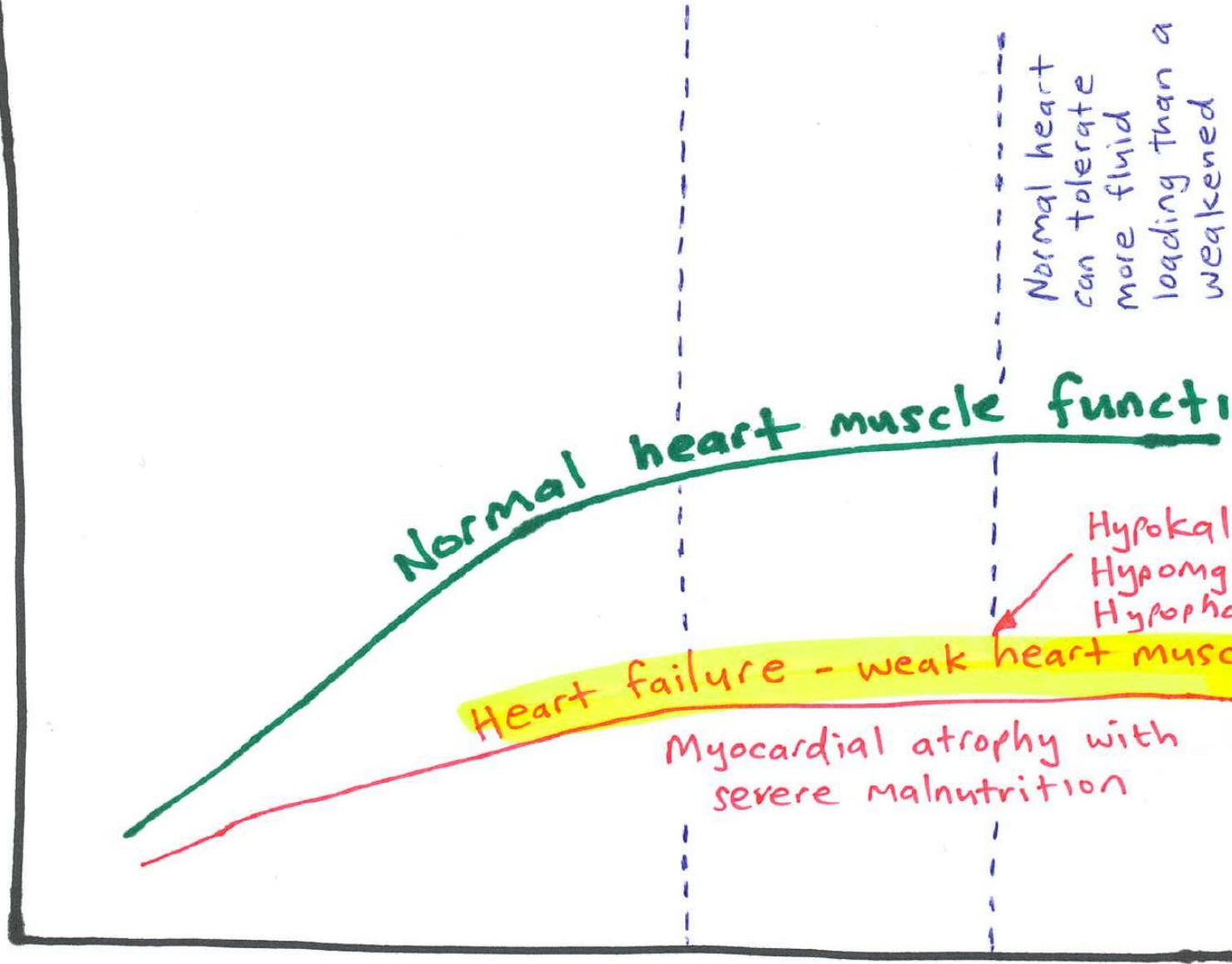
Normal heart  
can tolerate  
more fluid  
loading than a  
weakened  
heart

Heart failure - weak heart muscle

Hypokalaemia  
Hypomg<sup>2+</sup>  
Hypophosphataemia

Myocardial atrophy with  
severe malnutrition

Left ventricular end-diastolic pressure  
(or End-diastolic volume)



# Management of *failure to thrive*

- Holistic
- Refeeding syndrome
- Establish desired feeding pattern in hospital that can be reproduced at home
- Written feeding plan
- Psychosocial support for mother and family
- Development support
- Follow-up – growth, development, vaccines, behavioral problems



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