Protein Energy Malnutrition and feeding requirements

Dr Jeané Cloete

What covering?

1. What?
2. Who?
3. Why?
4. How notice it?
5. How manage it?
1. What?

What?

- Illness develop due to *inadequate* intake of
  - Protein
  - Energy
1. What?

2. Who?

Who susceptible?
Who susceptible?

- Possible in any age group
- Less frequent in older individuals
- Requirements/ kg mass are not as great
1. What?
2. Who?
3. Why?
Energy Requirement

- Physical activity
- Growth
- Maintenance

Energy Requirement

Optimal growth

Energy intake

Total Protein

Protein Quality
Develop PEM

Why?

- Diseases can cause PEM due to:
  - Intake
  - Absorption
  - Utilization of nutrients is interfered by disease and dysfunction
Why?

- Diseases can cause PEM due to:
  - Intake
  - Absorption
  - Utilization of nutrients is interfered by disease and dysfunction
- Disease like
  - HIV infection
  - Chronic diarrhoea
  - Mal absorption

The Malnutrition – Infection cycle

- Inadequate intake
  - Anorexia
  - Mal absorption
  - ↑ Nutrient losses
  - ↑ Nutrient requirements

- Susceptibility to infection
  - Weight loss
  - Mucosal damage
  - Immune deficiency

- ↑ Nutrient requirements
Clinical presentation

- Depends on:
  - Age
  - Degree of malnutrition
  - Duration of protein and energy deficiency
  - Previous nutritional status
  - Modifications produced by disease
Growth parameters

• Weight for Age
  • Indicates past and present malnutrition

• Weight for height
  • Present nutritional status
  • Indicates recent weight loss
  • Wasting

• Height for age
  • Indicates Long term nutritional status
  • Chronic growth delay
  • Stunting

• Mid upper arm circumference

Clinical assessment

• Wide spectrum of disorders under PEM

• Previously used Waterloo and Gomez classification

• Now Z scores to help with diagnosis

• PLUS any signs of visible severe wasting

• PLUS presence of bipedal oedema
Clinical features

Clinical features of PEM

Protein Energy Malnutrition

Kwashiorkor

Marasmus

Marasmic Kwashiorkor
## Clinical features of PEM

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Kwashiorkor

- Severe form of PEM
- Mostly after weaning from breast or bottle
- Present with:
  - Failure to thrive
  - Oedema
  - Anorexia
  - Diarrhoea
  - Skin and mucus membrane lesions
  - Misery and apathy
Clinical features of Kwashiorkor

Growth failure
Growth failure

- Deceptively chubby appearance
- Due to oedema
- Excess subcutaneous fat from high carbohydrate diet
- Muscle wasting

Oedema

- Hair changes
- Mental changes
- Wasting
- Anaemia
- Diarrhoea
- Dermatitis (fatty rash)
- Oedema
Oedema

- First appear on dorsum of the feet or lower tibia
- Oedema helps to differentiate between marasmus and kwashiorkor
- Pathophysiology is complex

Dermatosis
Dermatosis

- Dry scaly pigmentation
- Crazy paving
- Pseudo Purpura
- Bullous desquamation

Hair changes

- Sparse thin hair
- Changes in colour to Red & Grey
Immunosuppression

Inadequate intake

Anorexia  
Mal absorption  
↑ Nutrient losses  
↑ Nutrient requirements

Weight loss 
Mucosal damage 
Immune deficiency

Susceptibility to infection

Nutritionally Acquired Immunodeficiency

Inadequate intake

Anorexia  
Mal absorption  
↑ Nutrient losses  
↑ Nutrient requirements

Weight loss 
Mucosal damage 
Immune deficiency

Susceptibility to infection
Immunosuppression

- Infections are often more severe
- Associated with complications
- High mortality
- Deficiencies in Vit A and C
- Zinc, Iron, Folate and trace elements

Infections

↓ Cell mediated Immunity

- Gardia Lambdia parasites
- Gram negative Septicaemia
- Infective Mononucleosis
- Measles
- Tuberculosis
- Herpes Simplex (Disseminated)
- Gastro enteritis
Other presentations

- Apathy and irritability
- Major problems
  - Structural and functional changes in gut
  - Atrophic bowel
- Liver enlargement
  - Fatty changes
Other presentations

- Glucose intolerance with Hypoglycaemia
- Hypokalaemia – Ileus and Anaemia
- Purpura due to low platelets

? WORRY

- Severe infection
- Hypoglycaemia
- Hypothermia
- Jaundice
- Collapse due to dehydration
Marasmus

Protein Energy Malnutrition → Marasmus

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Marasmus

• First year of life
• After weaning
• Due to prolonged severe diarrhoea

Presenting symptoms:
• Failure to thrive
• Irritable crying
• Apathy
• Frequently diarrhoea
Marasmus

- Presenting symptoms:
  - Failure to thrive
  - Irritable crying
  - Apathy
  - Frequently diarrhoea

  - Degree of UWFA is extreme
  - < 60% of expected weight for Age
  - If chronic diarrhoea
    - Distended abdomen
    - With visible bowel loops

Differential Diagnosis
- Chronic infections like TB
- AIDS
- Tropical infestations
- Psychological factors
Marasmic Kwashiorkor

- Wasted forms
  - Clinical dermatosis
- And / Or
- Oedema
What covering?

1. What?
2. Who?
3. Why?
4. How notice it?
5. How manage it?

Management

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Management

Dehydration

Not shocked
- Oral fluid @ 10ml/kg every hour
- Until urine is passed
- Ringers bolus of 15 ml/kg
- Re Asses
- Then switch to ORS

Shocked

Management

Hospital
- Resus and Stabilization
- Hypoglycaemia
- Hypothermia
- Metabolic
- Feeding
- Follow up

Outpatient
Hypoglycaemia

- Test blood glucose 3 hourly in first 24 hours
- If blood glucose < 3 mmol/L
  - Immediate feed or
  - Dextrose 10 %, ivi or per os
  - Sugar solution 10 ml/kg
- Monitor blood glucose until > 3 mmol/L
- Continue feeds
- If patient is symptomatic or unresponsive
  - 10 % dextrose ivi 5 ml/kg
- Continue feeds

Management

Hospital → Resus and Stabilization
Hospital → Hypoglycaemia
Hospital → Hypothermia
Hospital → Metabolic
Hospital → Feeding
Hospital → Follow up

Management

Outpatient

Management
Hypothermia

- Prevent hypothermia

- Treat hypothermia by
  - Checking temperature 3 hours post feed
  - If axillary temp < 36 °C Warm the child urgently
  - Mother to child skin contact
  - Place heater nearby
  - If no mother wrap child in a warmed blanket including head
  - Do not apply direct heat to the skin

Management

Hospital

- Resus and Stabilization
- Hypoglycaemia
- Hypothermia
- Metabolic
- Feeding
- Follow up

Outpatient
Other

- Treat for infection even if no signs
  - Ampicillin and Gentamycin or Amikacin
  - For GIT infections treat for Gardia Lambdia
  - For dysentery treat with Cefotaxime or Ceftriaxone

- Mineral and micronutrient deficiencies
  - Potassium chloride solution 25 – 50 mg/kg/dose oral
  - Magnesium sulphate
  - Vit A
  - Folic acid
  - Multivitamin

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Feeding

- Initial phase
  - Begin feeding immediately
  - Use start up formula 130 ml/kg/day divided to give 3 hourly feeds
  - If hypoglycaemia or danger signs feed more regularly 2 hourly
  - If feeds refused or not taken give via Nasogastric Tube

- Rehabilitation
  - When appetite returns
  - Increase the feeds to higher protein/calorie content
  - First give the same amount as start up formula then gradually increase to 200 ml/kg/day

Thanks for your attention!