

CHRISTA KITZ
 SMO for pediatrics and tropical medicine
 Medical Mission Institute
 Tropical medicine & epidemic control
 Hermann Schell Str. 7
 97074 Wuerzburg
 Tel.: 0931- 8048523
christa.kitz@medmissio.de

Severe malnutrition - centre based rehabilitation

Malnutrition

Energy	2100 kcal
Protein	10-12% total energy (52g-63g), but<15%
Fat	17% of total energy (40g)
Vitamin A	1.666 IU (or 0.5 mg retinol equivalent)
Thiamine (B1)	0.9 mg (or 0.4 mg per 1000 kcal intake)
Riboflavin (B2)	1.4 mg (or 0.6 mg per 1000 kcal intake)
Folic acid	160 ug
Niacin (B3)	12 mg (or 6.6 mg per 1000 kcal intake)
Vitamin B12	0.9 ug
Vitamin C	28 mg
Vitamin D	3.2-3.8 ug calciferol
Iron	22 mg (low bioavailability ie 5-9%)
Iodine	150 ug
Magnesium	201 mg
Zinc	12.3 mg
Selenium	27.6 ug
Vitamin E	8.0 mg alpha TE
Vitamin K	48.2 ug
Biotin	25.3 ug
Pantothenate	4.6 ug

**Mean
population
requirements
per day**

FAO / WHO
2002

Malnutrition

Energy	2100 kcal
Protein	10-12% total energy (52g-63g), but<15%
Fat	17% of total energy (40g)
Vitamin A	1.666 IU (or 0.5 mg retinol equivalent)
Thiamine (B1)	0.9 mg (or 0.4 mg per 1000 kcal intake)
Riboflavin (B2)	1.4 mg (or 0.6 mg per 1000 kcal intake)
Folic acid	160 ug
Niacin (B3)	12 mg (or 6.6 mg per 1000 kcal intake)
Vitamin B12	0.9 ug
Vitamin C	28 mg
Vitamin D	3.2-3.8 ug calciferol
Iron	22 mg (low bioavailability ie 5-9%)
Iodine	150 ug
Magnesium	201 mg
Zinc	12.3 mg
Selenium	27.6 ug
Vitamin E	8.0 mg alpha TE
Vitamin K	48.2 ug
Biotin	25.3 ug
Pantothenate	4.6 ug

**Mean
population
requirements
per day**

FAO / WHO
2002

Micronutrient deficiency

Malnutrition

- iodine
goitre
cretinism
- vitamin A
(retinol)
xerophthalmia
keratomalacia
- vitamin B1
(thiamine)
beriberi

Micronutrient deficiency

Malnutrition

- vitamine B2
(Riboflavin)
ariboflavinosis
- vitamin B3
(Niacin)
pellagra
- vitamin C
(ascorbic acid)
scurvy

Micronutrient deficiency

Malnutrition

- **vitamine D**
rickets

**Saving capacity
of the adult
for essential
micronutrients**

Calcium	10–20 years
Vitamin B12	3 – 5 years
Vitamin A	1 – 2 years
Iron	1 – 2 years
Folic acid	3 – 4 months
Vitamin C	3 – 4 months
Niacin	3 – 4 months
Protein	6 – 8 weeks
Vitamin B1	4 – 10 days

Source:
Leitzmann 1984, p.33

Therapeutic Feeding

Malnutrition

*Diagnosis and treatment of severe
malnutrition in children and adults*

TFC-Required utilities

Malnutrition

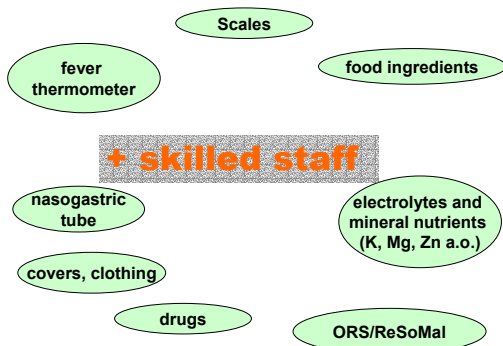


Foto: Christa Kitz

Types of TFCs

Malnutrition

- TFC 24h/24h : 24 hr care is most appropriate for the admission of complicated severely malnourished cases
- Day-care TFC : if it is difficult to admit the cases, particularly at night
- Nutritional Unit in the hospital. TFC should only exist during emergencies and for a limited period. Eventually, nutrition units in local hospital should be able to treat severe malnutrition, with protocols based on the same principles
- CTC “Home based treatment”, a new strategy: The future?

Therapeutic feeding

Malnutrition

The individual case:

- Who needs treatment?
 - (criteria of severe malnutrition)
- Which treatment is recommended?
 - (treatment protocols)
- Monitoring the course

The community:

- Is malnutrition a problem?
 - survey
- What should be the management?
 - SFP, TFC, CTC, etc
- Evaluation of TFC

Therapeutic feeding

Malnutrition

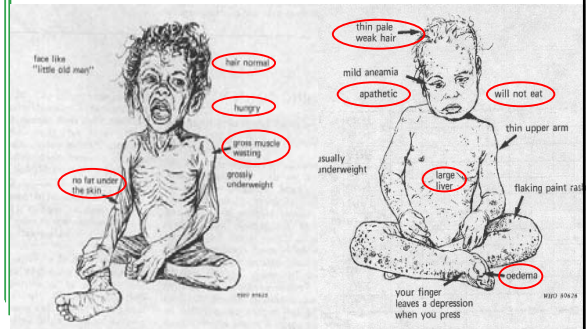
- What is TF?
It is a curative strategy, that aims:
 - To correct the nutritional status of children / adults affected by severe acute malnutrition.
 - To reduce mortality and morbidity.
 - To correct the vitamin and mineral deficits.
 - To immunize the children for the 6 illnesses of EPI, but particularly against measles.
- Target population: severe acute malnutrition

Severe malnutrition can present as:

- Clinically evident forms:
 - **Marasmus** or severe wasting
 - **Kwashiorkor** or oedematous malnutrition
- Non- clinical forms
 - **wasting**
 - **stunting**
 - **underweight**
 (detected only by anthropometry).

Marasmus

Kwashiorkor



Marasmus

Kwashiorkor

- Always look for oedema
 -
- Examine the child well

Kwashiorkor

The liver is always affected, it becomes fatty (steatosis). There is reduction of the activity of the liver enzymes.

→ reduction of the liver function / metabolism

Immunological changes with acute malnutrition

- T- and B-cell population
- natural killer cells
- immunoglobulines / antibodies
- phagocytic capacity
- complement factors

Who needs to be treated?

- Look for associated signs:
 - **Dermatosis:**
 - more frequent in Kwashiorkor
 - Similar to burns
 - increased **risk of infection**
 - **Eye signs**
 - related to Vitamin A deficiency or to eye infection

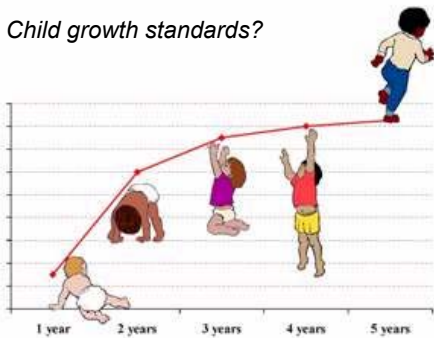
Non-clinical forms of malnutrition

- Wasting → Weight for height
- Stunting → Height for age
- Underweight → weight for age
(anthropometric measures)

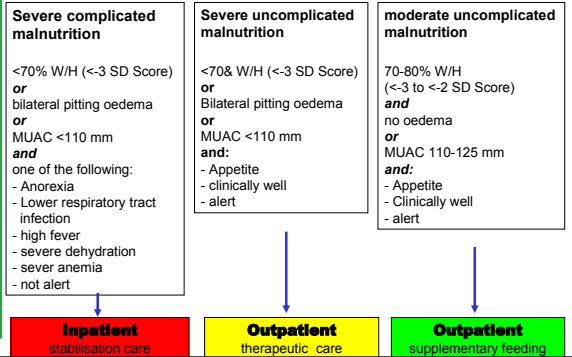
Who needs to be treated?

- Why do we need anthropometric measurements?
 1. Sometimes, the severity of malnutrition cannot be immediately determined by clinical examination
 2. To calculate doses of feeds and drugs
 3. monitor progress.
- What measures are indicated?
 - **Weight / Height (W/A):** method of choice in all ages (except pregnant women) for acute severe wasting
 - **Medium Upper Arm Circumference (MUAC):** alternative method, good predictor of short term mortality.
 - **BMI :** In adults. Only recommended to classify chronic undernutrition and in some nutritional surveys

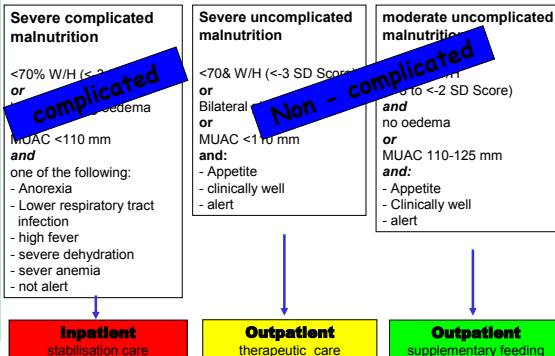
Child growth standards?



A new classification system for acute malnutrition



A new classification system for acute malnutrition



Treatment recommendations

marasmus, kwashiorkor, marasmic kwashiorkor

Treatment occurs in 3 phases:

- initial phase = stabilisation
- rehabilitation phase
- aftercare

Severe malnutrition is a life-threatening state and required fast action.

The **initial phase** should take place under **hospital conditions** or in a **feeding centre** with 24-hour care.

Principles of treatment

• “Reductive adaptation”

The systems of the body slow down to survive with reduced calories.

– Consequences:

- The blood glucose cannot be maintained: **risk of hypoglycaemia**
- Immunity is depressed with **high risk of infections**; BUT there are not signs of infection
- No ability to control temperature: **risk of hypothermia**
- The function has to recover slowly: **progressive feeding Iron is dangerous** if given early
- Na/K pump goes slow: **electrolyte imbalances**

Management of severe malnutrition

	Stabilisation		Rehabilitation	
	Day 1–2	Day 3–7	Weeks 2–6	
1. Hypoglycemia	—————→			
2. Hypothermia	—————→			
3. Dehydration	—————→			
4. Electrolytes	—————→			
5. Infection	—————→	—————→	—————→	—————→
6. Micro-nutrients	---	no iron	----	with iron --
7. Initial formula	—————→			
8. Follow on formula	—————→			
9. Stimulation	—————→			
10. Preparation of aftercare	—————→			

(source: Management of the child with a serious infection / severe malnutrition, WHO 2000)

Phase I: Complications

- Hypoglycaemia
- Hypothermia
- Septic shock
- Heart failure (Hypocaliemia)
- Heart failure (too much volume)



Associated !!
Frequent
Life threatening

Phase I: Complications

• Hypoglycaemia (<3mmol/l)

- Suspect if the child is: lethargic, floppy, unconscious, or has convulsions.
- **IF SUSPECTED: TREAT**
 - With oral glucose 10% 50ml
 - » or IV if **unconscious or convulsions**: IV first 5ml/kg 10%
 - Give antibiotics: Penicillin and Gentamycin
- PREVENT: frequent feeding

• Hypothermia (axillary<35°)

- TREAT : warming carefully
 - Kangaroo for small children
 - Give Antibiotics and glucose
- PREVENT: cover, avoid bath

Phase I: Complications

• Infection / Septic shock

- Due to immunosuppression
- They are life-threatening, but the signs are absent: look actively for it!
- TREAT: always give antibiotics
 - ROUTINE oral antibiotics
 - Amoxicillin, Cotrimoxazol
 - or IM/IV if oedema or complications
- Prevent:
 - Measles vaccine on admission and before discharge.
 - Hygiene

Vitamin A supplementation can reduce child mortality in acute measles by 50%

Vaccination is the most effective tool to increase the gross national product of a country

World bank 2006

SYSTEMATIC TREATMENT for severe malnutrition

DRUGS	D 1	D 2	D 3	D 4	D 5	D 6	D 7	D 8	D 15	Discharge
Vitamine A	X									
Folic Acid	X									
Measles vaccination	X									
Amoxicilline	X	X	X	X	X					
Paracheck (if available)	X									
Antimalarials (Artesunate+Fansidar)	X	X	X							
Mebendazole								X		
Iron, folic acid								X	X	X

Phase I: Other complications

• Dehydration (oral)

- **Don't use IV FLUIDS!!!** :

Oral rehydration with ReSoMal:

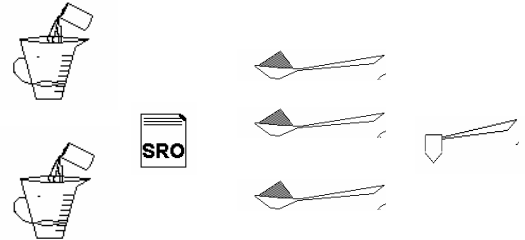
(rehydration solution for the malnourished)

5 ml/kg every 30 min/2 hrs.

5 – 10 ml/Kg/hr/for 4 – 10 hrs.



ReSoMal (rehydration solution for the malnourished)



Water 2 litres + ORS 1 packet + Sugar (50g) 3 spoons + Vitamins 1 measures

Phase I: Other complications

• Dehydration

- **Don't use IV FLUIDS!!!** : Use **ReSoMal**.

• Shock (unconsciousnes)

- Is the only indication for IV fluids

- Suspect if:
 - dehydration without diarrhoea
 - Dehydration with oedema
- Criteria:
 - » Lethargy + cold feet and hands + weak poulse or slow capillary refill, unconscious
- Treated with:
 - **IV fluids:** 15 ml/kg/hr Ringer with 5% glucose
 ½ 0.9% sodium chloride + ½ 5% glucose
 - If no improvement: IV Fluids 4ml/kg/hr
 - blood (if no improvement): 10 ml/kg over 3 hrs
 - Oxygen
 - Monitoring respiratory and heart rate (every 5 – 10 min)
 - Interruption of infusion if state worsens

Breast is best