Module 9: HIV and Primary Health Care

Session 1: Routine Childhood Services

Total Session Time: 30 minutes

Learning Objectives

By the end of session, participants will be able to:

- Outline pillars of HIV and AIDS Comprehensive Care
- Explain the importance of immunization
- Explain the effect of HIV on child growth and development
- Describe an integrated maternal and child care for HIV-infected mothers and HIV infected/affected children

Introduction

Primary Care; Is basic or general health care that focuses on the point at which a patient ideally first seeks assistance from the medical care system. Primary care is typically provided at the RCH clinic for women of reproductive age and underfive children. Primary care is considered comprehensive when the primary provider enters into a sustained partnership with the patient to take responsibility for the overall coordination for the care of the patient's health problems. Primary health care provider is responsible for referral, follow-up, etc.

10 Pillars of HIV and AIDS Comprehensive Care (1)

- Documentation/Confirmation of HIV exposure status and Early diagnosis of HIV infection
- Growth and development monitoring and promotion
- Routine Immunization (according to IVD) and De-worming
- Nutritional education and supplementation of macro- and micro-nutrients (Vit A and multivitamin)
- Aggressive treatment of acute infections
- Prophylaxis and treatment of Opportunistic Infections (CPT)
- Psychosocial support and palliative care
- Adolescent care and support
- Mother and family care: PMTCT plus
- Antiretroviral therapy when indicated

Immunization

Immunization is a critical strategy in:

- Prevention of common childhood illnesses
- Prevention of severe forms of OIs (e.g. TB) especially in HIV infected children
- Increased utilization of underfive clinics

Give immunizations according to National guidelines:

- Measles-Rubella (MR) at 9 months, and repeat at 18 months whether symptomatic or not
- Repeat BCG if there is no scar in 4 weeks
- BCG should not be given to children with clear signs and symptoms of HIV-disease or AIDS
- Avoid missed opportunities for vaccination to HIV infected children

- Encourage caregivers to safely keep, and to always bring the child's immunization/ health card to all clinic visits
- Health care workers should review the exposure and vaccination status

The Tanzania IVD Schedule

VACCINE	At Birth	6 Weeks	10 Weeks	14 Weeks	9 Months	18 Months
BCG	√					
ORAL POLIO	√	√	√	√		
DPT-HepB-HiB		√	√	√		
PNEUMOCOCCAL		√	√	√		
ROTA		√	√			
MEASLES-RUBELLA					√	√

GROWTH AND DEVELOPMENT

Effect of HIV on Child Growth and Development

Growth failure is greater in HIV infected children due to:

- Low birth weight
- Inadequate macro- and micro- nutrient intake
- Inadequate infant and young child feeding practices
- HIV infection causes
    - Recurrent common infections
    - Progression of other underlying diseases (e.g. TB)
    - Limited access to child care e.g. if mother is sick, dead, young caregiver, etc.
- Malabsorption

Growth and Development Monitoring and Promotion (1)

- Weight, height/length and OFC should be measured, recorded, charted and monitored regularly
- Interpret findings for the parent/caregiver
- Provide nutritional counseling at each visit to reinforce safer infant and young child feeding practices, particularly for those whose growth is faltering.
- Catch-up growth indicates treatment success

For interpretation, findings of the anthropometric measurements (Wt, Ht/Lt, OFC) should always be compared with standards using acceptable National tools (Growth charts) .

- Failure to gain weight/grow might be an early sign of treatment failure or undiagnosed HIV infection
- Regression, failure to gain, or slow acquisition of new skills in young children may be an early sign of HIV encephalopathy
- Developmental milestones should be assessed at each visit

REFER to Handout 2.1.2: WHO Growth Charts on page XXX of their Participant Handbook

for WHO growth chart, and Handout 2.1.3 Developmental Assessment

INTEGRATED MATERNAL AND CHILD CARE

Integrated maternal and child care, Is an HIV infected woman identified during PMTCT, signals an at risk 'exposed' infant. Exposure status of the child must be indicated on the RCH card number 1. A child with HIV infection signals an at risk/infected mother and or family. Both need care and is recommended to schedule both the underfive- and post natal- visits at the same time/date. Maternal health and survival directly impacts on child survival. HIV exposed infants experience a 2-5 fold increased mortality compared to infants of HIV negative women

Always ask about relationship of HIV affected child with accompanying adult. If mother is the accompanying adult, ask about HIV status

- If HIV status is unknown, offer, provide or refer for HIV counseling and testing
- If HIV positive, always ask about place and type of care provided

Provide care and refer as necessary. Always ask the mother/caregiver if she has attended the post natal and/or FP clinic, or has any other problems. Refer as necessary. Ask about other family members needing HIV testing and/or care

Detailed history is important to the HIV status of the caretaker and other members in the family including other siblings. Health care providers should recommend HIV testing and counseling as part of the standard of care for those whose HIV status is unknown.

Key points

- Immunization is critical for prevention of common childhood illnesses, especially for HIV infected children
- Growth improvement is a good indicator of ARV treatment success
- Maternal health and survival directly impacts on child survival
- Well attended RCH visits provide an opportunity to optimize care for HIV exposed and infected children and their mothers/ families

Session 2: Nutritional Management in Pediatric HIV and AIDS

Total Session Time: 90 minutes

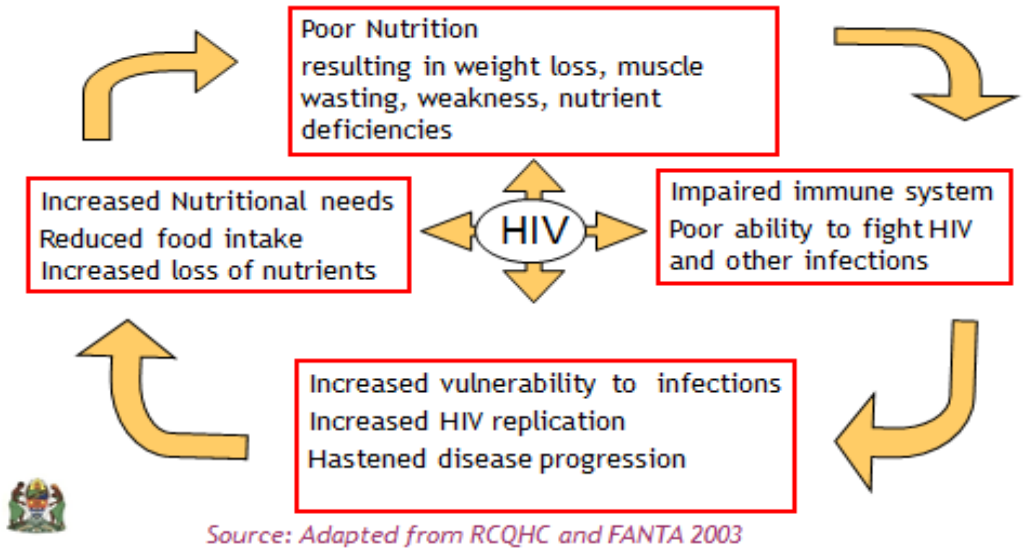
Learning Objectives

By the end of session, participants will be able to:

- Describe the interaction of HIV and Nutrition
- Describe the goals of nutritional care in HIV infected and affected children
- Explain the provision of nutritional advice to caregivers of HIV infected children
- Describe management of nutritional problems in HIV infected and affected children

Introduction

The Interaction between Nutrition and HIV



Source: Adapted from RCQHC and FANTA 2003

Effects of HIV on Nutrition

HIV affects the absorption and production of:

- Vitamins
- Minerals (Mg, Se, Zn)
- Hormones involved in the metabolism of carbohydrates
- Proteins
- Fats

Nutritional deficiencies affect immune functions that may influence viral expression and replication HIV directly attacks and destroys the of the immune system leading to repeated infections and illness.

- Poor and/or inadequate food/nutrient intake
- Poor appetite or abdominal pain

- Poor digestion
- Poor absorption of nutrients
- Disruption of metabolism/increased REE (Resting Energy Expenditure)
- Muscle wasting or loss of lean body tissue
- Increased nutritional needs
- HIV infected children are at increased risk of malnutrition because of:
    - Low birth weight
    - Inappropriate feeding practices
    - Inappropriate child care
    - Household food insecurity
    - Orphanhood

Malnutrition is a common condition in HIV-infected children and is major contributor to mortality in both HIV-uninfected and HIV-infected children. For HIV-positive children, nutrition is even more important to prevent malnutrition and maintain a strong immune system because the child may be at greater risk of developing infections. Poor nutrition weakens the immune system and predisposes to common infections.

Conditions causing Poor Nutrition in HIV Infected Children

- Persistent diarrhoea
- Recurrent infections or underlying illness e.g. (TB)
- Painful GIT conditions (mouth sores, candidiasis, herpes simplex stomatitis, Kaposi's sarcoma, xerostomia)
- Depression and changes in mental state can lead to loss of appetite
- Side effects of medications
- Household food insecurity

Even food insecurity in the community affects food intake.

Management of Inadequate Nutrition

- Feed child with nutrient dense or energy dense foods including nutritional supplements
- Feed child small frequent meals and snacks
- Nutritional support like enteral nutrition may be required

Effect of Nutrition on HIV

Nutrition Requirements for the HIV Infected Child

- The growing child has higher needs of energy, protein, vitamin, minerals and fluids
- Energy and protein requirements can be affected by complications which affect their intake:
- HIV infection is a high catabolic state increasing basic caloric requirements
- Fever increases energy requirements by 13% and protein requirements by 10%

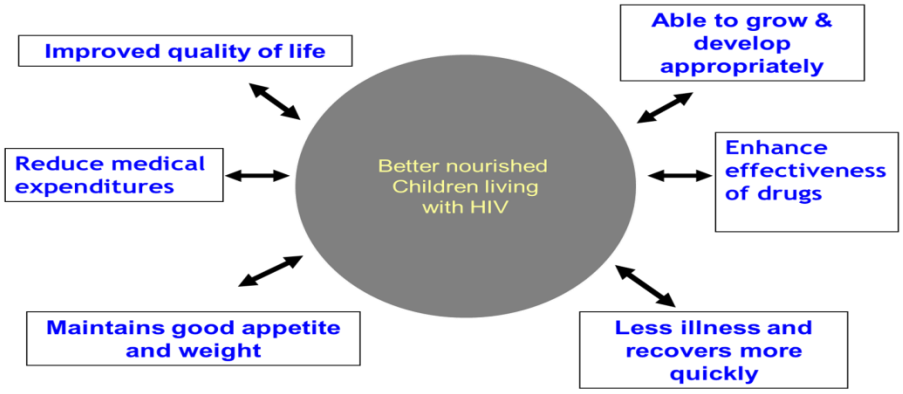
Since HIV causes the immune system to become weak and allow more infections, a person with HIV will need more energy or calories from food to stay strong. For an HIV-infected person who is in the early stages of HIV, Stages 1 and 2, their energy needs increase by about 10 percent of normal. So during counseling, we can suggest to a client to add 1 or 2 teaspoons of extra oil to their porridge, or eat an extra egg, or have an extra serving of porridge. Remember that energy comes from the macronutrients, carbohydrates, proteins and fat, so keep these foods in mind when counseling on increasing energy intake.

Goals of Nutritional Intervention in HIV Infected Children

- Promote optimal growth and development
- Prevent malnutrition
- Reduce morbidity and mortality
- Slow progression of the disease
- Optimize response to medical treatment
- Enhance quality of life by providing adequate energy and nutrients

The severity of growth failure among HIV-positive children is associated with reduced survival. HIV-infected infants with weight-for-age below –1.5 Z-scores have five times higher risk of dying before 25 months than non-infected children (Berhane et al 1997). Poor nutrition in HIV infected child results in retarded cognitive development and functional deficits (e.g., delayed sexual development among boys).

Benefits of Good Nutrition



Good nutrition helps persons with HIV and those who are suffering from AIDS to fight infection, strengthen their immune systems, and manage HIV-related complications.

Requirement for Optimal Infant and Young Child Feeding

- Optimize maternal nutrition (especially during pregnancy and lactation)
- Provide on going maternal/caregiver education and counselling
- Support implementation of national HIV and infant feeding guidelines by mothers/caregivers and health workers

Infant Feeding Options for HIV Infected Women

There are two main infant- feeding options that a mother can choose:

- Exclusive breastfeeding
- Replacement feeding

Once a mother has opted for either feeding method she should be encouraged to follow her decision. EBF and RF are the only options but EBF is preferred in this setting for most women. Feeding cow's milk or other animal milk is not recommended for infants <6 months of age (unless is the only options). After 6 months of age, infants (whether HIV-exposed or not) can safely be given whole cow's milk as a primary source of milk, but until 12 months the milk should be boiled, and additional liquids should be given.

Refer: *WHO Guiding principles for feeding non-breastfed children 6–24 months of age. Geneva, WHO, 2005.*

Exclusive Breastfeeding

- Feeding the infant only breast milk until 6 months of age
- Before 6 months of age, infant should not be given anything else except breast milk
- Exception: prescribed medicines or vitamins and mineral supplements

In addition to reduction of HIV transmission, exclusive breastfeeding in the first six months of life is also associated with reduced mortality over the first year of life in HIV-exposed infants compared to mixed feeding and replacement feeding *(Guidelines on HIV and Infant Feeding WHO 2010).*

Replacement Feeding

Feeding infants something other than breast milk which meet all the infants' nutritional requirements during the first 6 months of life

- The only replacement feed that meets infants' nutritional requirements is commercial infant formula

When mothers known to be HIV-infected decide to stop breastfeeding at any time, infants should be provided with safe and adequate replacement feeds to enable normal growth and development.

Mixed Feeding

Mixed feeding is when an infant below 6 months is breastfed and given other liquids such as water, tea, formula, cow's milk or foods such as porridge or rice. With mixed feeding, the contaminated fluids and foods introduced in babies who receive mixed feeding damage the bowel and facilitate entry of HIV from breast milk into the tissues.

NOTE: Mixed feeding is never recommended below 6 months of age

Complementary Feeding

Babies who are older than 6 months of age are fed foods and liquids in addition to breast milk or breast milk substitutes (formula). Complementary Feeding: *Any food, whether manufactured or locally prepared, that is added to a child's diet when the child reaches 6 months of age. Complementary foods are needed because breastmilk or replacement foods alone do not satisfy the child's nutritional requirements after this age.*

NOTE: Complimentary feeding is not the same as mixed feeding

National Recommendations for Infant Feeding in the Context of HIV

Exclusive breastfeeding for first 6 months

- Mothers living with HIV to breastfeed exclusively for the first 6 months of life unless formula feeding is AFASS

From 6 months

- Mothers should introduce complimentary feeds while continuing to breastfeed up to 12 months of age
- National Recommendations for Infant Feeding in the Context of HIV (2)

At 12 months

- Mothers should stop breast feeding gradually if a nutritionally adequate and safe diet without breast milk can be provided
- If a child is known to be HIV infected, continue breastfeeding up to 2 years of age and beyond

Advantages of Exclusive Breastfeeding

- Easy to digest and it gives all the nutrients
- Always available, need no preparation
- Protects the infant against diseases
- Improves brain development
- Keeps emotional relationship and bond with mother
- Protects the mother against some cancers and pregnancy
- Exclusive breastfeeding has low risk of HIV transmission

Exclusive breastfeeding requires feeding on demand and extra calories for the mother.

Making Breastfeeding Safer

Child

- Proper breastfeeding positioning and attachment
- Timely treatment of all oral lesions (oral thrush, ulcers etc.)

Mother

- Psychosocial support
- Appropriate breast care (hygiene) and treatment of infections like mastitis

Advantages and Disadvantages of Replacement Feeding

- Poses no risk of HIV transmission
- Other family members can help feed the infant

Disadvantages

- Commercial formula does not contain antibodies to protect the infant from infections
- Commercial formula is expensive
- Formula should be made fresh for each feed

Making Replacement Feeding Safer

- Boil and cool water before each use
- Caregivers should wash their hands and the child's face/hands with soap before preparing or giving feeds
- Feed with cup alone or cup and spoon not a bottle, or nipple
- Follow instructions on how to mix/prepare infant formula

It is importance for personal hygiene and cleanliness, proper food handling of baby food and feeds and clear observations of instructions in the preparation of infants food.

Infant and Young Child Feeding

For the first 6 months should practice exclusive breastfeeding

- If mother opt for replacement feeding, AFASS should be met

Age 6 – 12 months: adequate meals of thick enriched porridge, mashed foods at least 3 times a day (e.g. potatoes with meat, fish, milk, fruit)

Mothers known to be HIV-infected who decide to stop breastfeeding at any time should stop gradually within one month. Meals, including milk-only feeds, other foods and combination of milk feeds and other foods, should be provided four or five times per day. All children need complementary foods from six months of age.

- 12 months – 2 years: enriched foods 5 times per day (family foods, 2 cups of milk a day)
- 2 years and older: enriched family foods and 2 snacks between meals
- If the child is HIV infected, continue breastfeeding for at least 2 years, unless the mother is not able to breastfeed
- Solid foods should be introduced gradually to match the age and developmental characteristics of the child
- Caregivers should feed children a variety of locally available fruits, vegetables and animal products to increase intake of essential vitamins and minerals
- Feeding should be done patiently and persistently with supervision and love, HIV infected children may be frequently ill and suffering from fever, mouth sores and decreased appetite
- Provide a daily multivitamin supplement, if available, to help prevent nutrient deficiencies

Nutritional Care and Support

Good nutritional care and support should include:

- Nutrition education
- Nutrition counseling
- Monitoring nutritional status with appropriate early intervention
- Food and water safety and hygiene issues
- Household food security
- Food supplementation when necessary

Planning Balanced Meals

A balanced meal contains at least one from each of the following food groups:

- Cereals, tubers and roots
- Foods of animal origin
- Fruits
- Vegetables
- Oils, fats and sugars (in moderation)

Water is not regarded as a food group but it is an important part of a meal

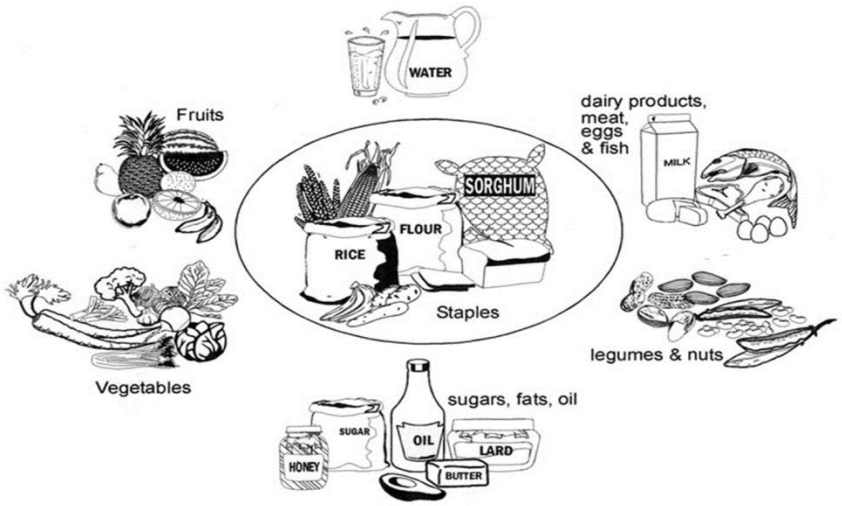
- Always Eat Variety of Foods

Eating a balanced diet means eating a variety of foods from each of the food groups, and eating enough food every day. Best to eat home-grown foods or foods produced locally instead of imported or processed foods, which do not have as many nutrients

- Proteins help you build muscle
- Cereals and roots give you long lasting energy
- Fats and sugars in moderation, are nourishing. They give you energy and increase body weight.
- Fruit and vegetables provide essential vitamins and are important for digestion.

It is also important to drink plenty of clean and boiled water.

Always Eat Variety of Foods



Protein is important for strengthening the immune system. Good sources of protein in the diet that are locally available and acceptable should be included as part of each meal to meet the increased protein needs of the HIV-infected child. Fruits and vegetables, though low in calories, provide a wide variety of vitamins and minerals essential for normal functioning of the immune system and other body functions. Locally available and acceptable fruits and vegetables should be eaten between meals as snacks. Fats and oils can be a used as a source of energy in the diet and hence provide extra needed calories. They also contain fat-soluble vitamins A, D, E and K that are essential for body functions.

Healthy Eating Habits

- Offer small meals frequently, especially when the child is sick
- Use a variety of locally available foods
- Add nutrient-dense foods (nuts, oil, fat, milk, oil seeds)
- Observe food safety and hygiene

When promoting good nutrition, one should always consider:

  - Stage of illness and symptoms
  - Food security (availability and accessibility of basic foods)
  - Resources (money, time, other caretakers)
  - Food likes and dislikes
  - Knowledge, attitudes, and practices (especially traditional dietary taboos).

- Improve cooking methods e.g. steaming
- Fruits and vegetables are the most forgotten, they should be promoted
- Use germination and sprouting, fermentation and mashing (increases nutrient content and make digestion and absorption easier)

Nutrient Supplements

Use of indigenous foods should be promoted. Nutrient supplements should NOT REPLACE meals, they should be additional to meals

Micronutrients

Multivitamin supplementation for children and pregnant women. There are increased requirements of Vitamin A, B6, B12, C, D,E and folic acid

- Vitamin A according to national policy/WHO recommendation:

- < 6 months 50,000 IU
- 6-12 months 100,000 IU
- 12- < 60 months 200,000 IU every 6 months

Children with anaemia need iron supplementation. WHO recommendation:

- Iron: 6 mg (of elemental Iron) /kg/day
- Folate:
- <4 months: 2.5 mg/day
- >4 months: 5 mg /day
- Ferrous Sulfate tabs 200mg contains 60mg of elemental iron.

For children who are already anaemic due to Iron deficiency, Iron supplementation should be given until Hb is normal (11gm/dL), and continued for additional 3 months to build up the bone marrow stores.

Fluid and Electrolyte Balance

Fluid requirement increases in presence of:

- Diarrhoea
- Vomiting
- Night sweats
- Prolonged fever

These losses should be replaced. Use low osmolarity ORS where indicated

Management of Persistent Diarrhoea

- Investigate and treat the cause if infectious
- Ensure adequate hydration (ORS)
- Consider low lactose diet (replace milk with yoghurt) or lactose free diet
- Small frequent feeds
- Multivitamin/multi-mineral supplements

Persistent diarrhea is defined as an episode of diarrhoea that lasts for 14 days or more.
Treatment of persistent diarrhoea consists of giving:

- Appropriate fluids to prevent or treat dehydration.
- A nutritious diet that does not cause diarrhoea to worsen e.g. Low lactose or lactose free diet.
- Supplementary vitamins and minerals, including zinc for 10 - 14 days.
- Antimicrobial(s) to treat *diagnosed infections.*

Nutritional Management for Common HIV Related Symptoms

Sore mouth/throat:

- Soft or mashed food
- Avoidance of spices or acidic foods
- Nutrient and energy dense foods

Nausea:

- Small frequent meals
- Avoidance of high-fat greasy foods
- Avoidance of lying flat after eating
- Take medications with food, unless contraindicated

Xerostomia (dry mouth):
- Moist foods e.g. gravy
- Liquids at meals and extra fluid between meals
- Good oral hygiene
- Consider prophylactic antifungals

Difficulty in breathing:
- Nutrient dense and energy-dense foods
- Use easy to eat foods

Constipation:
- Increase fluids
- Dietary fibre

Xerostomia or dry mouth can be caused by excessive breathing through the mouth, or it may be caused by insufficient production of saliva (called *hyposalivation*). Xerostomia can cause difficulty in speech and eating. Hyposalivation, may be a sign of an underlying disease such as Sjogren's syndrome. Other causes of insufficient saliva production include anxiety, dehydration, etc. The treatment of xerostomia involves finding any correctable causes and removing them if possible or relieving the symptoms. Studies have that patients with Xerostomia are at increased risk of oral candidiasis, hence need for prophylactic antifungal such as nystatin.

Neurologic disorders affecting nutrition:
- CNS manifestations of AIDS like HIV encephalopathy can affect intake
- Reduced sensory perception when chewing and swallowing can increase risk of aspiration
- Management involves consultation with other HCWs (e.g. occupational and physiotherapists)

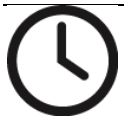
Food/Nutrition and Medications Interactions

• Food	Medication absorption, metabolism, distribution, excretion
• Medication	Nutrient absorption, metabolism, distribution, and excretion
• Medication side effect	Food consumption; nutrient absorption
• Medication +certain foods	Unhealthy side effects (affects food consumption)

Key Points

- Nutritional deficiencies affect immune functions hence influencing viral replication
- HIV infected children are at increased risk of malnutrition
- HIV infected children be should breastfed till 2 years of age and beyond
- The growing child has higher needs of energy, protein, vitamin, minerals and fluids
- Good nutritional care is an important component of HIV comprehensive care

Session 3: Management of Severe Malnutrition in HIV Infected and Affected Children



Total Session Time: 75 minutes

Learning Objectives

By the end of session, participants will be able to:

- Define severe acute malnutrition
- Describe approach to the diagnosis of severe acute malnutrition
- Describe the principles of management of severe acute malnutrition

Introduction

In Tanzania, 5% of children under 5 years are wasted and 1% are severely wasted. Malnutrition is more likely to occur in children with HIV and TB co-morbidity.

Severe Acute Malnutrition (SAM)

Defined as: The presence of oedema of both feet or severe wasting (weight-for-height/length <-3SD OR. Mid-upper arm circumference (MUAC) < 11.5cm or 115 mm)

The reference lines on the growth charts are called z-score lines based on z-scores, also known as standard deviation (SD) scores.

- Z-scores are used to describe how far a measurement is from the median (or average).
- For example a weight-for-height z-score of -2.33 means that the child's weight is 2.33 SDs below the expected median weight of children of the same height.
- The child has a lower weight for his/her height compared to the standard and s/he is classified as "wasted".
- A positive z-score indicates that the child's weight is to the right of the median, i.e. the child is heavier compared to the standard.
- The z-scores are calculated differently for measurements that are distributed normally and non-normally in the reference population.

Diagnostic Approach to Malnutrition

- Take anthropometric measurements
    - Check weight and height (or MUAC)
    - Check for oedema
- Look for skin and/or hair change
- Assess developmental and behavioural stigmata of undernutrition
- Anthropometry measurements (nutritional indices):
    - Weight-for-age
    - Height-for-age or length-for-age
    - Weight-for-height or weight-for-length

These are anthropometry measurements which are the measures of the size and proportions of the human body. .Early diagnosis and appropriate treatment of severe acute malnutrition can prevent both morbidity and mortality.

REFER to **Handout 9.3.1: How to take Anthropometric measurements in Children** on **page 393** of the participants handbook

Malnutrition Conditions

Low weight-for-age indicates **underweight**

- Cannot distinguish between acute and chronic malnutrition

Low height or l**ength-for-age** indicates **stunting**

- Chronic malnutrition and growth failure

Low weight-for-height or **weight-for-length** indicates **wasting**

- Acute malnutrition

WHZ stands for **W**eight for **H**eight **Z**-score

The reference lines on the growth charts are called z-score lines based on z-scores, also known as standard deviation (SD) scores. Z-scores are used to describe how far a measurement is from the median (or average). For example a weight-for-height z-score of -2.33 means that the child's weight is 2.33 SDs below the expected median weight of children of the same height. The child has a lower weight for his/her height compared to the standard and s/he is classified as "wasted". A positive z-score indicates that the child's weight is to the right of the median, i.e. the child is heavier compared to the standard. The z-scores are calculated differently for measurements that are distributed normally and non-normally in the reference population.

Types of Severe Acute Malnutrition

- Marasmus means caloric deprivation
    - WHZ < -3
- Oedematous malnutrition (Kwashiorkor), protein deprivation
    - Bilateral pitting oedema of lower limbs
- Marasmic kwashiorkor
    - Combination of above

Mid-Upper Arm Circumference (MUAC)
Measures wasting and acute malnutrition.
Children 6-59 months

- < 11.5 cm – severe wasting
- 11.5 -12.5 cm – moderate wasting

Children 5 – 9 years

- <13.5 cm – severe wasting
- 13.5 -14.5 cm – moderate wasting

Severe Wasting

Oedematous Malnutrition

Bilateral pitting oedema:

- Due to protein and micronutrient deficiency
- Absence of other causes of oedema
- Can occur despite adequate caloric intake

Inpatient Admission Criteria

- Severe wasting (weight-for-height leghth WHZ<-3)
- Severe wasting and bilateral/nutritional oedema of any grade
- Bilateral oedema of any grade
- No appetite:
    - Unable to eat test dose

Oedema is graded according to the severity.

- + Oedema localized to the feet
- ++ Oedema extends to the legs
- +++ Generalised oedema.

The child has to eat 2 spoonfuls of plumpy nuts or ready-to-use therapeutic food (RUTF) in 15 minutes. If they are not able to do that, then they require inpatient management for malnutrition

Inpatient Admission Criteria

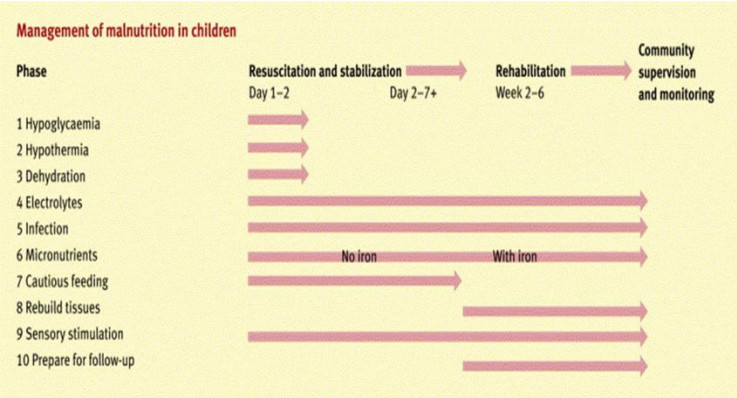
Medical complications:

- Intractable vomiting/severe dehydration

- Fever > 39 or hypothermia < 35
- Severe LRTI – tachypnea/hypoxemia/distress
- Severe anemia
- Altered mental status

Outpatient treatment failure:
- Worsening oedema
- Weight loss
- Static weight for five weeks
- Development of severe complications at any time
- Worsening oedema
- Weight loss
- Static weight for five weeks
- Development of severe complications at any time

Overview of Inpatient Treatment



REFER to Handout 9.32-9.3.3: Overview of Inpatient Treatment on page 397 and 399 of Participant Handbook for a clearer image on management of malnutrition in children.

Inpatient Treatment Phases
- Initial stabilization phase
    - Lasts ~ 1 week
    - Treatment of acute complications
    - Correction of electrolyte and micronutrient deficiencies
- Rehabilitation phase
    - Lasts 2 – 6 weeks
    - Catch-up growth

Step 1: Hypoglycemia
- RBG < 3 mm/L (or 54 mg/dl)
- Results from infection or low body stores of glucose
- Signs/Symptoms:
    - Hypothermia
    - Lethargy
    - Altered mental status or coma
- Treatment
    - Treat infections
    - Administer 10% dextrose 5ml/kg body wt. IV stat, OR

- 50 ml 10% glucose or sucrose orally or via NG tube
- Frequent feeding, initially every 2 hours

The treatment of Hypoglycemia, that if IV access is available, the patient is given 10% dextrose 5ml/kg body wt. IV. If IV access is not readily available, 50 ml 10% glucose (or 10% sucrose) is given orally or via NG tube.

Step 2: Hypothermia

- Axillary temperature < 35.0°C or rectal temperature < 35.5°C
- Result of infection or hypoglycemia
- Management
  - Treat infection if any
  - Re-warm child
    - Kangaroo Technique
    - Blankets/Clothing

Step 3: Severe Dehydration

- Difficult to tell from septic shock
- Do NOT use IVF unless shock is present
- Do NOT rehydrate with ORS
- Use ReSoMal
  - 5 ml/kg every 30 minutes for 2 hours
  - 5-10 ml/kg/hour for 4-10 hours, replacing with feeds at 4, 6, 8 hours

Standard ORS contains too much sodium and not enough potassium for severely malnourished children. ReSoMal stands for "**Re**hydration **so**lution for **mal**nutrition) and it contains:

- Water 2L
- ORS 1 1-L packet
- Sugar 50 g
- Electrolyte/mineral solution 40 ml

IV fluids should not be used in severely malnourished child for rehydration except in cases of shock and if so, give with care, infusing slowly to avoid flooding the circulation and overloading the heart.

- Monitor rehydration every 30 minutes for evidence of overhydration or heart failure
  - Pulse rate (↑25 beats/min)
  - Respiratory rate (↑ 5 breaths/min)
  - Worsening edema
  - Enlarging liver size
  -

Step 4: Electrolytes

Correct electrolyte imbalances

- High sodium
- Low potassium
- Low magnesium

- Use ReSoMal to correct dehydration
- Avoid adding salt in diet

Serum sodium may be low, but total body sodium is elevated. Extra potassium and magnesium can be prepared in a liquid form as mineral solution and added directly to feeds during preparation. Mineral solution is available commercially but if not available, give K, Mg and Zn separately.

Step 5: Infection

Source of infection may be hidden

- Management
    - If no complications
        - Amoxicillin 40mg/kg 12 hourly x 5 days
- If complications:
    - Ampicillin 50 mg/kg IV 6 hourly x 2/7, then Amoxicillin 40mg/kg 12 hourly x 5 days
    - Gentamicin 7.5 mg/kg OD x 7/7
- In severe malnutrition the usual signs of infection, such as fever, are often absent, and infections are often hidden. Therefore **give routinely on admission:**
- Broad-spectrum antibiotic(s) **AND**
- Measles vaccine if child is > 6m and not immunised (delay if the child is in shock).

If amoxycillin is not available, continue with ampicillin but give orally 50 mg/kg 6-hourly.

Step 6: Micronutrient Deficiencies

- Folic acid (5 mg) on Day 1
- Multivitamin supplement for 14 days
- Zinc 2 mg/kg/d for 14 days
- Iron should not be given until patient's appetite returns
    - Giving iron can make infections worse as most bacteria use iron as a nutrient
    - Carrier protein for iron may be deficient in children with SAM (protein deficiency)

CMV means Combined Mineral and Vitamin Mix. If the child is fed locally made F75 which contains electrolyte/mineral solution <u>but no CMV</u> give: Folic acid 5 mg on Day 1 and Multivitamin supplement (without iron) for 14 days. .If the child is fed on locally made F75 which <u>does not contain</u> electrolyte/mineral solution nor CMV, give the following:

- Folic acid (5 mg) on Day 1
- Multivitamin supplement (without iron) for 14 days
- Potassium 3-4 mmol/kg/d for 14 days (see Appendix 9)
- Magnesium 0.4-0.6 mmol/kg/d for 14 days
- Zinc 2 mg/kg/d for 14 days

Iron should not be given until the child has a good appetite and starts gaining weight (usually by the second week), as giving iron can make infections worse. Most bacteria use iron as a nutrient so giving iron will be feeding the bacteria. Children with severe acute malnutrition also have protein deficiency, so carrier protein for the iron may be deficient.

- Vitamin A:
    - Do not give vitamin A to children with edema or if they received Vitamin A supplement in the past month
    - Age < 6 months 50,000 IU
    - Age 6-12 months 100,000 IU
    - Age > 12 months 200,000 IU

Vitamin A Supplementation: All severely malnourished children have vitamin and mineral deficiencies. A single study in Senegal showed increase mortality among children with edematous malnutrition who received Vitamin A supplementation. Therefore many organizations recommend only supplement children with Vitamin A and malnutrition if edema is not present.

Step 7: Cautious Feeding

- Begin cautious feeding during stabilization phase using F-75 formula
- Feeds may be given orally or via NG tube
- 130 ml/kg/day (if severe edema: 100 ml/kg/day)
- Feeds should be given 2 hourly and then advanced to 3 hourly

Feeding should be started as soon as possible after admission and should be designed to provide just sufficient energy and protein to maintain basic physiological processes. The essential features of feeding in the stabilization phase are:

- small, frequent feeds of low osmolarity and low lactose
- oral or nasogastric (NG) feeds (never parenteral preparations)
- 100 kcal/kg/day
- 1-1.5 g protein/kg/day
- 130 ml/kg/day of fluid (100 ml/kg/d if the child has severe oedema)
- If the child is breastfed, encourage to continue breastfeeding but give the prescribed amounts of starter formula to make sure the child's needs are met.

During stabilization phase monitor:

- Daily body weight
    - Children with edema may initially lose weight
- Frequency of diarrhoea
    - It should gradually resolve
- Vomiting
- Amount of feed eaten
    - Appetite should return

F-75/F-100 can be made locally when not available using: Dried skimmed milk, Sugar, Vegetable oil, Elecrolyte/mineral solution and Water. Even in the absence of Electrolyte/mineral solution the recipes can still be prepared and are effective.

REFER to **Handout 9.3.4 Recipes for starter and catch-up formulas** on page 401 of the participants handbook for more information on how to prepare F75 and F100 locally.

Step 8: Catch-up Growth

Once appetite has returned, change to high calorie formula F-100:
- Switch F75 to F100 at same volume for 2-3 days
- Monitor closely for signs of heart failure during the transition

Rehabilitation phase:
- When tolerating F-100, increase volume 10-15 ml/kg/day to range of 150-220 ml/kg/day
- For rapid weight gain, give as much F100 or ready-to-use therapeutic food (RUTF) as the child can eat, 8 times a day
- F100 and RUTF are high in energy and protein
- Monitor weight gain

Following as the criteria for assessing weight gain:
> 10g/kg/day - Good
5-10g/kg/day - Moderate
<5g/kg/day - Poor
Readiness to enter the rehabilitation phase is signaled by a return of appetite, usually about one week after admission. A gradual transition is recommended to avoid the risk of heart Failure which can occur if children suddenly consume huge amounts

Step 9: Stimulation and Support

Development can be delayed in children with malnutrition:
- Provide stimulating environment
- Encourage physical activity when child begins to recover

Children with severe malnutrition need:
- Tender loving care
- A cheerful, stimulating environment
- Structured play therapy 15-30 min/d
- Physical activity as soon as the child is well enough
- Maternal involvement when possible (e.g. comforting, feeding, bathing, play).

Step 10: Follow-up

Ready for discharge when:
- No oedema
- Clinically well
- No medical complications

Instruct caregiver on how to:
- Feed child frequently with nutrient-rich foods

Return to clinic for:
- Monitoring growth
- Immunizations
- Vitamin A

A child may be considered to have recovered and be ready for discharge when she/he reaches 90% weight-for-length. For some children, earlier discharge may be considered if effective alternative supervision is available.

When children are being rehabilitated at home, it is essential to give frequent meals with a high energy and protein content. Aim at achieving at least 150 kcal/kg/d and adequate protein intake (at least 4 g/kg/d). This means feeding the child at least 5 times per day.

Complications of SAM

- Anaemia
    - Management of anaemia
        - Transfuse only if Hb < 4 or 4-6 if has signs of heart failure e.g. respiratory distress
        - Give 10 ml/kg packed red cells over 4 hours with frusemide (lasix)
- Severe dehydration/shock
- Heart failure:
    - One of the most common causes of death
    - Usually a consequence of over-hydration
    - Signs/symptoms: Tachycardia, respiratory distress, basal crepitations and tender hepatomegaly
- Heart failure management
    - Stop all intake of fluid/feeds until heart failure has improved or resolved (even if takes 24-48 hours)
    - Small amounts of sugar water can be given
    - Give IV diuretic – furosemide 1mg/kg IV

Digoxin can be given only if diagnosis is unequivocal and potassium is normal.

Care of the Mother

- Ensure mother has adequate nutrition:
    - Check MUAC
    - Check for presence of edema
- Give mother vitamin A
- If breastfeeding, advise mother to eat ~2500kcal and drink at least 2 liters daily
- Provide micronutrient supplementation

The MUAC for adult should be > 18.5 cm as normal. If the woman is pregnant or within 6 months postpartum should be >21cm.

Referral

Referral to a hospital with an established undernutrition ward is appropriate when:Child has complicated undernutrition, Failure to respond to current therapy, in the absence of untreated silent infections

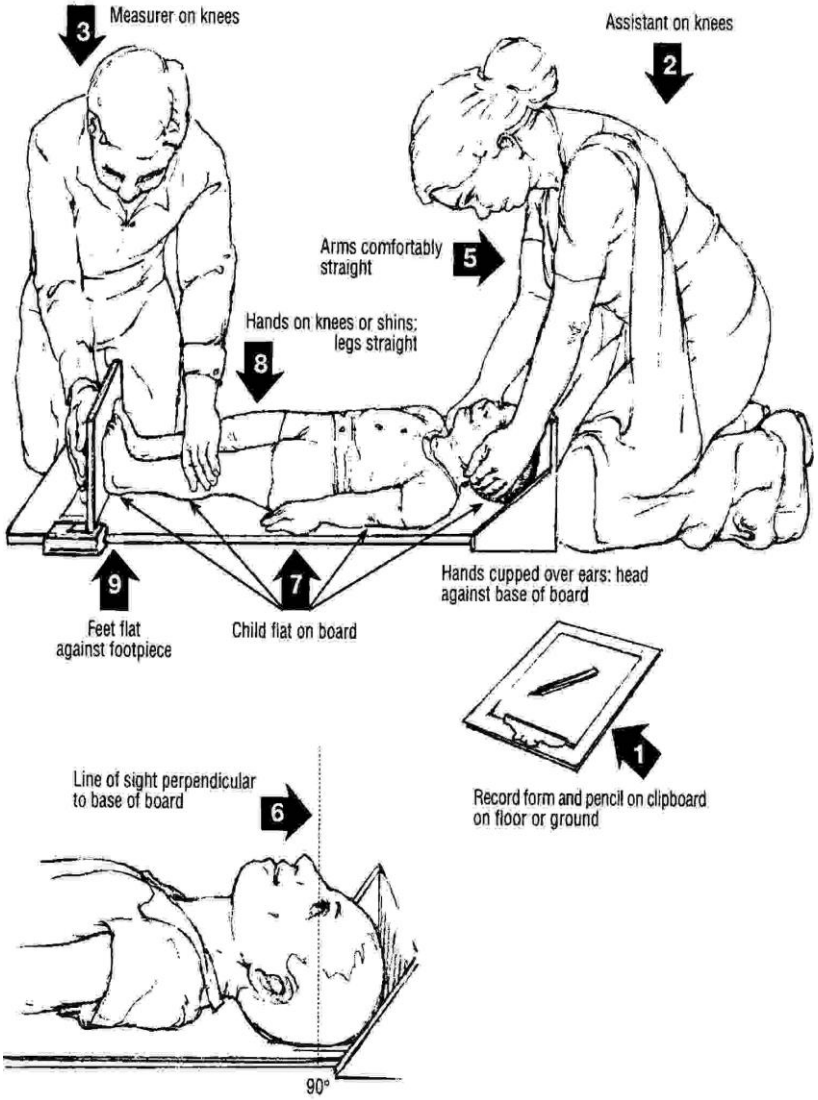
Key Points

- Severe Acute Malnutrition is the presence of oedema of both feet or severe wasting (weight-for-height/length <-3SD or MUAC < 115 mm)
- Under nutrition is a major cause of morbidity and mortality in Tanzania
- Early treatment of mild and moderately undernourished children can save lives and prevent hospitalization and death
- Weight and height must be assessed and compared to approved standards

- Test all children with under nutrition for HIV
- Screen all children with under nutrition for TB
- Adhere to recommended principles and steps during management of severe acute malnutrition

Handout 9.3.1: How to take Anthropometric measurements in Children

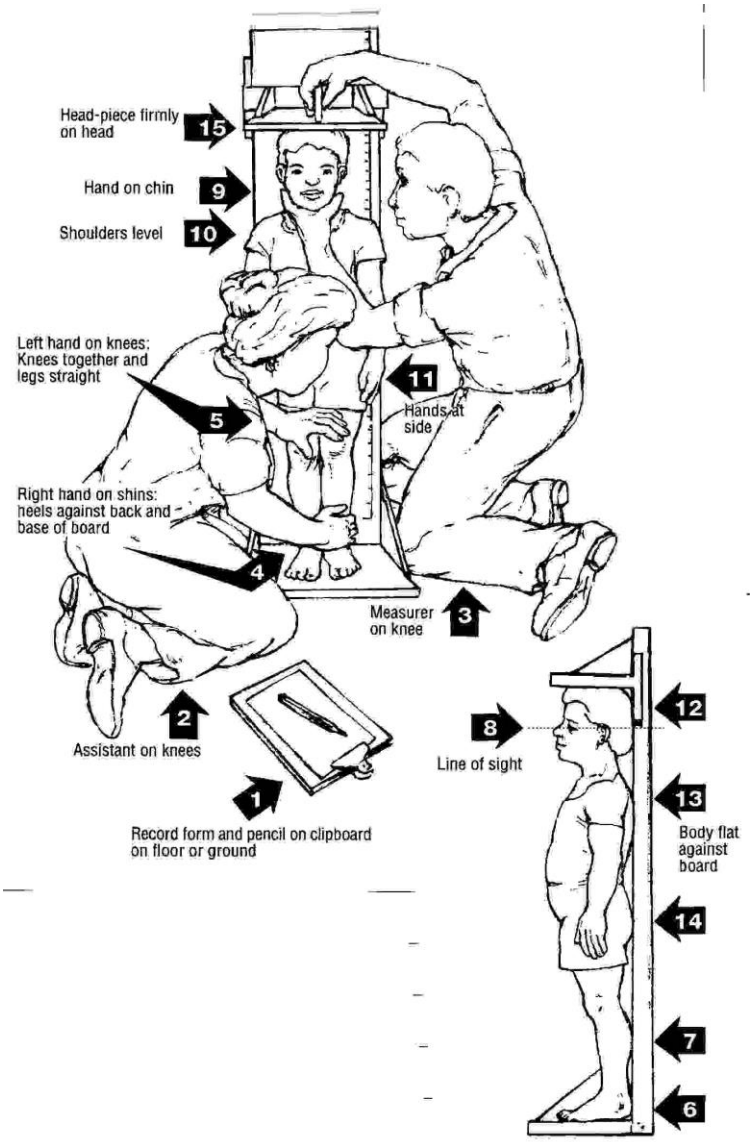
1. Taking Length



Use if child is less than 85cm or can't stand

- The mother holds the child's head
- The head should touch the back of the board
- The eyes should be looking straight up
- The other person holds down the child's knees, pressing the sliding wood piece flat against the child's heels and soles
- Align the child with the board
- The arms should be lying alongside the body
- The person holding the feet reads the measurement

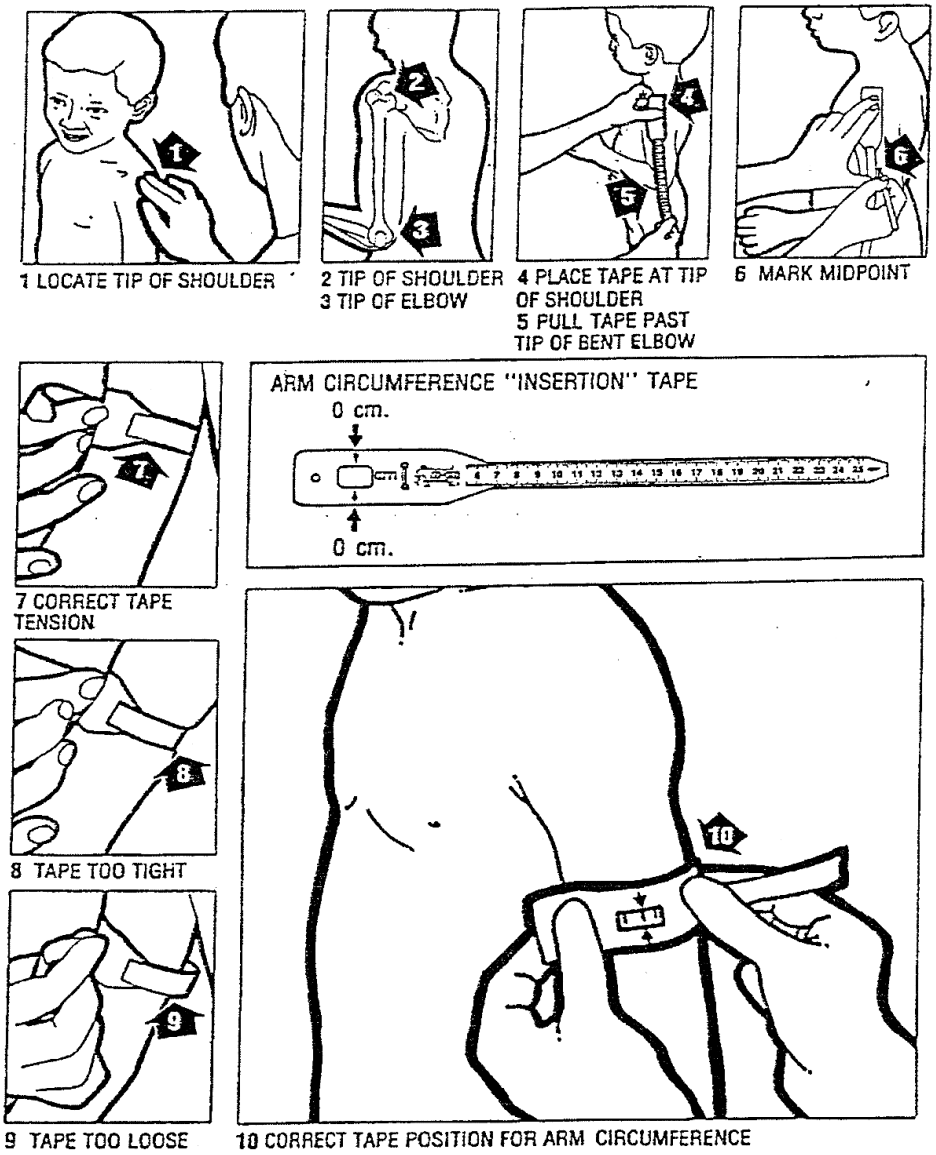
2. Taking Height



Use if the child is more than 85 cm

1. Child's heels, back legs, buttocks, shoulders, and head should touch the board
2. Heels should be flat on the floor and feet together
3. Knees, back, and neck should be straight
4. Arms should be straight down by the side
5. Head should be straight and looking ahead
6. The mother should help hold the child's legs and feet
7. You should hold the head and read the measurement

3. Taking MUAC



Mid-upper-arm circumference

1. Always take on the left arm
2. Measure the length of the upper arm
    - Between the bone at the top of the shoulder and the elbow bone
    - The arm should be bent
3. Mark the middle with a pen
4. Then the child's arm should fall relaxed to their side
5. Wrap the tape around the arm so that all of it is in contact with the skin
    - Should not be too tight or too loose
6. Read the MUAC to the nearest 0.1 cm

Handout 9.3. 2: Weight-for-Length Reference Card

Weight-for-Length Reference Card (below 87 cm)

Boys' weight (kg)					Length	Girls' weight (kg)				
-4 SD	-3 SD	-2 SD	-1 SD	Médian	(cm)	Médian	-1 SD	-2 SD	-3 SD	-4 SD
1.7	1.9	2.0	2.2	2.4	45	2.5	2.3	2.1	1.9	1.7
1.8	2.0	2.2	2.4	2.6	46	2.6	2.4	2.2	2.0	1.9
2.0	2.1	2.3	2.5	2.8	47	2.8	2.6	2.4	2.2	2.0
2.1	2.3	2.5	2.7	2.9	48	3.0	2.7	2.5	2.3	2.1
2.2	2.4	2.6	2.9	3.1	49	3.2	2.9	2.6	2.4	2.2
2.4	2.6	2.8	3.0	3.3	50	3.4	3.1	2.8	2.6	2.4
2.5	2.7	3.0	3.2	3.5	51	3.6	3.3	3.0	2.8	2.5
2.7	2.9	3.2	3.5	3.8	52	3.8	3.5	3.2	2.9	2.7
2.9	3.1	3.4	3.7	4.0	53	4.0	3.7	3.4	3.1	2.8
3.1	3.3	3.6	3.9	4.3	54	4.3	3.9	3.6	3.3	3.0
3.3	3.6	3.8	4.2	4.5	55	4.5	4.2	3.8	3.5	3.2
3.5	3.8	4.1	4.4	4.8	56	4.8	4.4	4.0	3.7	3.4
3.7	4.0	4.3	4.7	5.1	57	5.1	4.6	4.3	3.9	3.6
3.9	4.3	4.6	5.0	5.4	58	5.4	4.9	4.5	4.1	3.8
4.1	4.5	4.8	5.3	5.7	59	5.6	5.1	4.7	4.3	3.9
4.3	4.7	5.1	5.5	6.0	60	5.9	5.4	4.9	4.5	4.1
4.5	4.9	5.3	5.8	6.3	61	6.1	5.6	5.1	4.7	4.3
4.7	5.1	5.6	6.0	6.5	62	6.4	5.8	5.3	4.9	4.5
4.9	5.3	5.8	6.2	6.8	63	6.6	6.0	5.5	5.1	4.7
5.1	5.5	6.0	6.5	7.0	64	6.9	6.3	5.7	5.3	4.8
5.3	5.7	6.2	6.7	7.3	65	7.1	6.5	5.9	5.5	5.0
5.5	5.9	6.4	6.9	7.5	66	7.3	6.7	6.1	5.6	5.1
5.6	6.1	6.6	7.1	7.7	67	7.5	6.9	6.3	5.8	5.3
5.8	6.3	6.8	7.3	8.0	68	7.7	7.1	6.5	6.0	5.5
6.0	6.5	7.0	7.6	8.2	69	8.0	7.3	6.7	6.1	5.6
6.1	6.6	7.2	7.8	8.4	70	8.2	7.5	6.9	6.3	5.8
6.3	6.8	7.4	8.0	8.6	71	8.4	7.7	7.0	6.5	5.9
6.4	7.0	7.6	8.2	8.9	72	8.6	7.8	7.2	6.6	6.0
6.6	7.2	7.7	8.4	9.1	73	8.8	8.0	7.4	6.8	6.2
6.7	7.3	7.9	8.6	9.3	74	9.0	8.2	7.5	6.9	6.3
6.9	7.5	8.1	8.8	9.5	75	9.1	8.4	7.7	7.1	6.5
7.0	7.6	8.3	8.9	9.7	76	9.3	8.5	7.8	7.2	6.6
7.2	7.8	8.4	9.1	9.9	77	9.5	8.7	8.0	7.4	6.7
7.3	7.9	8.6	9.3	10.1	78	9.7	8.9	8.2	7.5	6.9
7.4	8.1	8.7	9.5	10.3	79	9.9	9.1	8.3	7.7	7.0
7.6	8.2	8.9	9.6	10.4	80	10.1	9.2	8.5	7.8	7.1
7.7	8.4	9.1	9.8	10.6	81	10.3	9.4	8.7	8.0	7.3
7.9	8.5	9.2	10.0	10.8	82	10.5	9.6	8.8	8.1	7.5
8.0	8.7	9.4	10.2	11.0	83	10.7	9.8	9.0	8.3	7.6
8.2	8.9	9.6	10.4	11.3	84	11.0	10.1	9.2	8.5	7.8
8.4	9.1	9.8	10.6	11.5	85	11.2	10.3	9.4	8.7	8.0
8.6	9.3	10.0	10.8	11.7	86	11.5	10.5	9.7	8.9	8.1

Weight-for-Height Reference Card (87 cm and above)

Boys' weight (kg)					Height	Girls' weight (kg)				
-4 SD	-3 SD	-2 SD	-1 SD	Médian	(cm)	Médian	-1 SD	-2 SD	-3 SD	-4 SD
8.9	9.6	10.4	11.2	12.2	87	11.9	10.9	10.0	9.2	8.4
9.1	9.8	10.6	11.5	12.4	88	12.1	11.1	10.2	9.4	8.6
9.3	10.0	10.8	11.7	12.6	89	12.4	11.4	10.4	9.6	8.8
9.4	10.2	11.0	11.9	12.9	90	12.6	11.6	10.6	9.8	9.0
9.6	10.4	11.2	12.1	13.1	91	12.9	11.8	10.9	10.0	9.1
9.8	10.6	11.4	12.3	13.4	92	13.1	12.0	11.1	10.2	9.3
9.9	10.8	11.6	12.6	13.6	93	13.4	12.3	11.3	10.4	9.5
10.1	11.0	11.8	12.8	13.8	94	13.6	12.5	11.5	10.6	9.7
10.3	11.1	12.0	13.0	14.1	95	13.9	12.7	11.7	10.8	9.8
10.4	11.3	12.2	13.2	14.3	96	14.1	12.9	11.9	10.9	10.0
10.6	11.5	12.4	13.4	14.6	97	14.4	13.2	12.1	11.1	10.2
10.8	11.7	12.6	13.7	14.8	98	14.7	13.4	12.3	11.3	10.4
11.0	11.9	12.9	13.9	15.1	99	14.9	13.7	12.5	11.5	10.5
11.2	12.1	13.1	14.2	15.4	100	15.2	13.9	12.8	11.7	10.7
11.3	12.3	13.3	14.4	15.6	101	15.5	14.2	13.0	12.0	10.9
11.5	12.5	13.6	14.7	15.9	102	15.8	14.5	13.3	12.2	11.1
11.7	12.8	13.8	14.9	16.2	103	16.1	14.7	13.5	12.4	11.3
11.9	13.0	14.0	15.2	16.5	104	16.4	15.0	13.8	12.6	11.5
12.1	13.2	14.3	15.5	16.8	105	16.8	15.3	14.0	12.9	11.8
12.3	13.4	14.5	15.8	17.2	106	17.1	15.6	14.3	13.1	12.0
12.5	13.7	14.8	16.1	17.5	107	17.5	15.9	14.6	13.4	12.2
12.7	13.9	15.1	16.4	17.8	108	17.8	16.3	14.9	13.7	12.4
12.9	14.1	15.3	16.7	18.2	109	18.2	16.6	15.2	13.9	12.7
13.2	14.4	15.6	17.0	18.5	110	18.6	17.0	15.5	14.2	12.9
13.4	14.6	15.9	17.3	18.9	111	19.0	17.3	15.8	14.5	13.2
13.6	14.9	16.2	17.6	19.2	112	19.4	17.7	16.2	14.8	13.5
13.8	15.2	16.5	18.0	19.6	113	19.8	18.0	16.5	15.1	13.7
14.1	15.4	16.8	18.3	20.0	114	20.2	18.4	16.8	15.4	14.0
14.3	15.7	17.1	18.6	20.4	115	20.7	18.8	17.2	15.7	14.3
14.6	16.0	17.4	19.0	20.8	116	21.1	19.2	17.5	16.0	14.5
14.8	16.2	17.7	19.3	21.2	117	21.5	19.6	17.8	16.3	14.8
15.0	16.5	18.0	19.7	21.6	118	22.0	19.9	18.2	16.6	15.1
15.3	16.8	18.3	20.0	22.0	119	22.4	20.3	18.5	16.9	15.4
15.5	17.1	18.6	20.4	22.4	120	22.8	20.7	18.9	17.3	15.6

Handout 9.3.3: Overview of Inpatient Treatment

Time frame for the inpatient management of severe acute malnutrition in children

	Stabilization/Transition*		**Rehabilitation**
	Day 1-2	**Day 3-7**	**Week 2-6**
1. Treat/prevent hypoglycaemia			
2. Treat/prevent hypothermia			
3. Treat/prevent dehydration			
4. Correct electrolyte imbalance			
5. Treat/prevent infection			
6. Correct micronutrient deficiencies	**No iron**	**No iron**	**Give iron**
7. Start cautious feeding			
8. Achieve catch-up growth			
9. Provide sensory stimulation and emotional support			
10. Prepare for discharge and follow-up after recovery			

*The transition phase occurs between Step 7 and 8 (though there might be some slight overlap)

Handout 9.6 4: Recipes for starter and catch-up formulas

	F-75 (starter)	F-100 (catch-up)	F-135 (catch-up)
Dried skimmed milk (g)*	25	80	90
Sugar (g)	100	50	65
Vegetable oil (g)	30 (or 35 ml)	60 (or 70 ml)	85 (or 95 ml)
Electrolyte/mineral solution (ml)	20	20	20
Water: make up to	1000 ml	1000 ml	1000 ml
Contents per 100 ml			
Energy (kcal)	75	100	135
Protein (g)	0.9	2.9	3.3
Lactose (g)	1.3	4.2	4.8
Potassium (mmol)	4.0	6.3	7.7
Sodium (mmol)	0.6	1.9	2.2
Magnesium (mmol)	0.43	0.73	0.8
Zinc (mg)	2.0	2.3	3.0
Copper (mg)	0.25	0.25	0.34
% energy from protein	5	12	10
% energy from fat	36	53	57
Osmolarity (mOsmol/1)	413	419	508

Preparation:

- using an electric blender: place some of the warm boiled water in the blender, add the milk powder, sugar, oil and electrolyte/mineral solution. Make up to 1000 ml, and blend at high speed
- if no electric blender is available, mix the milk, sugar, oil and electrolyte/ mineral solution to a paste, and then slowly add the rest of the warm boiled water and whisk vigorously with a manual whisk
- store made-up formula in refrigerator - when possible.