

Guide Line for Management of Severe Acute Malnutrition (SAM)

Learning objectives:

Classifications: clinically & by anthropometric measurements.

Criteria for admission to nutrition rehabilitation ward

Principle of treatment

Treatment phases, initial phase, rehabilitation phase and after care.

Complications as: hypoglycemia, hypothermia, dehydrations, electrolyte disturbance, infection, micronutrients deficiency and shock.

Introduction

The problems of malnutrition in Iraq began to appear from the early nineties, due to the circumstances the country had been through due to war, sanctions and many other factors, which collectively led to many health problems, one of which was malnutrition. As a result the management of SAM according to WHO guidelines in nutrition rehabilitation wards in Basrah was established and re-activated in early twentieths. In 2011 "Multiple indicator cluster survey" (MICS4) was carried; shows that 8 % of under-five children in Iraq are moderately or severely underweight, and 4 % are severely underweight. Additionally, more than one fifth (22%) of children are severely or moderately stunted with 10% of them severely stunted, results also indicate that almost 7% of children are wasted, and 3 % of them are severely wasted.

Severe acute malnutrition can present as: 1. Clinically evident forms:

Marasmus	Kwashiorkor
Severe wasting	Edema
No skin lesion	Skin lesion (skin smooth and shiny over area of edema), blistered, burned appearance changes in pigmentation, hair discolored and brittle
Loss of appetite	Loss of appetite
Child alert and irritable	Apathy
Marasmus- Kwashiorkor muscle wasting and edema	

Classification (detected only by anthropometry)

- **Weight for height W/H:** it reflect recent wt loss (wasting), expressed in % of median, less than 70% of median
- **Height for age H/A:** Stunting
- **Weight for age W/A:** Underweight
- **Medium Upper Arm Circumference (MUAC):** below 11.5 cm good predictor of short term mortality

1. Admission and discharge criteria for children who are 6–59 months of age with severe acute malnutrition

Before	After
Admit to inpatient care (NRC) all children :	Children with SAM should first be assessed with a full clinical examination to confirm whether they have:
1- Whose Wt. for length / height is below -3 SD.	1- medical complications and;
Or;	2- whether they have an appetite.
2- Have bilateral symmetrical edema (regardless of the degree of edema).	Children who have appetite (pass the appetite test) and are clinically well and alert should be treated as outpatients .
	Children who have:
	1- medical complications,
	2- severe edema (+++), or;
	3- poor appetite (fail the appetite test) or
	4- present with one or more IMCI danger signs should be treated as inpatients .

Why do we need anthropometric measurements?

1. To determine the severity of malnutrition
2. To calculate doses of feeds and drugs
3. Monitor progress of nutritional rehabilitation

Principles of treatment “Reductive adaptation”

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

As a result the consequences are:

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

Treatment occurs in 3 phases:

- 1-Initial phase "stabilization" where the acute medical conditions are managed
- 2-Rehabilitation phase
- 3-Aftercare

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

1. Treat/prevent hypoglycaemia
2. Treat/prevent hypothermia
3. Treat/prevent dehydration
4. Correct electrolyte imbalance
5. Treat/prevent infection

6. Correct micronutrient deficiencies
7. Start cautious feeding
8. Achieve catch-up growth
9. Provide sensory stimulation and emotional support
10. Prepare for follow-up after recovery

These steps are accomplished in two phases

An initial stabilization phase where the acute medical conditions are managed; and a longer rehabilitation phase.

Step 1. Treat/prevent hypoglycaemia

Hypoglycaemia and hypothermia usually occur together and are signs of infection. Check for hypoglycaemia whenever hypothermia (axillary <35.0°C; rectal <35.5°C) is found.

Frequent feeding is important in preventing both conditions.

Treatment:

If the child is conscious and dextrostix shows <3mmol/l or 54mg/dl give:

50 ml bolus of 10% glucose or 10% sucrose solution (1 rounded teaspoon of sugar in 3.5 tablespoons water), orally or by nasogastric (NG) tube. Then feed starter F-75 (see step 7) every 30 min. for two hours (giving one quarter of the two-hourly feed each time)

- antibiotics

- two-hourly feeds, day and night

If the child is unconscious, lethargic or convulsing give: IV sterile 10% glucose (5ml/kg), followed by 50ml of 10% glucose or sucrose by Ng tube. Then give starter F-75 as above

- antibiotics

- two-hourly feeds, day and night

Prevention:

- * feed two-hourly, start straightaway or if necessary, rehydrate first
- * always give feeds throughout the night

Step 2. Treat/prevent hypothermia

Treatment:

If the axillary temperature is <35.0 C, take the rectal temperature using a low reading thermometer. If the rectal temperature is <35.5 C:

- feed straightaway (or start rehydration if needed)

- re-warm the child: either clothe the child (including head), cover with a warmed blanket and place a heater or lamp nearby (do not use a hot water bottle), or put the child on the mother's bare chest (skin to skin) and cover them

- give antibiotics

Prevention:

- * feed two-hourly, start straightaway
- * always give feeds throughout the day and night
- * keep covered and away from draughts
- * keep the child dry, change wet nappies, clothes and bedding
- * avoid exposure (e.g. bathing, prolonged medical examinations)
- * let child sleep with mother/carer at night for warmth

Step 3. Treat/prevent dehydration

Note: Low blood volume can coexist with oedema. Does not use the IV route for rehydration except in cases of shock and then do so with care, infusing slowly to avoid flooding the circulation and overloading the heart

Treatment:

It is difficult to estimate dehydration status in a severely malnourished child using clinical signs alone. So assume all children with watery diarrhoea may have dehydration and give:

- **ReSoMal 5 ml/kg every 30 min. for two hours, orally or by nasogastric tube, then**
- **5-10 ml/kg/h for next 4-10 hours: the exact amount to be given should be determined by how much the child wants, and stool loss and vomiting. Replace the ReSoMal doses at 4, 6, 8 and 10 hours with F-75 if rehydration is continuing at these times, then**
- **continue feeding starter F-75**

During treatment, rapid respiration and pulse rates should slow down and the child should begin to pass urine. Monitor progress of rehydration: Observe half-hourly for two hours, then hourly for the next 6-12 hours,

Recording: pulse rate ,respiratory rate, urine frequency stool/vomit frequency

Prevention:

To prevent dehydration when a child has continuing watery diarrhoea:

- * **keep feeding with starter F-75**
- * **Replace approximate volume of stool losses with ReSoMal. As a guide give 50-100 ml after each watery stool**
- * **if the child is breastfed, encourage to continue**

Step 4. Correct electrolyte imbalance

All severely malnourished children have excess body sodium even though plasma sodium may be low (giving high sodium loads will kill). Deficiencies of potassium and magnesium are also present and may take at least two weeks to correct. Oedema is partly due to these imbalances. Do NOT treat oedema with a diuretic.

Give:

- **extra potassium 3-4 mmol/kg/d**
- **extra magnesium 0.4-0.6 mmol/kg/d**
- **when rehydrating, give low sodium rehydration fluid (e.g. ReSoMal)**
- **prepare food without salt**

Step 5. Treat/prevent infection

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 antibiotics) AND**
- **measles vaccine if child is > 6m and not immunized**

Choice of broad-spectrum antibiotics:

- a) **If the child appears to have no complications give Amoxillin syrup:**
- b) **If the child is severely ill (apathetic, lethargic) or has complications (hypoglycaemia; hypothermia; broken skin; respiratory tract or urinary tract give:**
 - **Ampicillin 50 mg/kg IM/IV 6-hourly for 2 days, then oral amoxycillin 15 mg/kg 8-hourly for 5 days, or if amoxycillin is not available, continue with ampicillin but given orally 50mg/kg 6-hourly**

■ **Gentamicin 5 mg/kg IM/IV once daily for 7 days**

3. Use of antibiotics in the management of children with severe acute malnutrition (in outpatient care)

Before	After
<p>The WHO Management of severe malnutrition 1999 recommended that:</p> <p>1- All children with severe acute malnutrition should be admitted to hospital and treated with a course of antibiotics.</p> <p>2- If clinical complications were present, then parenteral antibiotics were recommended, depending on local resistance patterns and availability.</p> <p>3- For children without obvious clinical sepsis, oral antibiotics were recommended.</p> <p>Because severe acute malnutrition suppresses the immune response, it is hard to detect infection.</p>	<p>1- Children admitted with severe acute malnutrition and complications such as septic shock, hypoglycemia, hypothermia, skin infections, or respiratory or urinary tract infections, or who appear lethargic or sickly, should be given parenteral (IM or intravenous [IV]) antibiotics;</p> <p>2- Children admitted with severe acute malnutrition and with no apparent signs of infection and no complications should be given an oral antibiotic.</p> <p>3- Children with uncomplicated severe acute malnutrition, not requiring to be admitted and who are managed as outpatients, should be given a course of oral antibiotic such as amoxicillin.</p> <p>4- Children who are undernourished but who do not have severe acute malnutrition should not routinely receive antibiotics unless they show signs of clinical infection.</p>

Step 6. Correct micronutrient deficiencies

All severely malnourished children have vitamin and mineral deficiencies.

Although anaemia is common, do NOT give iron initially but wait until the child has a good appetite and starts gaining weight (usually by the second week), as giving iron can make infections worse.

Give:

■ **Vitamin A orally on Day 1 (for age >12 months, give 200,000 IU; for age 6-12 months, give 100,000 IU; for age 0-5 months, give 50,000 IU) unless there is definite evidence that a dose has been given in the last month .**

Give daily for at least 2 weeks:

■ **Multivitamin supplement**

■ **Folic acid 1 mg/d (give 5 mg on Day 1)**

■ **Zinc 2 mg/kg/d**

■ **Copper 0.3 mg/kg/d**

■ **Iron 3 mg/kg/d but only when gaining weight**

Step 7. Start cautious feeding

In the stabilization phase a cautious approach is required because of the child's fragile physiological state and reduced homeostatic capacity. 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.

In inpatient settings where ready-to-use therapeutic food (RUTF) is provided as the therapeutic food in the rehabilitation phase (following F-75 in the stabilization phase)

- **Once children are stabilized, have appetite and reduced edema and are therefore ready to move into the rehabilitation phase**, the transition from F-75 to ready-to-use therapeutic food over 2–3 days, as tolerated. The recommended energy intake during this period is 100–135 kcal/kg/day. The optimal approach for achieving this is not known and may depend on the number and skills of staff available to supervise feeding and monitor the children during rehabilitation.

- In inpatient settings where F-100 is provided as the therapeutic food in the rehabilitation phase

- Children who have been admitted with complicated severe acute malnutrition and are achieving rapid weight gain on F-100 should be changed to ready-to-use therapeutic food and observed that they accept the diet before being transferred to an outpatient program.

Step 8. Achieve catch-up growth

In the rehabilitation phase a vigorous approach to feeding is required to achieve very high intakes and rapid weight gain of >10 g gain/kg/d. The recommended milk-based F-100 contains 100 kcal and 2.9 g protein/100 ml. Modified family foods can be used provided they have comparable energy and protein concentrations.

Step 9. Provide sensory stimulation and emotional support

In severe malnutrition there is delayed mental and behavioral development.

Step 10. Prepare for follow-up after recovery

A child who is 90% weight-for-length (equivalent to -1SD) can be considered to have recovered. The child is still likely to have a low weight-for-age because of stunting. Good feeding practices and sensory stimulation should be continued at home. Show parent or caregiver how to feed frequently with energy and nutrient dense foods and give structured play therapy

EMERGENCY TREATMENT OF SHOCK AND SEVERE ANAEMIA

1. Shock in severely malnourished children

The severely malnourished child is considered to have shock if he/she:

- Is lethargic or unconscious and
- Has cold hands plus either: 1) slow capillary refill (longer than 3 seconds or 2) weak or fast pulse

Shock from dehydration and sepsis are likely to coexist in severely malnourished children.

They are difficult to differentiate on clinical signs alone. Children with dehydration will respond to IV fluids. Those with septic shock and no dehydration will not respond. The amount of fluid given is determined by the child's response. Over hydration must be avoided. To start treatment:

- ✓ give oxygen
- ✓ give sterile 10% glucose (5 ml/kg) by IV
- ✓ give IV fluid at 15 ml/kg over 1 hour.

Use Ringer's lactate with 5% dextrose; or half-normal saline with 5% dextrose; or half-strength Darrow's solution with 5% dextrose; or if these are unavailable, Ringer's lactate .

✓ measure and record pulse and respiration rates every 10 minutes

✓ give antibiotics

If there are signs of improvement (pulse and respiration rates fall):

✓ repeat IV 15 ml/kg over 1 hour; then

✓ switch to oral or nasogastric rehydration with ReSoMal, 10 ml/kg/h for up to 10 hours. (Leave IV in place in case required again); Give ReSoMal in alternate hours with starter F-75, then

✓ continue feeding with starter F-75

If the child fails to improve after the first hour of treatment (15 ml/kg), assume that the child has septic shock. In this case:

✓ give maintenance IV fluids (4 ml/kg/h) while waiting for blood,

✓ when blood is available transfuse fresh whole blood at 10 ml/kg *slowly* over 3 hours; then

✓ begin feeding with starter F-75

If the child gets worse during treatment (breathing increases by 5 breaths or more/min and pulse increases by 25 or more beats/min): stop the infusion to prevent the child's condition worsening

Severe anaemia in malnourished children

A blood transfusion is required if:

*Hb is less than 4 g/dl

*or if there is respiratory distress and Hb is between 4 and 6 g/dl

Give:

✓ whole blood 10 ml/kg body weight slowly over 3 hours

✓ furosemide 1 mg/kg IV at the start of the transfusion .

It is particularly important that the volume of 10 ml/kg is not exceeded in severely malnourished children. If the severely anaemic child has signs of cardiac failure, transfuse packed cells (5-7 ml/kg) rather than whole blood.

Key message

Children with SAM are at risk of life threatening problems and they need careful assessment, special treatment and management with regular feeding and monitoring.

Therefore severely malnourished children are prioritized for immediate admission to nutritional rehabilitation wards (NRWs) and with proper case management of severe acute malnutrition (SAM) and follow up care the lives of many children can be saved and the case fatality rate can be lowered from over 30% to less than 5%.

Reference:

Training course on management of severe acute malnutrition (WHO)

Nelson text book of pediatrics 20th edition