
**March 2018**

# SEVERE ACUTE MALNUTRITION

## A guideline to the treatment protocol

For Nurses, Community Health Workers, Health Extension Officers and Doctors in Papua New Guinea

Contents

## EXECUTIVE SUMMARY

Severe acute malnutrition is one of the leading causes of child death in under-fives, thus, an 'everyday emergency' that requires inclusion in current treatment protocols.

The purpose of this guideline is to describe the procedure to contents of the protocol 'treatment of severe acute malnutrition in children 0-59 months old', adapted by the Pediatric society at the Medical Society of Papua New Guinea 50th symposium in 2014. The two have been separated to allow ease in protocol use during patient care; keeping the protocol short and factual, thus, handy. For each fact in the protocol, one needs to refer to the guideline for full explanation, wherever required. This guideline is useful not only as reference material but also for pre and in-service capacity building on assessing and treating acute malnutrition. Unless otherwise stated, all presenting signs and symptoms remain as is indicated in the Standard Treatment for Common Illnesses of Children in Papua New Guinea (PNG). Therefore, the guideline is tailored to PNG; and should be used for assisting health care workers to bring nutrition into day-to-day services i.e. organizing patient screening and identifying the problem of acute malnutrition, offering nutrition and medical care and support. However, the content ought not to be seen as rigid, given that, locally, conditions can differ. Integrating nutrition into routine activities should be planned and agreed for each implementing institution.

This guide has six chapters.

Chapter one describes how to identify children with SAM including anthropometric assessments and deriving cut off indices. The chapter modestly shows that a child growing well can falter, weight falls so low to the risk of death. It is best described as wasting, a condition that happens in days or weeks – consequently deteriorating to death. A child can be at-risk, moderately (MAM) or severely (SAM) wasted; the latter remain at extreme danger for death. Due to this risk of death, some children with SAM will need hospital care.

Chapter two explains a step by step plan on how to diagnose and treat medical complications often associated with SAM for hospitalized cases.. The current approach considers SAM treatment at both hospital and in outpatient programs, the third chapter describes the latter, a process that is restricted to children six months and older. However, the forth chapter looks at the infants less than six months in whom treatment of SAM differs from that of older children. There are two other chapters, five, that shows preparation of feeds in the event that those preferred by World Health Organization (WHO) as the choice for rehabilitating SAM are not in place. The final chapter , that incorporates how hospital and community care for SAM can link to each other.

Adhering to treatment protocols for SAM should reduce infant and child mortality, indirectly, contributing to sustainable development goal (SDG) No. 3. Nationally, SAM treatment efforts should contribute to the newly developed PNG's nutrition policy (2016-2026) objective No. 3 that seeks to implement interventions for many forms of malnutrition including treating wasting. Doing so should save lives of children affected by severe malnutrition and improve child survival in a short run; and in a long run, impact on life expectancy, a key result area in PNG's National Health Plan 2011–2020, that affirms to reduce malnutrition in objective 4.4. Collectively the outcome should address key targets of SDG no.2: Reducing hunger.

# CHAPTER ONE: IDENTIFICATION OF SEVERE ACUTE MALNUTRITION (SAM)

## Introduction

Just looking at a patient does not give the diagnosis of acute malnutrition. Assessment of the problem includes individual particulars, examining for bilateral pitting edema, anthropometric measurements, and clinical examination as well as taking history. This should be done for all children less than five years, at all contact points for early detection. A similar process ought to be carried out among children attending ART and TB clinics, considering the risk in this population, not to mention many other infections. Many causes as well as physiological changes in appendix 3

**Note:**
Acute malnutrition is a rapid onset condition characterized by bilateral pitting oedema or sudden weight loss caused by a decreased dietary intake and/or illness. There are two forms of acute malnutrition:

1. Severe acute malnutrition(SAM) which is characterized by presence of bilateral pitting oedema or severe wasting
2. Moderate Acute Malnutrition(MAM) which is characterized by moderate wasting

### Quick steps to follow

a. Record the child's date of birth (age) and sex
b. Examine for and grade bilateral pitting edema
c. Take Mid Upper Arm Circumference (MUAC) (if the child is > 6 months and or without edema)
d. Take weight
e. Take length (if < less than 87 cm or under the age of two years), otherwise, take height
f. Diagnose for SAM
g. Take history; and carry out a full clinical examination to confirm medical complications associated to SAM and whether there is an appetite. Further rule out presence of one or more Integrated Management of Childhood Illness (IMCI) danger signs.
h. Decide where to treat a child with SAM

### Elaboration of the above steps

**a. Determine age and sex**

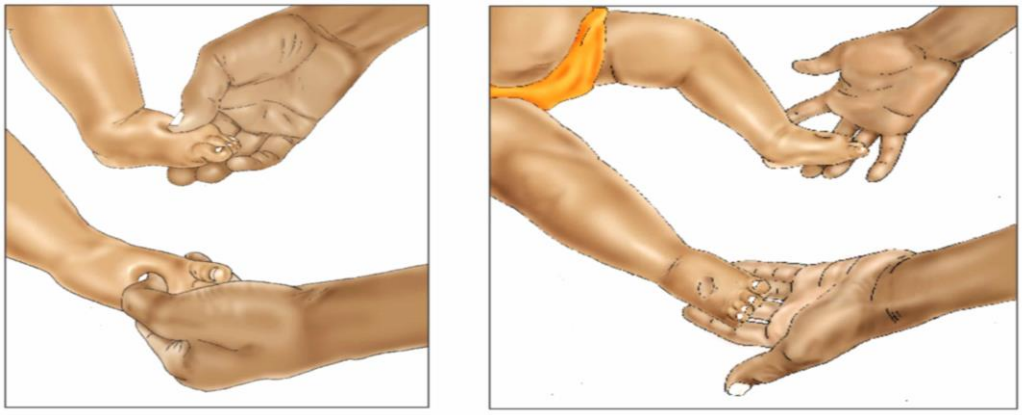
The age of the child can be obtained from the child health card, immunization card or birth certificate or other official documents. Otherwise: -

1. *if a child has 1-19 teeth, then approximate age in months = number of teeth + 6*
   **or**
2. *If a child is under 110 cm or if is not able to touch the opposite ear with the opposite hand, she/he should be treated as less than 5 years*."
3. *Indicate if male or female*

**b. Examine and grade for bilateral pitting edema (edema)**

Edema caused by SAM presents with some special characteristics like starting from both feet, extending upwards to the arms, face and the rest of the body. It is pitting (leaves a dent on moderate pressure). It does not change with time of the day or posture. Apply thumb pressure gently for at least three seconds (count 1001, 1002, and 1003) on the topside of each foot concurrently. An individual has edema if the depression caused by the thumb remains after lifting the thumb (Figure 1).

**Figure 1: Demonstration of bilateral pitting edema**



**Grading edema:**
+ Mild: both feet;
++ moderate: both feet, plus lower legs, hands, or lower arms;
+++ severe: generalized oedema including both feet, legs, hands, arms and face
**Note**: Other than SAM, generalized edema is can be caused by nephritis, intestinal parasites, liver disease, renal problems and heart failure.

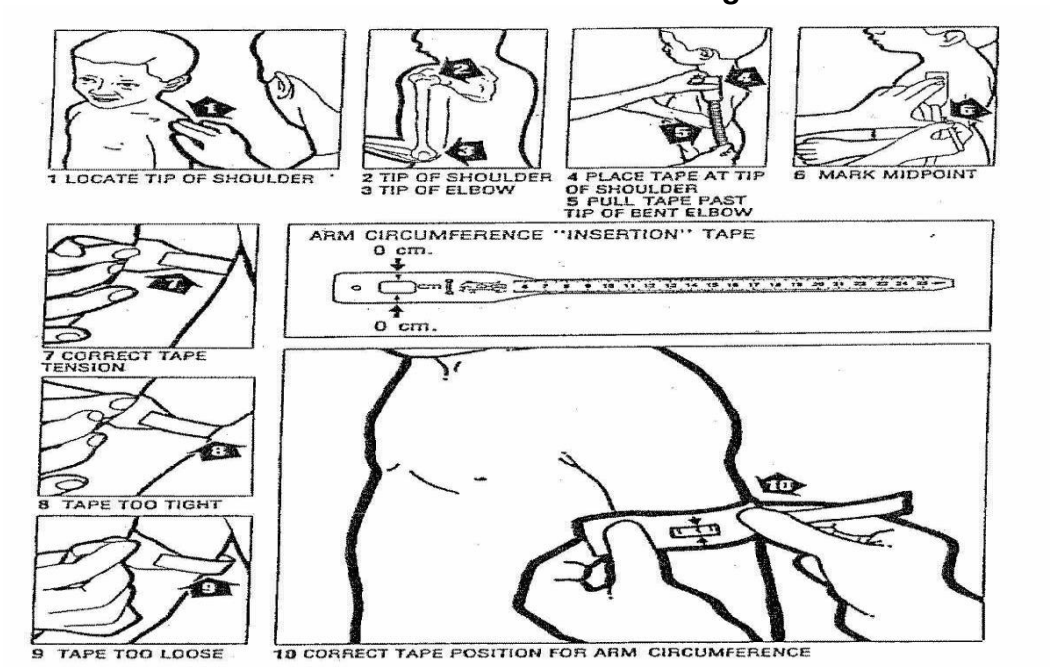
**c. Take mid upper arm circumference (MUAC)**

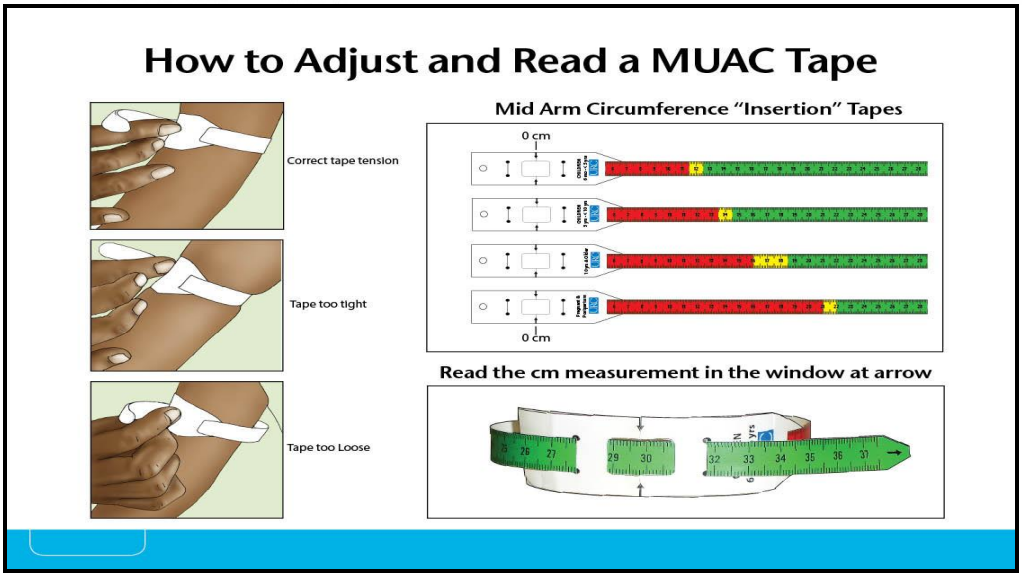
Children suffering from acute malnutrition can now be easily identified by a health worker using a tape to measure a child's mid-upper arm circumference (MUAC). This MUAC tape uses a simple traffic light system to immediately alert the health worker to a child's condition and the necessary course of action. It is a possible measurement to do. Once trained;

- Determine the mid-point between the elbow and the shoulder (acromion and olecranon) of the less active arm as shown in the next picture (figure 2)
- Locating mid-point
  Place the arm at a right angle, place the zero mark of the measuring tape (dark arrow) at the shoulder blade (acromion) and stretch it to the elbow (olecranon). Then determine the mid-point of the length between the acromion and olecranon.
- Place the tape measure around the located mid-point of the less active arm to measure the mid-upper arm circumference. The arm should be relaxed and hanging down the side of the body at the time of measuring. The color coded tail must pass through the slit and not the window of the tape.
- Measure the MUAC while ensuring that the tape neither pinches the arm nor is left loose
- Read the measurement from the window of the tape at the black arrow on the tape points.

- Record the MUAC to the nearest 0.1cm or 1mm. Tapes can differ depending on the source: either in cm or mm.
- For colored MUAC tape: a measurement in the green zone means the child is properly nourished, yellow zone means that the child is moderately malnourished while a red zone means that the child is severely malnourished: on condition that edema is ruled out.
- Repeat the measurement to ensure an accurate measurement. Once trained, MUAC should be an easy tool to assess for SAM.

**Figure 2: How to locate arm land marks and measuring the MUAC**



**d. Take weight**

It is important to weigh the child with as minimal clothing as possible. There are several types of weighing scales such as the standing-on bathroom scale, electronic scale (digital), and salter scale. When using the salter scale (the most common one in public clinics for children):

- Hook the scale to a tree with a rope, a tripod or a stick held horizontally by two people at eye level.
- Suspend the weighing pants from the lower hook of the scale, and readjust the scale reading to zero
- Undress the child and place him/her in the weighing pants
- Hook the pants to the scale
- Ensure that the child hangs freely without holding onto anything
- Record to the nearest 100 g; when the child is settled and the weight reading is stable
- To reduce errors, make sure that nobody touches the pants or the scale at the time of reading off the child's weight
- Read and record the value from the scale. The assistant should repeat the value for, verify the value and record it immediately.

**Steps for taking the weight of a child using an electronic scale:**

- Place the electronic scale on a flat level surface
- Switch on the weighing scale, wait for the 0.00 reading
- Undress the child
- Make him/her stand on the middle of the scale's surface
- Record to the nearest 100 g when the child is settled and the weight reading is stable. Make sure that nobody holds the child during the weighing and that the child stands freely without holding onto anything
- Read and record the value from the scale. The assistant should repeat the value for verification and record it immediately.

**Steps in taking the weight of a child that is carried by the mother/ caretaker; using the electronic scale:**

- Place the electronic scale on a flat level surface
- Switch on the weighing scale, wait for the 0.00 reading
- Make the mother/caretaker stand in the middle of the scale, wait for the weighing scale reading to stabilize
- 'Tare' off the weight of the mother/caretaker by pressing the 2 in 1 button, again let the reading stabilize at 0.00 reading while the mother/ caretaker remains standing on the scale
- Handover the child to the mother/caretaker (that is standing on the scale)
- Read and record the weight (it will be for the child alone).

**e. Take length/ height**

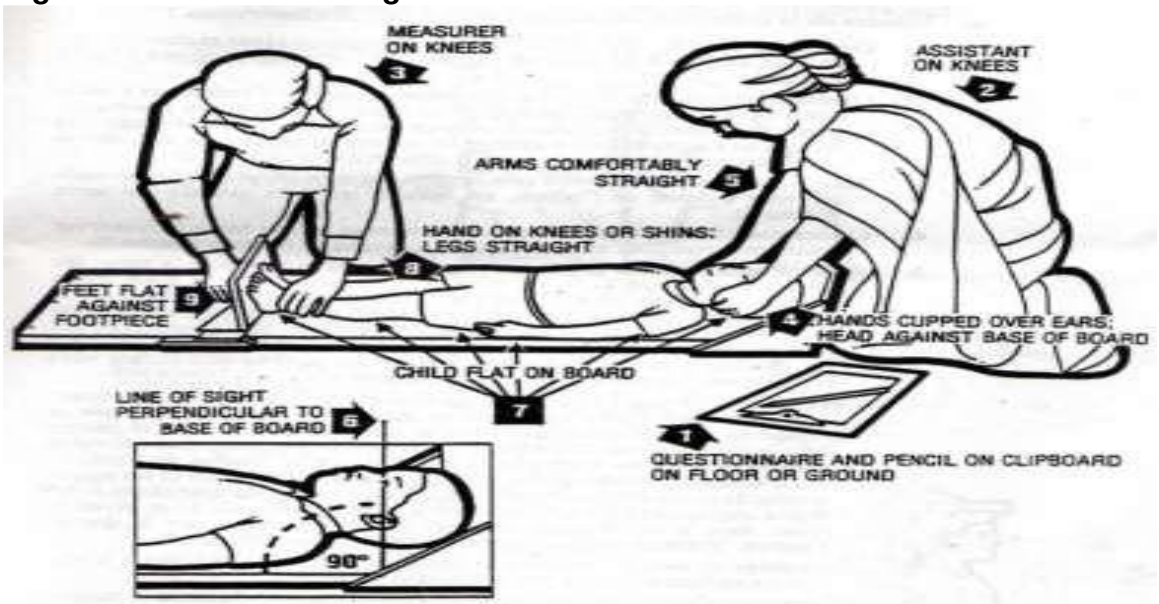
Consider length when a child is < 2 years or 87 cm tall.

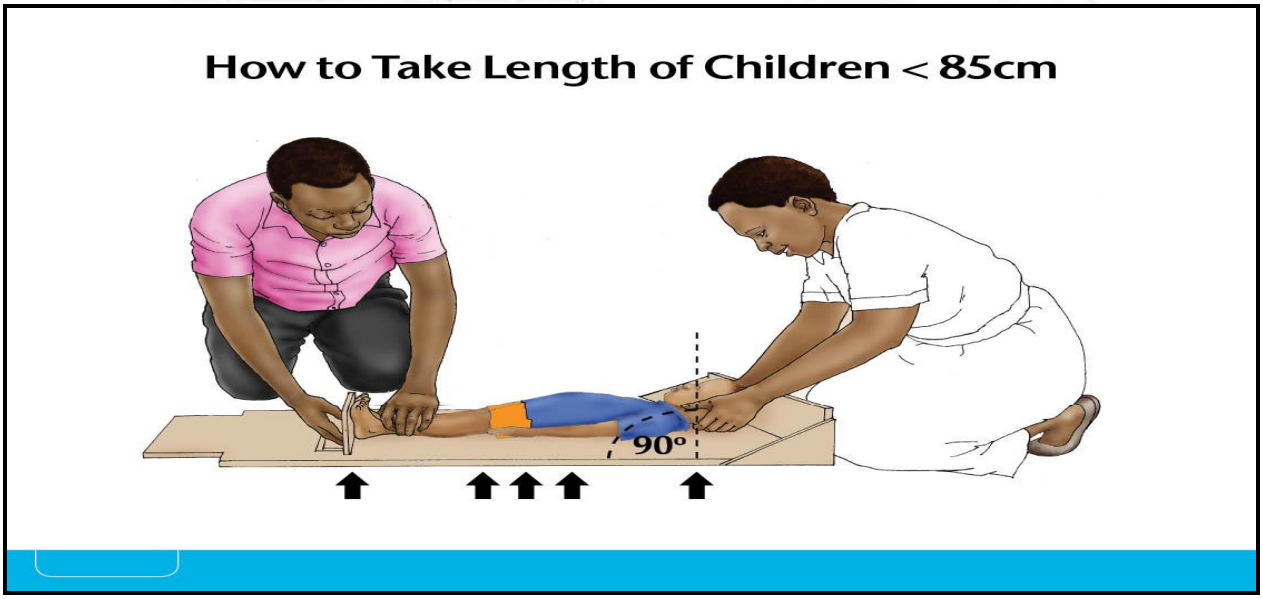
**Steps for taking accurate length measurements (Figure 3:**

- Place the measuring board horizontally on a flat level surface
- Remove the child's shoes and any head covering

- Place the child, lying down and face up in the middle of the board.
- Let the assistant hold the sides of the child's head and position the head until it is touching the head board
- Let the measurer place his/her hands on the child and firmly hold the child's knees together while pressing down. The soles of the feet should be flat on the foot piece, toes pointing up at right angles
- The measurer should immediately remove the child's feet from contact with the footboard with one hand while holding the footboard securely in place with the other hand
- Read it aloud and the assistant repeats the reading and records it immediately. Note that on the board, the longer lines indicate centimeter markings while the shorter lines in between indicate millimeter.

**Figure 3: How to take length**



**NOTE**: Malnourished children are usually irritable and therefore it's important to involve the care giver in anthropometric measurement to help calm them down and also to create confidence.

**a. Steps for taking accurate height measurements:**

Take height for children older than 2 years and the ≥ 87 cm taller

- Set the measuring board vertically on a stable level surface
- Remove the child's shoes and any head-covering
- Place the child on the measuring board, standing upright in the middle of the board. The child's heels and knees should be firmly pressed against the board by the assistant while the measurer positions the head and the cursor. The child's head, shoulders, buttocks, calf and heels should be touching the board
- Once the five contact points are touching the board, read the measurement to the nearest 0.1 cm.
- Read it aloud and the assistant repeats the reading and records it immediately.

**f. Diagnose for SAM in children who are 0–59 months of age**

**The diagnosis for SAM is defined based on:**

— Presence of bilateral edema or,

— Anthropometric indices

**Table1: MUAC interpretation**

| | **Less than 6 months (0-5 months)** | | |
|---|---|---|---|
| | SAM | MAM | Normal |
| Bilateral Pitting oedema | +, ++, +++ | 0 | 0 |
| MUAC cut off | NA | NA | NA |
| W/H Z score | < -3 SD | -3 to -2 SD | >-2SD |
| W/A Z score | <-3 SD | -3 to -2SD | .-2SD |
| | **6-59 months** | | |
| Bilateral Pitting oedema | +, ++, +++ | 0 | 0 |
| MUAC cut off | <11.5cm | 11.5- <12.5 cm | 12.5 cm and above |
| W/H Z score | < -3 SD | -3 to -2 SD | >-2SD |
| W/A Z score | <-3 SD | -3 to -2SD | .-2SD |

A child has SAM if: -

1. Presence of edema (kwashiorkor)
2. MUAC < 11.5 cm (child > 6 month, no edema)
3. Weight for height Z-score < -3SD
4. WFA < -3SD or < 60% (last option) as indicated above.

   "*Visible severe wasting*" is **NOT** considered as a diagnostic criterion for SAM.

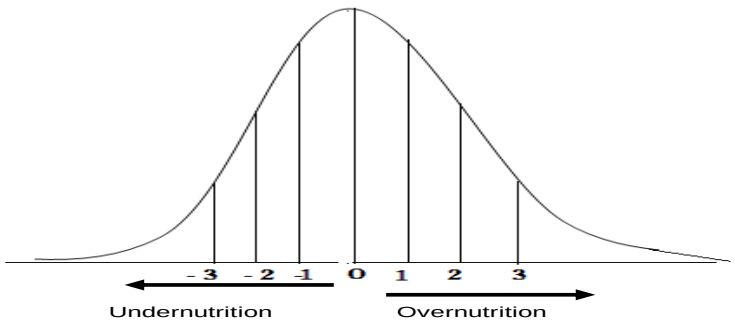
   In addition, some children with SAM identified using weight for height do not consistently have a MUAC <11.5 cm, and vice versa, thus, use either or presence of edema.

**The Z-Scores**

- The Z-score or standard deviation (SD) classification system has been chosen in preference to percentiles in the management of severe forms of malnutrition.
- A Z-score is one way of describing how far a value such as a weight measurement, deviates from the median or expected value for that age.

- Consider median as ‘middle’. This ‘middle’ is regarded as a standard.
- To deviate means to move away from that ‘middle’ or that standard; one can move for better or worse.
- In mathematical terms, one Z-score is the same as one SD.
- When a measurement is lower than the median (the ‘middle’), it is indicated with a negative sign (e.g. -1 Z-score)
- When it is greater than the median, it is indicated with a positive sign (e.g. + 2 Z-score or simply 2 Z-score).
- The further away a measurement is from the median on either side, the greater the risk of malnutrition.
- To the left implies the risk of under nutrition (e.g. < – 3 Z-score for SAM) while to the right, the risk of over-nutrition (e.g. > 3 Z-score), refer to the bell shape curve next for further clarification in figure 4

**Figure 4:**
**The bell shape curve with arrows showing the risk of malnutrition**




**How to determine the weight for height Z-score**
Using the weight for height table (appendix 4);
Find the length/ height in cm in the first column in white (on the vertical or Y axis). At that point of the child’s height/length, move your eyes across (horizontally) to locate the child’s weight in kg along that horizontal line (x-axis).
Or Look out for the nearest weight value to the child’s weight as above.
At that point of the child’s weight or nearest value to the child’s weight, look directly up the y-axis to the point directly above the child’s weight or nearest value to the child’s weight..
Read off the number where the two lines meet (child’s weight and the SD; length or height remains a constant). Sometimes, the point read off may happen in a range of SD points. What is important is that any Z-score < -3SD means the child has SAM, between -3 and -2SD is MAM and above -2SD is Normal nutritional status.

**Case study on how to interpret weight for length/ height Z-score**
A child without oedema at 84 cm tall (this is length since it is <87 cm) and 8.7 kg heavy has SAM since he is at < -3SD. A child with a similar length but 9.0 kg

heavy does not have SAM based on the same anthropometric index. The latter child's SD is between -3 and -2 and NOT <-3SD.

**g. Take history; and clinical examination to confirm medical complications.**

**1. History taking**

The rationale for taking history is to arrive at a theoretical framework on how the presenting problem may have occurred. This involves both medical, dietary and social history. In all, a health worker tries to get as much information as possible.. In order to help a mother or other primary care taker recall coherently, it is easier to look at a holistic approach, look at the child starting from the time of pregnancy, through delivery, until the onset of the presenting problem. Even with the presenting problem, consider sourcing for information on treatment options that have been tried to-date. Because there are basic primary health care practices for which a child should have benefitted prior to the current contact, it is good practice to generate information in the area to ease updating basic care packages like immunization, micronutrient supplementation and deworming among others. Remember malnutrition and associated disorders may not be the only challenges to deal with. Try as much as possible to get facts that can lead to additional support, including TB and HIV testing and linking to care if not already done.

**NOTE:** Malaria, TB, diarrheal diseases and acute respiratory disease are the major causes of morbidity, and these, depress a child into SAM. Next is a list of basic medical and dietary factors to review.

**Table 2: Points to consider during history taking**

| **Medical history** | **Dietary history** |
|---|---|
| • Presenting complaints<br>• Birth weight and progressive weight<br>• How the growth millstone is progressing with respect to age (sitting up, standing, etc.)<br>• Immunization of the child right from birth<br>• Attendance of antenatal<br>• Blood test for HIV for mother and child<br>• Contact with people with measles or tuberculosis<br>• Any deaths of siblings<br>• The type of stool of the child<br>• Illness or diseases in the past two weeks | • How the baby is feeding<br>• Exclusive breastfeeding<br>• When complementary feeding was started<br>• Quality – types of food<br>• Quantity - how much<br>• Frequency/ interval of feeding – how often<br>• Type of feeding; active or passive<br>• Type of feeding – bottle or cup feeding<br>• Appetite<br>• Method of cooking<br>• Ask whether that is the mother's first born, then ask about the previous feeding of the first children<br>• Is the baby a twin<br>• Hygiene practices; hand washing, water source, waste disposal<br>**Economic situation History**<br>• Family size<br>• Family and social situation (has the child lived separate from the biological mother?) |

| | |
|---|---|
| | • The mother and father's occupation |

## 2. Clinical examination

As a principle, a clinician should always undress children identified with SAM and examine them naked, to identify any hidden features/ complications. For children with non-edematous SAM (marasmus), look for signs of wasting such as loss/ reduction of subcutaneous fat with loss of muscle bulk and sagging skin, loss of muscles around the shoulders, arms, buttocks, ribs and legs (see figure 5 next for a reminder on non-edematous features).

**Figure 5: Common features associated with non-edematous SAM**

For children with edematous SAM (often called Kwashiorkor), the edema is on both feet (bilateral) and pitting. Upon history, the swelling should have started in the feet,

although it can progressively become more generalized (hands and arms, “moon face”). Generally, edematous children are apathetic, lethargic and miserable (when left alone) but irritable (upon touching). They present with hair changes (yellow/reddish) and become sparse, dry and brittle. The hair can be pulled out easily, leaving bald patches. More often, the children have skin problems such as lesions, atrophy, cracks and peeling; patchy and fragile, yet, prone to infection. (See Figure 6 next for an impression of edematous malnutrition).

**Figure 6: Common features associated with edematous SAM**

**NOTE:** Consider complicated if SAM presents with edema +++, hypoglycemia, hypothermia, dehydration, shock, fevers, severe infections such as pneumonia, very severe anemia, cardiac failure or eye signs of vitamin A deficiency. There are other conditions that place a child with SAM in as much danger, such as unable to eat/ breast feed, vomiting, fitting or convulsions, lethargic or not alert, unconsciousness or poor social environment (unable to treat child at home). Refer to the standard treatment for common illnesses of children in PNG (9th edition) for a full checklist for sick children.

### h. Decide where to treat a child with SAM

Previously, all children with SAM had to be treated in hospitals – an option that leaves out many that need the service, or otherwise, keep some children in hospital admission for too long. Now, with the introduction of therapeutic feeds for home use (such as RUTF), many more children are being reached. A child can be admitted and treated in the hospital (see inpatient treatment of SAM in chapter two) or given prescribed therapeutic feeds and be treated from home (described as outpatient treatment of SAM in chapter three).

## CHAPTER TWO: INPATIENT TREATMENT OF SAM

### Introduction

Children with SAM and other complications can be admitted for inpatient management. Other than the child's clinical condition, including appetite, consider social circumstances, such as whether children are disabled or there are other mitigating circumstances, including significant social or access issues can be a reason for inpatient treatment. Children with SAM who have medical complications, poor appetite, or present with one or more Integrated Management of Childhood Illness (IMCI) danger signs should be treated as inpatients. The IMCI danger signs are inability to drink or breastfeed; vomits everything; has had convulsions (more than one or prolonged >15 min); lethargic or unconscious; convulsing now. Children with SAM who have severe bilateral edema +++ should be admitted for inpatient care; even if they present with no medical complications or have appetite. In other settings where SAM management is already at scale, children with SAM who have ++moderate or +mild bilateral edema, but with an appetite, are often rehabilitated as outpatients. Given that PNG's geographical conditions, yet, is only starting SAM management, moreover, starting with a few pilot hospitals till best practices inform scale up, it is best that a child with any grade of bilateral pitting edema is hospitalized. The situation can be re-visited once SAM treatment options scale up.

### MEDICAL MANAGEMENT DURING INPATIENT TREATMENT OF SAM

In children with SAM, yet presenting with these conditions, expect a number of functional alterations. Thus, any treatment or feeding must start low and be done slowly; for many reasons but importantly, sodium pump is faulty, causing a problem in absorption and usual crossing of membranes. Routine tests include blood glucose, full blood count (FBC), urea and electrolytes (U&E), HIV test, urinalysis and culture, Blood slide for malaria if febrile, chest X ray (CXR) to screen for TB as well as performing a TB score (in standard treatment book). Otherwise, investigations can be gastric aspirate or sputum for GeneXpert if TB possible; lumbar puncture, blood and urine culture if the child looks ill; stools culture if diarrhea; if edema present consider: stool for parasites (especially strongyloides), urine for protein, liver function test (LFT) among others.

> Caution: If treatment with ARVs is started in the severely malnourished patient whilst they have physiological malnutrition, they are likely to develop very severe side effects from the drugs. Such side effects may lead to deterioration of the patient or even death. Thus, it is recommended to be deferred till transition (see step 8 ahead). **If a child is not in shock, heart failure or diagnosed with very severe anemia, go to Step 1**, otherwise, take these three as an emergency.

**Emergency 1: Management of shock during inpatient treatment of SAM**

The general principles of resuscitation, in particular providing oxygen and improving breathing, similarly apply to children with SAM. The only indication for intravenous infusion (IV) in a child with SAM is circulatory collapse, caused by severe dehydration or septic shock – when the child is lethargic or unconscious (excluding cardiogenic shock).

**Diagnosis** – Shock is diagnosed when these four signs are present:

a. Lethargic or unconscious AND

b. Cold hands/ feet - AND
c. Capillary refill > 3 sec AND
d. Weak/ fast pulse

All children with SAM and signs of shock (with lethargy or unconsciousness) should be treated for septic shock. This includes especially children with signs of dehydration but no history of watery diarrhoea, children with hypothermia or hypoglycaemia, and children with both edema and signs of dehydration.

**Treat and monitor** –

**<u>If a child is in shock you must act quickly:</u>**

1. Give oxygen
2. Give IV fluid at 15mL/kg over 1 hour, using:

1st option: Ringers Lactate with 5% dextrose

2nd option: Half-strength Darrow's solution with 5% dextrose

**If neither is available, 0.45% saline + 5% dextrose should be used**

The only indication for intravenous infusion in a child with SAM is circulatory collapse caused by severe dehydration or septic shock when the child is lethargic or unconscious (excluding cardiogenic shock).

3. Measure and record HR and RR after fluid starts, monitoring for fluid overload and heart failure (increased RR by 5/min and HR by 25/min, liver enlarges, crackles on lung exam). Monitor every 5–10 min, if signs of heart failure develop, intravenous therapy should be stopped immediately.

**After one hour**

4. If signs of shock do not improve, repeat IV therapy at 15 ml/kg for another hour. Remember malnourished children don't handle IV fluid well as this causes overload.
5. Once there are signs of improvement, start therapeutic milk feeds and give ReSoMal as detailed in treatment of dehydration in step 3 below.
6. If the child is very pale and in shock, give a blood transfusion of 15 ml/kg packed red blood cells slowly over 3 hours
7. Give IV antibiotics immediately (listed in step 5 below)

**<u>Emergency 2:</u> Heart failure**

**Diagnosis** – physical deterioration with a gain in weight

Increase in liver size, tenderness over liver

Increased Respiration Rate *(>50/min for 5 to 11mo & >40/min for 1-5 years, or an acute increase in respiration rate of more than 5 breaths/min)*

"Grunting respiration" during each expiration – *sign of "stiff lungs".*

Crepitation in the lungs

Prominent superficial and neck veins

Heart sounds - Development of triple rhythm

Increasing or reappearance of edema during treatment

A fall in Hb concentration (rule out fluid overload *vs*. actual fall in hemoglobin)

**Treat and monitor** –

**<u>If a child is in heart failure you must act much more quickly:</u>**

Stop all intake of fluids or feeds (oral or IV); No fluid or food should be given until the heart failure has improved or resolved *(even if it takes 24-48 hours)*

Small amounts of sugar-water can be given orally if worried about hypoglycemia

Give frusemide (1mg/kg) – *may not be very effective*

Digoxin can be given in small single dose *(5 mcg/kg – lower than the normal dose of digoxin)*
*If very anemic do transfuse where there are facilities and expertise to perform an exchange transfusion*

**Emergency 3: Very severe anaemia and severe anaemia**
**Diagnosis** – Hb <4 g/dL or <6 g/dL with signs of respiratory distress
**Treat and monitor** –
Transfuse with packed cells at 10ml/kg slowly over 3 hours

If there are no signs of CCF (Congestive Cardiac Failure) transfuse with whole blood at 10ml/kg slowly over 3 hours

**Do Not-** Give Iron supplementation in the acute or first phase of management of SAM. Give Iron after 2 weeks of SAM management unless taking RUTF (Has Iron)

**NOTE: If a child requires no emergency treatment(s) while admitted in hospital, start with step 1 till 11 below.**

**Anemia and HIV**
PNG HIV guidelines recommend that if Hb < 7 you either transfuse or start ABC. Normally you start with AZT. However, AZT causes anemia. Thus, many places will transfuse because AZT is all that there is.

**Step 1 - Treat hypoglycaemia**

**Diagnosis**
Hypoglycemia is a blood glucose < 3 mmoL/l
**Signs of Hypoglycemia**
• Low body temperature
• Lethargy or limpness
• Possible loss of consciousness
• Eyelid retraction is one sign of an over-active sympathetic nervous system, which starts before actual hypoglycemia develops. If a child is sleeping with his eyes slightly open, wake the child up and give feeds, or even sugar water to drink. Health staff and caretaker should be taught to look for this sign during the night. The rule is to feed small but often, if hypoglycemia should be prevented. Hypoglycemia occurs because of malabsorption in all types of sugars; there is intolerance of sugars due to poor receptor responses.
**Treat and monitor (to prevent re-occurrence)** –

**a. Treat**

**If conscious:** And able to drink, give 50mL (approximately 5-10mL/kg) of sugar-water Or F75 diet.
**If losing consciousness:** Give 50mL (or 5-10mL/kg) of sugar-water by NG tube immediately. When consciousness is regained, give small doses of therapeutic milk feed frequently. At the minimum, every 3 hours including during the night for the 1st 24 hours
**If unconscious:** Give sugar-water by NG tube. They should also be given glucose as a single intravenous injection (5mL/kg of a sterile 10% glucose solution).

All severely malnourished patients with suspected hypoglycemia should be treated with second-line antibiotics. Also keep the child warm and monitor for hypothermia.

b. **Monitor**

The patient's response to treatment should be dramatic and rapid. If a very lethargic or unconscious patient does not respond, it indicates a different cause for the clinical condition such as an infection. The different source of the lethargy must be determined and treated. If consciousness drops or temperature falls, re-test the blood glucose level and give another dose of glucose 50mL by NG tube or IV (10% glucose as above).

To make sugar water: Add 10 g (2 heaped table spoons of sugar) to100 mL clean drinking water (slightly warm if possible to help dilution) and shake or stir vigorously. (Refer to STM).

**c. Prevent**

Make sure that the severely malnourished patient receives sugar water on admission if it is not close to a feed time or if the patient is waiting in the casualty/emergency department for over one hour. For patients at risk of hypoglycemia (very sick children with poor appetite, with vomiting or diarrhea), give frequent, regular feeds every three hours.

**<u>Step 2</u> - Treat hypothermia**

**Diagnosis**

Severely acutely malnourished patients are highly susceptible to hypothermia.

**Signs of Hypothermia**

Hypothermia is indicated by a rectal temperature below 35.5ºC, or an under-arm temperature below 35ºC.

**Treatment of Hypothermia**

Do not bathe severely malnourished patients on admission. Later, when the patient is stabilized, bathe patient only during the warmest part of the day with warm water. Dry patients quickly and gently after washing.

Use the "kangaroo technique" for children with a care taker.

Put a hat on the child and wrap mother and child together.

Offer hot drinks for the mother to keep her skin warmer (plain water, tea or any other hot drink). Even later during treatment, do not bath severely ill children with SAM

Give hot drinks to the mother *(hot water is sufficient)* to warm her skin

Monitor body temperature during re-warming

Treat for hypoglycemia and give second-line antibiotic treatment

**<u>Step 3</u> - Treat dehydration**

**Diagnosis**

Misdiagnosis and inappropriate treatment for dehydration is the most common cause of death of the severely malnourished patient. It is difficult to diagnose dehydration in these patients. It is important to take a detailed medical history and determine if there was a recent fluid loss resulting from acute diarrhea or vomiting. Unfortunately, the usual signs of dehydration - such as non-elastic skin (unless one uses the forehead) and sunken eyes (unless it is most recent/ acute) - are often present in the severely malnourished patient regardless of hydration status. Consider that if there is no acute

weight loss, there is unlikely to be dehydration. There should be more worries with acute diarrhea than persistent. What will kill the child is dehydration not diarrhea. With persistent diarrhea, the body is probably adapted. Consider **two options: -**

Option 1: Assume some dehydration if: there is history of diarrhea AND,
Option 2: Assume severe dehydration if: there is profuse watery diarrhea and signs such as 'recent' sunken eyes, cool extremities, absence of tears, dry mouth, very thirsty, 'reduced' urine output, rapid pulse and respirations. Suspect eye impressions below for dehydration.

**Figure 7: Eye signs of dehydration**

**Treatment (rehydration) – see table 2 below.**
World Health organization recommends using a modified oral Rehydration Solution for Malnutrition (ReSoMal). Where ReSoMal is not available for children with SAM with dehydration, refer to chapter six. Otherwise the rehydration plan is as follows:

**Plan A**
**No dehydration – prevent dehydration**
50-100 mL per loose stool if < 10 kg
- if >10 kg

**Plan B**
**Some & Severe dehydration – replace losses**
- Start milk feeds (F75) as outlined in step 7. Give milk feeds at least every 3 hours. If possible, every 2 hours (see milk volumes p. 52)
- Give extra ReSoMal in between milk feeds for 6-10 hours
  - 50 if < 10 kg
  - 100 ml if > 10 kg
- It is important you monitor the child for signs of over-hydration.
- As the child is rehydrated, the pulse rate (PR) and respiratory rate (RR) should decrease to a normal range and the child should begin to pass urine.

- Continued fast breathing and rapid pulse rate during rehydration suggests co-existing infection or over hydration.
- Stop fluids if: RR by 5/min and PR by 25/min, liver enlarges, fine crackles on lung exam, or galloping heart rhythm.
- World Health Organization's recommended therapeutic foods already contain adequate zinc, and children with SAM receiving F-75, F-100 or RUTF should not therefore receive additional zinc. If these feeds are not in use (refer to chapter six), give zinc (10–20 mg per day) to all children as soon as the duration and severity of the episodes of diarrhea start to reduce, thereby reducing the risk of dehydration. By continuing supplemental zinc for 10–14 days, this will also reduce the risk of new episodes of diarrhea in the following 2–3 months.
- ReSoMal (or locally prepared ReSoMal using standard WHO ORS) should not be given if children are suspected of having cholera or have profuse watery diarrhea (≥ 3 loose or watery stools in a day, for more than 14 days). Such children should be given standard WHO ORS that is normally made, i.e. not further diluted.

**Plan C**

In case of shock – use IV fluids. Refer to emergency 1 above.

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a. In case of shock – **(Plan C)** – use IV fluids. Refer to emergency 1 above.

Table3. Treatment of dehydration in children with severe malnutrition

| PLAN A - Prevent dehydration | PLAN B - Some/severe dehydration |
|---|---|
| i) 50-100 ml per loose stool if <10kg<br>ii) 100 ml if >10 kg<br>*Note: it is important child receives something. If milk is not available, then give ReSoMal or ORS until milk becomes available to prevent dehydration<br>* Continue breastfeeding | Give extra ReSoMal or ORS in-between feeds (but watch for over hydration!)<br>i) < 10kg: 50-100 ml between feeds for up to 6-10 hours<br>ii) ii) > 10kg: 100 ml between feeds for 6-10 hours<br>* ReSoMal preferred. If not available use ORS or modified ORS<br>* Monitor closely for signs of fluid overload<br>* Insert NG tube if unable to take orally |

**<u>Serious caution about hydrating children with SAM</u>**

**The standard protocol for the dehydrated child (who is not malnourished) should not be used.** With SAM, the "therapeutic window" is narrow: even dehydrated children can quickly go from having a depleted circulation to experiencing over-hydration with fluid overload and cardiac failure. Several deaths can occur not at admission with diarrhea but a few days later, most probably, due to over hydration. If respiratory rate is going up, check weight gain; if the latter is going up fast, there is definitely fluid overload, resulting from cardiac failure. **DO NOT GIVE IV FLUIDS EXCEPT IN SHOCK.** In malnutrition, both marasmus and to greater extent when there is edema, IV infusions are

rarely used because there is a particular renal problem that makes the children sensitive to salt (sodium) overload and at high risk of fluid overload. Non-edematous children with SAM bear a slow sodium pump, while those with edema experience a fast pump because of an opened cell membrane, thus, a 'leaky' system. To prevent overuse of oral rehydration salts i.e. ReSoMal, do not leave these products accessible in the ward for the caretakers to give freely to children. Over consumption of ReSoMal can lead directly to heart failure in SAM patients and may worsen edema condition. If there is no dehydration, do not treat diarrhea with rehydration fluids with the intention to prevent the onset of dehydration. This will again lead to over-hydration and heart failure.

**Step 4 – Correct electrolyte imbalance**

Feeds designed based on WHO recommendation such as F75, F100 and RUTF have sufficient electrolytes.

**Prevention:** Start therapeutic feeding at 100kcal/kg/day and increase to 130kcal/kg/d for a few days before going to the full intake. See step 7 ahead for details.

**Diagnosis**

Sudden development of acute weakness, "floppiness", lethargy, delirium, neurological symptoms, acidosis, muscle necrosis, liver and pancreatic failure, cardiac failure or sudden unexpected death

**Cause**

Before SAM develops in a child, glucose from the intake of carbohydrates is the body's preferred source of energy. As malnutrition sets in, the body loses access to carbohydrates, shifting to catabolism of fat and protein. Major organs such as the heart, lungs, intestines, liver, and kidneys suffer atrophy, the very organs that aid in survival. Atrophy of the myocardium results in poor contractility and diminished cardiac output; thus, rapid correction of malnutrition may cause fluid shifts and intravascular volume overload, which may precipitate congestive heart failure in that case. During such negative energy balance (starvation), the body's stores of electrolytes are diminished, and insulin levels in blood are low. However, plasma levels remain within the normal range due to compensatory mechanisms.

During treatment of SAM, electrolytes may become further disturbed, upon re-feeding; due to nutritional disequilibrium. This is a consequence of significant fluid shifts and electrolyte imbalances upon aggressive start of nutritional support; mostly, depletions in potassium, magnesium, phosphorus or zinc.

**Treatment**

If one is using milk feeds other than that based on WHO recommendation (see chapter six) e.g. FSS or MOF, then add the following and give **WITH FEEDS** for **2 weeks** (but don't give on an empty stomach).

**Potassium**

| Weight range (Kg) | Tab span-K TDS | Or potassium mixture (mL) |
|---|---|---|
| 3-5.9 | 0.5 | 5 |
| 6-9.0 | 1.0 | 10 |
| > 10 | 1.5 | 15 |

**Magnesium oxide**

40 mg twice daily (stop if constipation develops)

**Zinc**
10mg per day <6 months, 20mg per day >6 months

**Step 5: Infections and routine medications**

Children admitted with SAM 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 intramuscular (IM) or IV antibiotics, otherwise, give an oral antibiotic.

a. **Uncomplicated:** oral amoxicillin or septrin x 5-7 days
b. **Complicated:** ill-appearing, hypoglycemia, hypothermia, respiratory infection:
   - **1st line:** Crystalline (Benzyl) penicillin (or Ampicillin) PLUS gentamycin for 5-7 days
   - Crystalline penicillin IV may be changed to oral amoxicillin after 2 days if clinically stable
   - Use Flucloxacillin instead of crystalline penicillin if there are signs of skin sepsis or staph infection
   - **2nd line**: If child fails to improve in 48 hours change to ceftriaxone (50 mg/kg/day BD)

**Treat worms**
**No edema**: Albendazole (crushed/chewed) single dose
**Edema present**: Albendazole (crushed/chewed) daily for 3 days
**Treat thrush**
Nystatin 1 ml TID or Gentian Violet BD x 7 days, or;
Fluconazole PO 6 mg/kg day 1 then 3 mg/kg/day x 7 days
**Measles vaccine**
For >6 months to 9 months of age
**Other vaccines**
As needed prior to discharge

**Step 6: Correcting micronutrient deficiencies**

Feeds designed based on WHO recommendation such as F75, F100 and RUTF have sufficient electrolytes. Avoidance of additional micronutrients reduces potential toxicity associated with providing too much. If using other forms of feeds other than that developed based on WHO (see chapter six) e.g. FSS or MOF, then consider the following routine supplements:

**Vitamin A:**
**No eye signs of vitamin A deficiency:** Once on day 1
**IF eye signs of vitamin A deficiency or recent measles,** THEN give on days 1, 2, and 15 (even if they are using F75/100/RUTF)
**Dose:** <6 months 50,000IU; 6-12 months 100,000 IU; >12 months 200,000IU.
**Multivitamin**: 5 ml daily for 2 weeks
**Folic Acid** 5 mg day 1, then 1 mg daily for 2 weeks

**Step 7: Initial (phase 1) therapeutic feeding for SAM**

Feeding is as important as any other rescue treatment given to children with SAM. Non-edematous children with SAM maintain body protein breakdown that is often slowed in the edema group. This reduces supply of amino acids; result in decreased synthesis of plasma proteins that are well involved in transport of nutrients. Thus much care must be taken in deciding what and how to feed the two groups during inpatient treatment for SAM. The best starter feed is F75, because it has no excess load (see nutrient composition in appendix), thus, is just suitable in critical state. Therefore, F-75 therapeutic milk should be used in therapeutic feeding centers under medical supervision, and must never be given directly to family members or caregivers. There is no expected weight gain during treatment with F75, if it happens; it could be re-feeding, or excess fluid load resulting from rehydration upon misdiagnosis of diarrhea.

**Non-oedematous**
Start with F75 at 130mL/kg/day, 3 hourly feeds preferred as ≥ 4 hourly frequencies may risk hypoglycemia in the early hours of admission.

**Oedematous**
Starts at 100mL/kg/day, 2 hourly feeds preferred as ≥ 4 hourly frequencies may risk hypoglycemia in the early hours, plus, delaying resolution of edema. Step up to 130mL/kg/day as edema subsides and child's appetite is picking. An easy reference table showing a child's weight and an approximated F 75 volume summarized in appendix 4. Hyperosmolar recipes due to the excess of sugar can cause osmotic diarrhea, thus, F75 is by far the best starter feed when medical treatment for SAM is initiated.

**Feeding in context of HIV**
**Children with SAM who are HIV infected should be managed with the same therapeutic feeding approaches as children with SAM who are not HIV infected. Transition is the point at which HIV care should be started, unless an earlier need is considered more beneficial than the consequences. Children with SAM and are HIV infected and who qualify for lifelong ART should be started on ARV drug treatment as soon as possible after stabilization of metabolic complications and sepsis. This would be indicated by return of appetite and resolution of severe edema. HIV-infected children with SAM should be given the same ARV drug treatment regimens, in the same doses, as children with HIV who do not have SAM. HIV-infected children with SAM who are started on ARV drug treatment should be monitored closely in the first 6–8 weeks following initiation of the therapy, to identify early metabolic complications and opportunistic infections.**

**Feeding technique**
In children with SAM, expect slow muscles, including those associated with swallowing and taking down feeds. As a principle, feeding should be slow because vomiting and aspiration will occur, since muscle contractions are really poor. If the child cannot complete 3/4 of prescribed feeds, resort to using a NG tube. However, start by feeding orally, and put down the balance (rejected feed) through a NG tube. The child should be

on the mother's lap against her chest, with one arm behind her back. The child should never be force fed. The use of NG tube should not normally exceed three days and should only be used in Phase 1.

**Step 8: Catch up growth**

The feed, given during phase I, maintains life without putting further stress of growth as is with feeds designed to promote catchup growth, which include F100 and RUTF. Catch up growth (also called rehabilitation) is started gradually, in a stage referred to as transition. With its caloric density of 75 kcal per 100 ml of reconstituted milk, F-75 is not intended to make children put on weight, and its use should be limited to phase 1.

**Transition to RUTF**

Once children are stabilized, have appetite and reduced edema and are therefore ready to move into the rehabilitation phase, they should transition from F-75 to RUTF over 2–3 days, as tolerated. Most RUTFs are lipid-based pastes combining milk powder, electrolytes and micronutrients and offer the malnourished child the same nutrient intake as F-100. The recommended energy intake during this period is 100–135 kcal/kg/day. WHO (2013) did not give details on the optimal approach for achieving this, but rather that success may depend on the number and skills of staff available to supervise feeding and monitor the children during feeding.

Ready-to-use therapeutic food should therefore be introduced in carefully restricted amounts for several days. The most feasible options for transitioning children from F-75 to RUTF is to **start by testing the child's appetite on the RUTF**, based on body weight as indicated in the next table.

**Table 4: Appetite test chart**

| Weight of child (kg) | Has appetite if completes RUTF sachets (each sachet contains 92g of paste) |
|---|---|
| < 3.5 | 1/8 to 1/4 |
| 3.5 – 3.9 | |
| 4.0 – 5.4 | 1/4 to 1/3 |
| 5.5 – 6.9 | |
| 7.0 – 8.4 | 1/3 to 1/2 |
| 8.5 – 9.4 | |
| 9.5 – 10.4 | |
| 10.5 – 11.9 | More than half |
| 12.0 – 13.5 | |
| > 13.5 | |

Once there is an appetite (based on table 3 above), start feeding by giving RUTF. Let the child drink water freely. Since slow muscles, including those associated with swallowing and taking down feeds are expected of a child with complicated SAM, transition to RUTF should be gradual. In other words, replace one F75 feed by one, till such a time when the child can tolerate RUTF. See below for a quick guide.
Table 5:

| TRANSITIONING FROM F75 TO RUTF | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Feed 1 | Feed 2 | Feed 3 | Feed 4 | Feed 5 | Feed 6 | Feed 7 | Feed 8 |
| Day 1 | F75 | RUTF | F75 | F75 | F75 | F75 | F75 | F75 |
| If the child reacts negatively, stop RUTF, back to F75 and transition to F100 when reaction resolves, otherwise, continue to Day 2 and 3 | | | | | | | | |
| Day 2 | F75 | RUTF | F75 | RUTF | F75 | F75 | F75 | F75 |
| Day 3 | F75 | RUTF | F75 | RUTF | F75 | RUTF | F75 | F75 |
| If the child completes all RUTF of Day 3, use RUTF only thereafter, otherwise continue below | | | | | | | | |
| Day 4 | F75 | RUTF | F75 | RUTF | F75 | RUTF | F75 | F75 |
| Day 5 | F75 | RUTF | F75 | RUTF | RUTF | F75 | RUTF | F75 |
| Day 6 | F75 | RUTF | RUTF | RUTF | RUTF | F75 | RUTF | F75 |
| If the child completes all RUTF on day 6 or is so eager earlier, step up and withdraw F75 as would be the case below | | | | | | | | |
| Day 7 | RUTF | RUTF | RUTF | RUTF | RUTF | RUTF | RUTF | RUTF |

**Case study on transitioning from F75 to RUTF**

Review step 7 backwards on how much feeds were started during stabilization. For a child consuming 130mL/kg/day of F75 at that time, if completed, will be taking in 100Kcal/kg/day. It becomes easier and more tolerable for the child if the same energy content, but of RUTF, is given to the same child at the start transition. See column 2 of table 3 next.

For instance, a severely malnourished child without edema at 5 kg will have been consuming 130mL/kg/day of F75 = 650mL for the entire day. Given that the energy intake is based at 100Kcal/kg/day = 500Kcal. Since 1 sachet of RUTF = 520Kcal, this child of 5Kg will consume about a sachet at transition, if the child has an appetite. Based on the appetite test table 2, above, this very child will be considered to have an appetite if she/ he eats at least a quarter sachet RUTF, the first time it is given. NOTE: The 500Kcal is the total day's energy needs for the 5Kg child, whether this child consumes F75 alone, or RUTF alone or both while interchanging at meal times.

At start of transition, it may not be possible for a sick, severely malnourished child (even if medical conditions are under control), to eat RUTF alone, we are transiting from a liquid therapeutic food remember! Thus, spread the 1 sachet the 5Kg child is supposed to eat into, say, six or feeds/ meals [the number of meals remains the same here whether it is F75 or RUTF or even if the two are interchanged]. At first, replace only one of these six feeds with that one portion (from the spread you make) of RUTF. If the child tolerates it, replace two feeds of F75 the next day and continue replacing. At half way success of transiting, there will be better and faster results once RUTF and F75 are alternated at each feeding. Beware not to unnecessarily double the energy intake – thus, for a child who will be transited at 100 Kcal/ Kg/ day will receive 50 Kcal/ Kg/ day provided by RUTF and the other half from F75. This should be done over 2–3 days until the child takes the full requirement of RUTF. Once this is successfully achieved, step up RUTF to 150 Kcal/ kg/ day and increase to 200 Kcal/ kg/ day by discharge (next table).

**Table 5: RUTF dosing chart for transition during inpatient treatment of SAM**

| | Transition period | | Discharge |
|---|---|---|---|
| | Start at 100 Kcal/ kg/ day | Increase to 150 Kcal/ Kg/ day | 200 Kcal/ Kg/ day |
| Body weight (Kg) | = number of sachets per day | | |
| 3.0-3.4 | 0.6 | 0.9 | 1.3 |
| 3.5-3.9 | 0.8 | 1.0 | 1.5 |
| 4.0-5.4 | 1.0 | 1.2 | 2.0 |
| 5.5-6.9 | 1.3 | 1.6 | 2.5 |
| 7.0-8.4 | 1.5 | 2.0 | 3.0 |
| 8.5-9.4 | 1.8 | 2.5 | 3.5 |
| 9.5-10.4 | 2.0 | 2.7 | 4.0 |
| 10.5-11.9 | 2.3 | 3.0 | 4.5 |
| ≥ 12.0 | 2.5 | 3.5 | 5.0 |

**Transition to F100**

This happens for inpatient settings where F-100 is provided as the therapeutic food in the rehabilitation phase including for children that cannot tolerate RUTF or the ones depending on a NG tube but for who catch growth is required.

At the start of transition, both edema and non-edematous patients will have been feeding at 130mL/kg/day. Since the target is to rehabilitate the child at 200mL/kg/day, any increments during transition need be gradual aimed at that seal. An easy to refer to table showing the child' weight and F100 volume to give is summarized in appendix 7. In order to prevent relapse when these children are discharged back home, any one that is achieving rapid weight gain on F-100 should be changed to RUTF and observed that they accept the diet before being transferred to an outpatient programs.

**Step 9: Sensory stimulation**

Provide loving care, cheerful stimulating environment and involvement of the mother;
Provide toys for the child to play with or books to look at the surroundings;
Physical activity as soon as the child is well enough.

**Step 10: Monitoring progress and discharge criteria**

Children with SAM who are admitted to hospital can be transferred to outpatient care when their medical complications, including edema, are resolving and they have good appetite, and are clinically well and alert. However, move the child back to the initial feeding phase if edema worsens. Otherwise, plan to discharge all stable children that have a good appetite based:

a. Children with SAM should only be discharged from treatment when their:

— weight-for-height/length is ≥–2 Z-score and they have had no edema for at least 2 weeks, or

— MUAC is ≥12.5 cm and they have had no edema for at least 2 weeks.

b. The anthropometric indicator that is used to confirm SAM at admission should also be used to assess whether a child has reached nutritional recovery, i.e. if MUAC is used to identify that a child has SAM, then MUAC should be used to assess and confirm nutritional recovery. Similarly, if weight-for-height is used to identify that a child has

SAM, and then weight-for-height should be used to assess and confirm nutritional recovery.
c. Children admitted with only bilateral pitting edema should be discharged from treatment based on whichever anthropometric indicator, MUAC or weight-for-height that is routinely used.
d. Immunizations should be completed/ up to date

**NOTE**

- Percentage weight gain should no longer be used as a criterion for discharge from treatment, because just 15% target weight makes more than half of such children exceed 80% of the median value.
- While in outpatient programs, follow up should be regular to avoid relapse.

**Discharge nutrition messages**

- Start giving soft food while continuing with breast feeding when the child is 6 months old. If you do not know his age, start when he can roll over side to side or able to lift head and chest off the ground when lying on their tummy or sit with support and a straight back.
- Even if complementary feeding shall be introduced at 6 months of age with continued breastfeeding up to 2 years, encourage mothers to continue breastfeeding that child beyond the 2 years
- To enrich complementary foods with energy, add extra coconut cream, dipping or margarine to the child's food
- Feed the child small, many times, as many as 4-6 times a day
- To obtain adequate body building foods, feed the child on cooked and mashed peanuts, beans and animal foods such as fish every day
- Continue to breastfeed and give the child food s/he is sick and give extra food after sickness
- Remind a mother/ caretaker on routine vaccinations that may be at the nearest close date
- To contribute to maternal health, encourage mothers to eat more variety and extra food whenever pregnant or breastfeeding
- Talk about follow-ups preferably 1-2 weeks from discharge date

******** Family planning: discuss available methods ••••••**

**Step 11: Documentation and data capture during inpatient treatment for SAM**

Enter all the children eligible for inpatient treatment of SAM in the registration book. Each child should be assigned a unique code. If a child is new, capture enrolment information at the appropriate form in appendix. For each child, fill in an inpatient malnutrition daily record sheet to track progress. A child will either be captured as a transfer (from outpatient or inpatient); re-admission (after more than two consecutive days of absence from the ward or after previously being discharged as cured). Enter all the information for admission and discharge in the patient card. At admission, there is need to work out the required discharge target, unless the child has edema, in which case, it is worked after upon complete resolution. At the end of each month, fill in a monthly report for children with SAM. Refer to appendix for data collection tools. However, consider inpatient service for SAM a success, if death (mortality) rate is < 10%, defaulters < 15% and recovery > 75% for each month.

NOTE: If steps 1 to 11 are completed for a child admitted in hospital, they should be followed up in the outpatient program for treating SAM. This is to allow the child to receive medical and nutrition care for as long as it is needed; thus, preventing relapse. Outpatients program (next chapter) may not be considered for a child who attains full recovery from malnutrition while in the admitted in the hospital.

**Case studies on two children – one that gains full recovery from malnutrition while on the ward and another that is transferred to an outpatients program soon upon transition.**

**a. Discharge as 'cured' or out of danger to risks of SAM while in ITC**

Recall the child that was feeding on 130mL/kg/day of F75 in stabilization. That child was then transited to RUTF at 100Kcal/kg/day after passing an appetite test. Once gradual introduction of RUTF became a success, the child consumed RUTF alone as the source of nutrients (and no more F75). The 100 was stepped to 150 and then 200Kcal/kg/day (table 3) while still on the ward. Since we have two options to discharge i.e. weight-for-height/length is ≥–2 Z-score or MUAC is ≥12.5 cm (in either case, after edema is gone for at least 2 weeks). Use only one of the discharge options, say, at MUAC ≥12.5 cm. if this child reaches MUAC ≥12.5 cm, all medical complications have been treated and routine vaccines updated, the child is considered fully recovered from severe malnutrition, thus no need for RUTF. As this child remains at risk of relapse since the home environment remains the same, there is need to link them to the community programs (chapter four) for support.

**b. Discharge as 'transferred' to outpatients program**

Let's look at the very child that was feeding on 130mL/kg/day of F75 in stabilization. That child was then transited to RUTF at 100Kcal/kg/day after passing an appetite test. Once gradual introduction of RUTF became a success, the child consumed RUTF alone as the source of nutrients (and no more F75). The 100 was stepped to 150 and then 200Kcal/kg/day (table 3), while still on the ward. Since we have an option to transfer to outpatients program, if the child is clinically stable, there is no need to keep this child on the ward till the child either attains any of the options to discharge i.e. weight-for-height/length is ≥–2 Z-score or MUAC is ≥12.5 cm (in either case, after edema is gone for at least 2 weeks). This child can be transferred to outpatients program before that, even if the indices put this child in SAM (< - 3 SD or MUAC < 11.5 cm). The outpatients program will continue the nutrition rehabilitation until recovery from SAM.

Note: Both the two cases demonstrated above have left the ward; one as fully recovered, and another, as a transfer to outpatients' program for SAM.

**Summary definitions for data capture and reporting**

**New admission:** Patients directly admitted to the program to start the nutritional treatment. New admissions are recorded into three different columns:

*(B1) "Edematous patients" or Kwashiorkor patients*

(B2) *"Wasted patients" or Marasmic patients*

(B3) *"Others"*

**(B3) Others**: Patients clinically unwell with signs of malnutrition.
**(B4) Readmission after defaulting:** Patient that has defaulted from a nutritional therapeutic treatment and is re-admitted in your programme within less than two months. If patient returns after two months, it is a recorded as a new admission.
**(B5) Relapse**: Recurrence of signs and symptoms of malnutrition after a period of improvement /are cured.
**(B6) Transfer In:** Patients that have started the nutritional therapeutic treatment in a different site and is referred to your site to continue the treatment. This can be transfers from in-patient to out-patient or from out-patient to in-patient or transfers from one OTP/ITP to another OTP/ITP
**(B7) Non Responder:** Patient that has not reached the discharge criteria after forty days in the ITP or two months in the OTP due to nutritional deterioration.

**DISCHARGE**
**(D1) Cured**: Patients that has reached the discharge criteria
**(D2) Death:** Patient that has died while in the program. For the out-patient program, death to be confirmed by a home visit
**(D3) Defaulter:** Patient that is absent for two consecutive follow up visits for OTC.) confirmed by a home visit. For ITP patient that has absconded
**(D4) Medical Transfer:** Patient that is referred to a health facility/hospital for medical reasons and the referring health facility/hospital will not continue the nutritional treatment
**(F) Transfer out to In-patient Program:** Patient initially admitted in Out-patient program and is referred back to in-patient program for close follow up.
**(F) Transfer out to OTP:** Patient initially admitted in inpatient program and is referred to Outpatient program
**(G) Total end of the month:** Total beginning of the month (A) + Total admissions (C) – Total Discharges (E) – Transfer to ITP or OTP (F)

In summary:

**Inpatient admission Criteria**
Presence of edema
Or otherwise presence of any other medical complications with evidence of one or more or:-
MUAC < 11.5cm
Weight for Height Z-Score < -3SD
Weight for Age Z-Score <-3SD or <60% (last options)

**And one exits as a transfer to outpatient care if:-**

Clinically well, alert and with a good appetite
Otherwise discharge from treatment if:-
Clinically well, alert and good appetite AND
MUAC ≥12.5cm and no edema for at least 2 weeks or
Weight for Height/ Length ≥ -2SD and no edema for at least 2 weeks

## CHAPTER THREE: OUTPATIENT TREATMENT OF SAM

### Introduction

Development of RUTF has made outpatient management of children with SAM more feasible and safer, happening either in health facilities or in communities. However, what is described in this section considers that activities will be conducted at an existing health facility. In a later chapter on community involvement, other considerations will be made on how to operationalize outpatient treatment of SAM in communities.

Only children who develop SAM with medical complications require hospitalization. Admission for inpatient care may also be justified if there are significant mitigating circumstances such as disability or social issues, or there are difficulties with access to care. Any other child can then be treated at home if the parent or care-provider is able to give him or her RUTF. This arrangement allows children to be appropriately managed while avoiding the risk and problems of inpatient care, such as nosocomial infections, costs and disruptions to families. Children with SAM without bilateral pitting edema but who have no medical complications and have appetite should be managed as outpatients by providing appropriate amounts of RUTF. During this phase, it is preferred that the child comes once every week or fortnight to the local clinic for a check-up, and subsequent refill of RUTF, until recovery. If there are several staff members, then the outpatient clinic for SAM treatment can be run each day, otherwise, each site ought to make it clear on the day(s) of the week and the hours when the clinic is open and functioning, plus, the name and phone number of the person responsible.

### Step1: Identifying and diagnose SAM, then decide where to treat.

To identify and diagnose SAM, refer to the topic in earlier chapter in this guideline. However, as a principle, all newly diagnosed children are regarded as SAM for outpatient treatment if MUAC is <11.5 cm **or** weight-for-height <-3, with no medical complications, there is appetite and home circumstance should support treatment. Discuss the problem with parents/ caretakers and try to find reasons for malnutrition.

### Step 2: The outpatients' treatment process for SAM.

Transfer stable children with SAM treated as inpatients (case study b in step 11 of chapter two above) to outpatient care or otherwise newly diagnosed SAM patients without medical or IMCI complications. While it is possible to transfer children from inpatient to outpatient treatment of SAM, a decision to do so after the initial phase of stabilization should be guided primarily by the children's clinical condition, including appetite and response to treatment, and also social circumstances. Thereon, start the treatment appropriate for outpatients; conduct an appetite test, make prescription, counsel, and document and give prescriptions to use while at home. Go through the same procedure (a – d next) at every clinic appointment till recovery.

**a. Appetite test for outpatient treatment of SAM**

Without good appetite, home treatment cannot be practical, thus, is the most important criterion to decide if a patient should be sent for in or outpatient treatment of SAM. If

appetite test is passed, explain home care to the mother/caregiver and give IMCI treatment for the accompanying illness. Passing the appetite test is the main criterion for out-patient management. If appetite test is again failed, explain to the mother/caregiver of the dangers of taking the child home and encourage her to accept in-patient care, even if it were for a few days. Upon relaxation from travels and anthropometric measurements, the following should be done during appetite test:

Wash the hands of both the caretaker and the child;
Give the RUTF from the packet itself and water to drink freely in a cup;
Continue to gently encourage any shy or sad child who may refuse to eat the RUTF;
A child passes appetite based on the table content below. If less is consumed, appetite is poor, if more is consumed, and then appetite is very good.

**Table 7: Appetite test chart (similar to table 3)**

| Weight of child (kg) | Has appetite if completes RUTF sachets (each sachet contains 92g of paste) |
|---|---|
| < 3.5 | 1/8 to ¼ |
| 3.5 – 3.9 | |
| 4.0 – 5.4 | 1/4 to 1/3 |
| 5.5 – 6.9 | |
| 7.0 – 8.4 | 1/3 to ½ |
| 8.5 – 9.4 | |
| 9.5 – 10.4 | |
| 10.5 – 11.9 | More than half |
| 12.0 – 13.5 | |
| > 13.5 | |

**b. RUTF prescription/ dose during outpatient treatment of SAM**

RUTF is not for children less than six months old, these should be exclusively breastfed. Children with SAM who have diarrhea should receive zinc, in the same way as children who are not severely malnourished. However, children with SAM who are receiving RUTF that complies with the WHO specifications should not be given additional zinc supplements even if they have diarrhea, as these therapeutic foods contain at least the recommended amounts of zinc for management of diarrhea. RUTF prescriptions are based on a child's body weight as indicated in the table next. RUTF should be given in enough amounts (next table) to allow steady use until the next appointment.

**Table 8: RUTF dosing chart**

| Weight of Child (kg) | Packets per Day | Packets per 2-Week Supply | Packets at Discharge (1-Week Supply) |
|---|---|---|---|
| < 3.5 | Based on 200kcal/kg/day | Based on 200kcal/kg/day | Based on 200kcal/kg/day |
| 3.5 – 3.9 | 1.5 | 22 | 11 |
| 4.0 – 5.4 | 2.0 | 28 | 14 |
| 5.5 – 6.9 | 2.5 | 36 | 18 |
| 7.0 – 8.4 | 3.0 | 42 | 21 |
| 8.5 – 9.4 | 3.5 | 50 | 25 |
| 9.5 – 10.4 | 4.0 | 56 | 28 |
| 10.5 – 11.9 | 4.5 | 64 | 32 |
| 12.0 – 13.5 | 5.0 | 70 | 35 |
| > 13.5 | Based on 200kcal/kg/day | Based on 200kcal/kg/day | Based on 200kcal/kg/day |

**Important to know: specification of RUTF**

There are currently several commercial types of RUTF: Lipid based pastes and bars. Several countries are producing their own RUTF using the standard recipe so that these products that nutritionally equivalent to F100, and have been shown to be physiologically similar to both F100 and the commercial RUTFs. An important difference between F100 and RUTF is that RUTF (table 7) contains iron (in the correct amount for the recovering severely malnourished patient) whereas F100 used in the recovery phase requires iron supplementation. RUTF-paste is a ready-to-eat therapeutic spread usually presented in individual sachets or pots. It is composed of vegetable fat, peanut butter, skimmed milk powder, lactoserum, maltodextrin, sugar, and a mineral and vitamin complex.

*Instructions for use:* Clean drinking water must be made available to children during consumption of RUTF. It is contra-indicated for children who are allergic to cow's milk, proteins or peanuts and those with asthma or other allergic disease.

*Recommendations for use:* In in therapeutic feeding during the management of SAM, it is recommended to use the product in catch up growth phase.

*Storage of RUTF:* Some commercial RUTFs (such as Plumpy'nut®) have a shelf life of 24 months from manufacturing date. Locally produced RUTFs that are not packed under nitrogen in a sealed container have a shelf life of 3 to 6 months. Keep stored in a cool and dry place**.**

**Table 9: Mean nutritional value of RUTFs (based upon plumpy'nut®)**

| Nutrient | /100 g | /92 g | Nutrient | /100 g | /92 g |
|---|---|---|---|---|---|
| Energy (Kcal) | 545 | 500 | Vitamin A (µg) | 910 | 840 |
| Protein (g) | 13.6 | 12.5 | Vitamin D (µg) | 16 | 15 |
| Lipid (g) | 35.7 | 32.86 | Vitamin E (mg) | 20 | 18.4 |
| Calcium (mg) | 300 | 276 | Vitamin C (mg) | 53 | 49 |
| Phosphorus (mg) | 300 | 276 | Vitamin B1 (mg) | 0.6 | 0.55 |
| Potassium (mg) | 1111 | 1022 | Vitamin B2 (mg) | 1.8 | 1.66 |

| | | | | | |
|---|---|---|---|---|---|
| Magnesium (mg) | 92 | 84.6 | Vitamin B6 (mg) | 0.6 | 0.55 |
| Zinc (mg) | 14 | 12.9 | Vitamin B12 (µg) | 1.8 | 1.7 |
| Copper (mg) | 1.8 | 1.6 | Vitamin K (µg) | 21 | 19.3 |
| **Iron (mg)** | **11.5** | **10.6** | Biotin (µg) | 65 | 60 |
| Iodine (µg) | 100 | 92 | Folic acid (µg) | 210 | 193 |
| Selenium (µg) | 30 | 27.6 | Pantothenic acid (mg) | 3.1 | 2.85 |
| Sodium (mg) | <290 | < 267 | Niacin (mg) | 5.3 | 4.88 |

**c. Counselling**

- ✓ Explain to the mother/caretaker the outpatient treatment option and how SAM treatment will be organized and the purpose.
- ✓ Carefully explain the expectations and the way they should use the RUTF and attend all follow up clinics.
- ✓ For breast feeding children, state that breastfeeding should be continued and offered on demand.
- ✓ Emphasize that the malnourished child (for whom prescription is made) should consume RUTF steadily throughout the day and separate from usual food; the latter may have phytates which inhibit absorption of some of the already well balanced nutrients. Thus indicate that normal food does not contain the right amounts and balance of these nutrients needed to restore the child's nutritional status, but just a little can be given only after consumption of RUTF.
- ✓ Talk about how much a child should eat each day (this is given in the table above) adding that it contains all the ingredients that the patient needs to recover and is really like a special medicine to reverse malnutrition which should not shared by other members in the family.
- ✓ However, add that RUTF does not contain water, thus, a child should also be offered safe drinking water to drink at will.
- ✓ Remind mother/caretaker of the next follow up clinic, preferably weekly since excessive time between follow ups gives significantly worse results than weekly visits, but circumstances may differ for each set up.

**d. Routine medications**

Other relevant activities include systematic check for status on vaccination and other relevant routine supplementation or drug use and subsequent updates where necessary, based on the national protocol.

**Antibiotics**

Children with uncomplicated SAM, not requiring to be admitted and who are managed as outpatients, should be given a course of oral antibiotic such as amoxicillin. Children transferred from inpatient treatment of SAM; do not require a course of oral antibiotic during SAM treatment as outpatients, since the former will have already completed that while in hospital. Children who are undernourished but who do not have SAM should not routinely receive antibiotics unless they show signs of clinical infection.

**Micronutrients**

Additional micronutrients (iron, vitamins, potassium, magnesium or zinc, etc.) should not be given to the patients as this is such a "double dose", one coming from the diet

(RUTF) and the other prescribed, which is essentially toxic. However, a high dose (50 000 IU, 100 000 IU or 200 000 IU, depending on age) of vitamin A should be given to all children with SAM with recent measles on day 1, with a second and a third dose on day 2 and day 15 (or at discharge from the program), irrespective of the type of therapeutic food they are receiving. A similar consideration is restricted to inpatient use when there evidence of vitamin A deficiency. One dose of Folic acid (5mg) can be given to children with clinical anemia.

**Deworming;**

Follow the national protocol;

**Treating presenting infections;**

Follow the national protocol.

**Step 3: Follow ups in outpatient treatment of SAM**

In order to avoid relapse, children's progress is monitored during follow ups. Track the child's records based on the unique code assigned at enrolment. "Fast track" those obviously severely ill to in-patient treatment; do not keep them waiting. All others should be examined to determine presence of any complication using IMCI criteria. Routinely, take weight, MUAC and examine for edema. A child's length or height recorded at admission can be used as a reference, as any changes in this measurement may be too small to have a significant contribution.

Encourage mothers/ a caretaker whose children may not do well in the first week or two, it is common that the patient will probably not finish all the RUTF in the initial days of treatment. While many children will do well, a few may not. During follow ups, it is necessary to strictly identify any children that are failing-to-respond and the cause of failure investigated and managed. Children who fail to respond, but with a good appetite for RUTF, or who develop medical complications, should be assessed by an experienced health-care worker and referred for inpatient care. A child is considered failure-to-respond when:-

Either no or trivial weight gain after 5 weeks in SAM treatment
Any weight loss by the third week while in SAM treatment
Weight loss exceeding 5% of body weight at any time; if the same scale was used
Failure to reach discharge criteria after three months in the program
Absenteeism (defaulting) on two consecutive follow-up clinics. Distance and time the patients have to travel can be a major determinant of coverage, defaulting rate and reputation of the whole program. To avoid many of these challenges, link the patients to community programs (see chapter four). As there is no logic in transporting the child more than necessary, given PNG's rugged land scape, synchronize follow ups with any other patient reviews such as TB or ART services.

**Step 4: Recovery and discharge criteria from outpatient treatment of SAM**

The average length of the treatment is just five to six weeks, but a child may take up to three months in the program. The anthropometric indicator that is used to confirm SAM should also be used to assess whether a child has reached nutritional recovery, i.e. if MUAC is used to identify that a child has severe acute malnutrition, then MUAC should

be used to assess and confirm nutritional recovery. Children with SAM should only be discharged from treatment when their:
— weight-for-height/length is ≥–2 Z-score or
— MUAC is ≥12.5 cm
Inform mother/caretaker that there will not be further follow ups. Either of these will suffice, there is no value in using both except for research. In either case, the child is regarded as **'cured'**.

Other exits from outpatient treatment of SAM include a child who has '**died'** or one that is '**transferred'** into hospital care. The latter results from failed appetite at subsequent follow up; worsened or development of edema; failure to respond or development of diarrhea that can cause significant weight loss. A child whose home circumstances can no longer support home treatment is also eligible as a transfer for in-hospital treatment of SAM. There are circumstances when a child has not reached "cured" criteria after three months in treatment; consider as failure to respond. Let community support teams (chapter four) investigate the home environment as possible cause while a high level practitioner considers medical review.

**Step 5: Documentation and data capture**

Enter all the children eligible for admission to the program in the registration book. Each child should be assigned a unique code. If one is new, capture enrolment information, otherwise, update other information for each follow up visit. A child will either be captured as a transfer (from inpatient like case study b in step 11 of chapter two or other functional SAM treatment centers); clinic enrollment (newly diagnosed and fit for outpatient treatment) or re-admission (after more than two consecutive visits of absence or after previously being discharged as cured). Enter all the information for admission or follow up in the patient card. On admission, discharge target should be calculated worked out. At subsequent visits up to exit from the program, fill in the follow up details even if there was transfer in which case write on the chart of the patient the reason for the transfer. At the end of each month, fill in a monthly report for children with SAM. Refer to appendix for data collection tools. For each month, consider outpatient SAM treatment services a success if deaths (mortality) remain < 10%, defaulters < 15% and recovery > 75%.

**In summary:-**
Entry into the outpatient treatment for SAM, must ensure that the child does not have any medical complication and has:-
* Good appetite and any of
* MUAC < 11.5cm
* Weight for Height Z-Score < -3SD
* Weight for Age Z-Score <-3SD or <60% (Last Options)

Exit from the outpatient treatment for SAM considers:-
* MUAC ≥12.5cm
* Weight for Height/ Length ≥ -2SD

**Outcome indicators**

**Cure Rate:** Total number of patient recovered in the program /Total number of exits (Target = 75%)

**Death Rate:** Total number of patient died in the program /Total number of exits (Threshold = 10%)

**Defaulter Rate:** Total number of true defaulters in the program/Total number of exits (Threshold = 15%)

**Transfer out Rate:** Total number of patients transferred to another nutrition program/Total number of exits (Threshold = N/A)

**NOTE:**

All malnourished children must be attended to in order to prevent deterioration of children with MAM to SAM or development of threatening medical complications

## CHAPTER FOUR: IDENTIFYING AND MANAGING INFANTS WHO ARE LESS THAN 6 MONTHS OF AGE WITH SAM

### Introduction

Chapters two and three described treatment for children with SAM aged 6-59 months. However, SAM is increasingly being recognized in infants who are < 6 months of age. Yet, there are important physiological differences between young infants and older children that justify separate consideration of the management of SAM in this age group. Due to immature body systems compared with those of older children, this category may require modified management approaches or clinical interventions.
**Note:** All SAM children less than 6 months with or without medical complications must be managed in In-patient care for SMA

### Defining SAM in infants who are < 6 months of age

— weight-for-length less than –3 Z-score, or
— Presence of bilateral pitting edema
— And NOT by MUAC

### Deciding where to treat malnourished children < 6 months

Infants who are less than 6 months of age with SAM with or without any of the following complicating factors should be admitted for inpatient care:
a. any danger signs (standard treatment for common illnesses of children in PNG) or medical complication as outlined for infants 6 months of age or older with SAM in this guideline;
b. recent weight loss or failure to gain weight;
c. ineffective feeding (attachment, positioning and suckling) directly observed for 15–20 min, ideally in a supervised separated area;
d. any pitting edema;
e. any medical or social issue needing more detailed assessment or intensive support (e.g. disability, depression of the caregiver, or other adverse social circumstances).

### Medical treatment of malnourished children aged < 6 months

Infants who are less than 6 months of age with SAM should receive the same general medical care as infants with SAM who are 6 months of age or older:
a. infants with SAM who are admitted for inpatient care should be given parenteral antibiotics to treat possible sepsis and appropriate treatment for other medical complications such as TB, HIV, surgical conditions or disability;
b. infants with SAM who are not admitted should receive a course of broad-spectrum oral antibiotic, such as amoxicillin, in an appropriately weight-adjusted dose.

### Feeding approaches for infants who are less than 6 months of age with severe acute malnutrition

All children should be exclusively breastfed for the first 6 months of their life; thus, should be breastfed (as much as possible) and the mothers or female caregivers should be supported to breastfeed these infants. If an infant is not breastfed, support should be given to the mother or female caregiver to re-lactate. If this is not possible, wet nursing should be encouraged, but only if potential wet nurses are tested for HIV.
The infants should also be provided a supplementary feed. Supplementary suckling approaches should, where feasible, be prioritized.
— for infants with SAM but without edema, expressed breast milk should be given, and, where this is not possible, commercial (generic) infant formula or F-75 or diluted F-100 may be given, either alone or as the supplementary feed together with breast milk;
— for infants with SAM and edema, infant formula or F-75 should be given as a supplement to breast milk.
**Note:** Full strength F100 should NEVER be used for small infants or children less than 3kg. Unmodified powdered whole cow's milk should NOT be used either. The renal solute load is too high for this category of child and could provoke hypernatremia dehydration.

**How to prepare diluted F100**
Use 100 mL of F100 already prepared and add 35 mL of water, then you will get 135 mL of F100 diluted. Feed based on body weight (as shown in the table next) and discard any excess. As the infant's condition and appetite improve, step up feeds in increments of 5 mL.

**Table 10: Feeding volume for children < 6 months being treated for SAM**

| Baby weight (Kg) | Therapeutic feed (mL) for the 8 feeds/day plan |
|---|---|
| ≥ 1.2 | 20 |
| 1.3-1.5 | 21 |
| 1.6-1.7 | 26 |
| 1.8-2.1 | 30 |
| 2.2-2.4 | 35 |
| 2.5-2.7 | 40 |
| 2.8-2.9 | 45.5 |
| 3.0-3.4 | 48 |
| 3.5-3.9 | 57 |
| 4.0-4.4 | 65 |

**When breastfeeding is possible**
Because "the recovery is due to breast milk", support the practice as much as possible.
Ask the mother to breast-feed every 3 hours for at least 20 minutes, more often if the infant cries or seems to want more. Since the aim is to give breast milk, any mother that had stopped breastfeeding should be supported to re-lactate.

**Re-lactation**

Re-lactation can be a reality through supplementary suckling technique. Use a tube the same size as n°8 NGT (a n°5 tube can be used and is better for the infant, but the milk should be strained through cotton wool to remove any small particles that block the tube).

- Put the appropriate amount of the feed in a cup and hold it.
- Put the end of the tube in the cup, while the other tip of the tube on the breast at the nipple.
- The mother offers the breast in the usual way.
- When the infant suckles on the breast, with the tube in his/ her mouth, the milk from the cup is sucked up through the tube and taken by the infant. It is like taking a drink through a straw.
- At start, the mother needs help to support/ hold the cup, while keeping one tube end in the cup and another on the breast.
- The cup can be as close to the nipple so the cup feed can be taken with little effort by such a weak infant. Placing the cup above the level of the nipple can cause quick flow of the feed into the infant's mouth.
- With time and confidence, the cup can be lowered progressively and with much more confidence, the mother is able to hold the cup and tube without assistance.
- A peer mother that has succeeded in using the technique successfully can assist; in fact, more helpful if all this is done in a group of all mothers that are re-lactating.
- If the baby gains weight yet the supplement milk feed is the same amount, it is a sign that breast milk flow is good, be sure to rule out edema.
- If breast milk is the reason for weight gain, reduce the amount of the cup feed that is given at each meal. Reduce it by the amount not taken.

If there is no realistic prospect of being breastfed, infants with SAM should be given appropriate and adequate replacement feeds such as commercial (generic) infant formula, with relevant support to enable safe preparation and use, including at home (when discharged). NOTE: Assessment of the physical and mental health status of mothers or caregivers should be promoted and relevant treatment or support provided. Link all such mothers to women support groups and breastfeeding clinics such as Susu Mamas.

**Feeding infants in context of HIV:**

Refer to the **Policy for IYCF in PNG, Policy 11 "**Exclusive breast feeding for the first six months followed by introduction of nutritionally adequate complementary foods from 6 months with continued breastfeeding for up to 24 months shall be encouraged to all infants and young children exposed to HIV/AIDS".

**Discharge from inpatient care**

Infants who are less than 6 months of age and have been admitted to inpatient care can be discharged when:
a. all clinical conditions or medical complications, including edema, are resolved, and
b. the infant has good appetite, is clinically well and alert, and
c. weight gain on either exclusive breastfeeding or replacement feeding is satisfactory, e.g. above the median of the WHO growth velocity standards or more than 5 g/kg/day for at least 3 successive days, and
d. the infant has been checked for immunizations and other routine interventions, and
e. the mothers or caregivers are linked with needed community-based follow-up and support.
Give follow up appointments to establish child's progress.

**Discharge from all care**

Infants who are less than 6 months of age can be discharged from all care when they:
a. are breastfeeding effectively or feeding well with replacement feeds, and
b. have adequate weight gain, and
c. has a weight-for-length ≥–2 Z-score.

## CHAPTER FIVE: COMMUNITY INVOLVEMENT

### Introduction:

Malnutrition starts when children are in their home environments. You may recall (causes) that inadequate food intake and disease, spark off this problem. But these two, have underlying causes, ranging from not having enough and appropriate food for children, poor care for such children and mothers and poor environment. Since the underlying problems are within the family and where they live, the community has a very big role to play, both to prevent, but also in early identification of such children and taking quick action.

In order to achieve early identification of children with acute malnutrition, community approach to management of acute malnutrition should be effected. Here, trained community health workers, Village Health Volunteer (VHVs)s and community members should measure the MUAC of infants and children who are 6–59 months of age and examine them for bilateral pitting edema at every opportunity.

Community approach to managing malnutrition ensures integration of nutrition care services into the ongoing health care services at all levels and health care packages (mobile clinics, foot patrols, community outreaches) at health facility level linking up with community (house to house community gatherings, churches etc. ) screening and referral, follow up and sensitization services.

All Infants and children who are 6–59 months of age and have a MUAC <11.5 cm (Red MUAC), or who have any degree of bilateral edema should be immediately referred for full assessment at a treatment center for the treatment of SAM. Likewise those have MUAC of 11.5 to <12.5 cm (Yellow MUAC) should be referred for full assessment for MAM management and care services.

There are on-going efforts by government to institute village health volunteers (VHVs) or community based attendants (CBAs); all at the grass root level. Thus, treatment of SAM through linking communities to health services should be more effective and efficient if greater effort is made to strengthen the partnership between national and sub-national governments and these non-government service providers including but not limited to NGOs and churches. This guideline will refer to these as community.

### Why should the community be involved?

- For active case-finding through screening with the MUAC tape, and timely referring to hospital for all children determined in a red and yellow MUAC zone and any that are sick. This is intended to reduce mortality and other adverse outcomes since the child will be identified earlier than not, and most likely the condition can be reversed. On a whole, if a child is identified early, there is avoidance of unnecessary hospitalization and exposure to nosocomial infections of children for those who do not need hospitalization, consequently reduces treatment costs.

- Home follow ups for all children who are not responding to treatment; those whose caretakers have refused admission to the in-patient facility; and children who do not return for appointments (to determine if they have moved away, defaulted or died).
- Support community members on nutrition awareness/ sensitization; here key health and nutrition messages are delivered and guidance offered to community members on when and where to access appropriate services.
- The approach makes treatment of SAM a public health intervention, and this would definitely strengthen the rural health system in PNG.

**How can community approach to managing malnutrition be effected?**

1) Through IMAM approach management of acute malnutrition services should be decentralized to lower levels of health service care (sub health centers, community posts, urban clinics, Aid posts and clinic posts ) and then linked to communities through Village Health Volunteers , community members and other community-level structures/organizations.

2) Having extended nutrition care services to lower service centers, integrate nutrition care services (screening for malnutrition, referral, management and prevention) into the routine health care service across all health care service delivery packages (community outreaches, mobile clinics, foot patrol etc.) then link up to communities as explained in the steps below:

**Key steps to Community approach to managing acute malnutrition/Community involvement**

**Step 1: Community assessment**

This is helps in determining bottlenecks to service access and uptake. As a result, the following shall therefore be established:

- Key community leaders, persons, role models, influential people and CBO/Organizations (church, NGO or government) will be identified to help on community understanding and sensitization about the problem and program.

- The existing community based structures that are functional and can help e.g VHVs, Women support groups, local NGOs that offer community work and link up with them for joint planning and implementation. Any health and nutrition related interventions shall be identified for easier integration.

- Social and cultural factors related to nutrition such as malnutrition being related to sorcery etc. as well as other practices that may affect services like health seeking behaviours

- The different channels of communication that could help effectively in these communities

**Step 2: Develop messages, materials and plans**

Based on the assessment results, messages to address bottlenecks and create awareness on services availability, good practices including key nutrition messages shall be developed to address malnutrition at community level. These include pamphlets, local radios, posters etc.

**Step 3: Community sensitization**

Discuss the problem at community level through focus group discussions, local radios, community level meetings and other means of communication to create awareness

Discuss and negotiate on the adoption of IMAM as an approach to management of acute malnutrition agreeing on what specified community members are expected of as their roles in IMAM. Continue this to always address any upcoming challenges

**Step 4: Community Training**

Districts (DHOs and their counsels) and LLD health teams members /leaders should then ensure that the identified VHVs are trained on identification, referral, follow up and health and nutrition information dissemination.

**Step 5: Implementation of community approach to managing malnutrition**

- Active case finding and referral

This is done by the trained VHVs within their village catch mate areas (house to house, community meetings, at church, outreach programs and at any opportunity) and by Health workers during mobile clinics, foot patrol and community outreaches.

The importance of this is to identify and refer children with acute malnutrition to treatment centres before the onset of medical complications (life threatening)

- **Follow up of patients with acute malnutrition**

Children with malnutrition are at a higher risk of developing diseases and death. Follow up is to ensure monitoring of their progress as well as effective utilization of their treatment/therapeutic feeds. This must be collaboration between health facilities and communities (VHVs, community leaders, community based organizations etc.); while VHVs conduct home visits to follow up all acutely malnourished children in their communities including the defaulters and giving feedback to the health care service providers at health facilities, health care service providers at health facilities inform the community (VHVs, community leaders, community based organizations etc.) on defaulter cases, non-respondents, new admissions etc who require follow up.

Acutely malnourished children after recovery or even during treatment should be linked up to existing livelihood programs too.

**Step 6: On-going community sensitization and supervision**

Health facility community officers in charge, district and LLG health leaders should ensure involvement of community members and leaders/VHVs in their quarterly meetings to discuss and understand the IMAM program progress and have joint solutions to the problems limiting the impact of the program which promotes community ownership.

**Step 7: Recording and reporting**

Using the existing data collection tools (registers, tally sheets and report summaries) of VHVs, the VHVs will record all the cases screened for malnutrition, identified with malnutrition, referred for nutrition services, followed up, and sessions held with community members on key nutrition messages. These will be submitted to the VHV nearest health facility (sub health centre), then to the district and district to the province (FHPC).

At start, it is useful to work with such non-state actors that are willing to partner in the fight against acute malnutrition. However, there is need for regular mapping since new players may come or even old ones change their core objectives, in which case, acute malnutrition treatment advocacy will be required so the zeal is not dropped. This can happen especially when charitable support to non-stage agencies starts to dwindle – definitely resulting in loss of revenue. In the interim (2014), a list (not fully exhausted) of non-state service providers/ stakeholders (the NGOs and churches) within PNG is provided next.

- Ameture Haus with our lady of The Sacred Heart
- Anglicare (e.g. Wabag, Hagen)
- Buk Bilong Pikinini (a group that speaks to the child and mother in Goroka, POM)
- Bismarck Ramu Group
- Care international
- Catholic Health Services
- Child Fund PNG
- Children's foundation
- Christian Health Service of PNG
- Clinton Health Access Initiative (CHAI) (e.g. in Hagen, Mendi)
- Family Health International (FHI) (e.g. in Madang, Vanimo)
- Family voices (e.g. in Goroka)
- Foundation for People and Community Development
- Habibat for Humanity
- Interchurch Organization for Development Cooperation
- Liap family (e.g. in Manus)
- Live and learn (found in Kimbe)
- Marie stops
- Médecins Sans Frontières (MSF) (e.g. in Tari)
- Melanesia Organizational Development
- National volunteer service
- Oil search (e.g. in Tari)
- Oxfarm
- PNG Bible Church Health Services
- Salvation Army
- Save the children
- Susu Mamas (in Hagen, POM, Goroka and Lae)
- Voluntary Service Overseas (VSO) in Madang
- Welfare Foundation (e.g. in Manus)
- World Vision International (in Bougainville)
- World Wide Fund for Nature

## CHAPTER SIX: ALTERNATIVE FEEDS OTHER THAN WHO FORMULAE (F75, F100, RUTF AND ReSoMal)

### Introduction

Formulae designed based on WHO recommendations provides better outcomes for inpatient treatment of SAM. Thus, it is important not use inappropriate recipes, especially at the start of inpatient treatment of SAM. In the absence of F75, hyperosmolar recipes due to the excess of sugar can cause osmotic diarrhea. Similarly, inappropriate levels of micronutrients can cause electrolyte imbalance. To alleviate this problem, some recipes have been designed.

### USING DRIED WHOLE MILK

FSS ≃ F75

| | |
|---|---|
| Dried whole milk: | 35 g |
| Sugar: | 100 g |
| Vegetable oil: | 20 g |
| CMV: | 1 scoop |
| Water to make: | 1000 mL |

MOF ≃ F100

| | |
|---|---|
| Dried whole milk: | 110 g |
| Sugar: | 50 g |
| Vegetable oil: | 30 g |
| CMV: | 1 scoop |
| Water to make: | 1000 mL |

**Preparation**

For best results, mixing the dry ingredients and adding them to a little water works BETTER THAN having water added to powder. Once the paste is made, then more water can be added slowly till 1 L mark.

### USING FRESH COW'S MILK

PREPARING F 75

| | |
|---|---|
| MEASURE: | 300 mL boiled hot milk |
| OIL: | 20 g = (2 level table spoons) |
| SUGAR: | 100 g = (10 level table spoons) |
| CMV: | 1 scoop sealed inside the CMV tin |
| WATER: | Hot water to make up to a litter |

PREPARING F 100

| | |
|---|---|
| MEASURE: | 880 mL boiled hot milk |
| OIL: | 20 g = (2 level table spoons) |
| SUGAR: | 75 g = (7.5 level table spoons) |

CMV: 1 scoop sealed inside the CMV tin
WATER: Hot water to make up to a litter

**Preparation**
Boil water
Boil milk
Measure sugar, vegetable oil, CMV, then add together in a jug. Whisk the three ingredients thoroughly
Add the boiled milk and continue to whisk; finally add water to make up to 1 liter.
NB. Reconstituted feeds should be used within 2 hours.

### Half-strength standard WHO low-osmolarity ORS

Dissolve one sachet of standard ORS in 2 L water (instead of 1 L)
Add 1 level scoop of commercially available CMV mix
Add and dissolve 50 g of sugar.

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## APPENDICES

### 1. Acronyms

| | |
|---|---|
| AIDs | Acquired immune deficiency syndrome |
| ART | Antiretroviral therapy |
| ARV | Antiretroviral |
| CBA | Community Based Attendant |
| CHW | Community Health Worker |
| CMV | Combined minerals and vitamins |
| CXR | Chest X-ray |
| FBC | Full blood count |
| FSS | Full strength sunshine |
| GAM | Global Acute Malnutrition |
| HIV | Human Immunodeficiency Virus |
| IMCI | Integrated Management of Childhood Illnesses |
| IV | Intra venous |
| IYCF | Infant and Young Child Feeding |
| LFT | Liver function test |
| MAM | Moderate Acute Malnutrition |
| MOF | Milk oil formula |
| MUAC | Mid-upper Arm Circumference |
| NG | Nasogastric |
| NGO | Non-Governmental Organization |
| ORS | Oral rehydration solution |
| OTC | Outpatient Therapeutic Care |
| PNG | Papua New Guinea |
| ReSoMal | Rehydration solution for malnutrition |
| RUTF | Ready to Use Therapeutic Food |
| RUTF | Ready-to-use therapeutic food |
| SAM | Severe acute malnutrition |
| TB | Tuberculosis |
| U&C | Urinalysis and culture |
| U&E | Urea and electrolytes (U&E) |
| VHV | Village Health Volunteer |
| W/H | Weight for Height |
| W/L | Weight for length |
| WHO | World Health Organisation |

## 2. Definition of terms

**Below are operational definitions that could be used when reporting the monthly statistics for management of severe acute malnutrition**

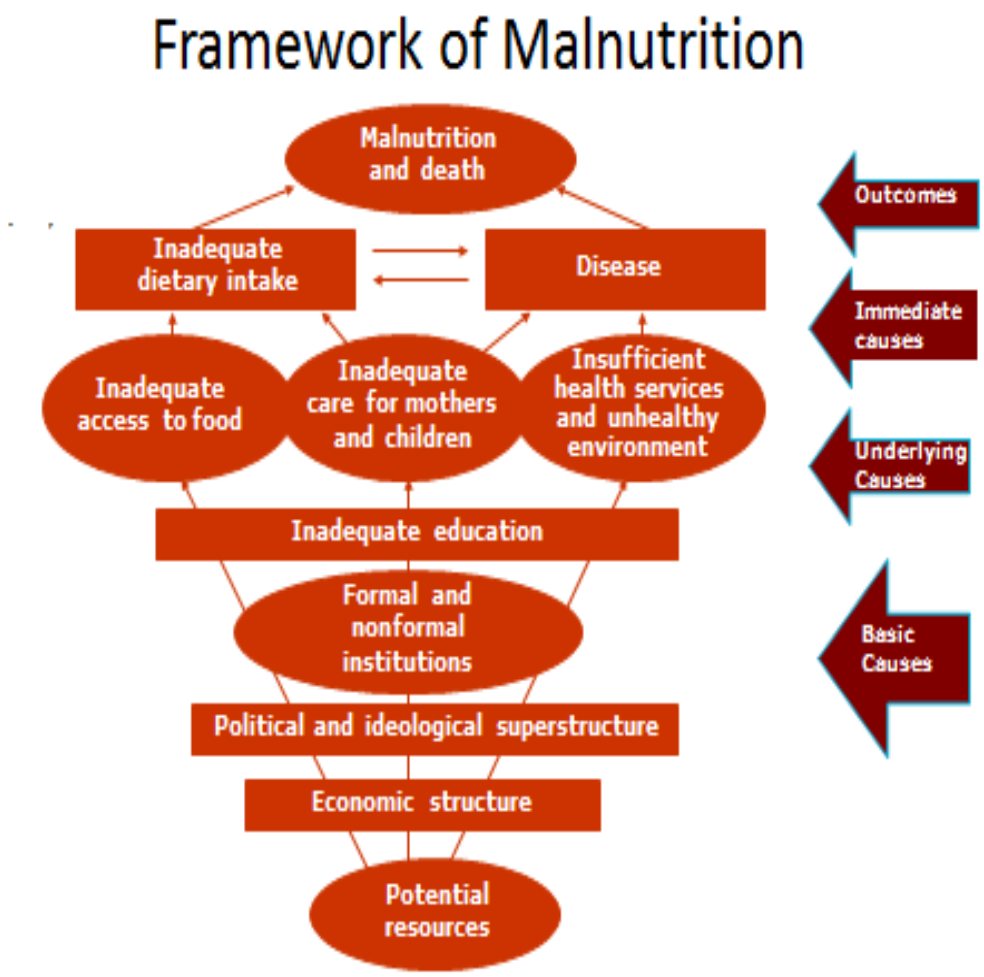
| Terminology | definition |
|---|---|
| New admission* | A new admission is defined as a patient with SAM who has not been under treatment elsewhere for this episode of SAM |
| Readmission after defaulting | Patient that has defaulted from a nutritional therapeutic treatment and is re-admitted in your programme within less than two months. If patient returns after two months, it is a recorded as a new admission. |
| Relapse | Recurrence of signs and symptoms of malnutrition after a period of improvement /are cured. |
| Transfer In | Patients that have started the nutritional therapeutic treatment in a different site and is referred to your site to continue the treatment. This can be transfers from in-patient to out-patient or from out-patient to in-patient or transfers from one OTP/ITP to another OTP/ITP |
| Cure | Cure is defined as a patient reaching the criteria for discharge |
| Death | Patient that has died while in treatment for SAM. For the out-patient program, death to be confirmed by a home visit. |
| Defaulter | Patient that is absent for two consecutive appointments (for Out patients) as confirmed by a home visit. For ITP patient that has absconded. |
| Medical transfer | Patient that is referred to a health facility/ hospital for medical reasons and the referring health facility/ hospital will not continue the nutritional treatment. |
| Length of stay | The length of stay is defined as the time from admission to the time of exit. |
| Exit | An exit is defined as a patient leaving a facility regardless of condition |
| Discharge | A patient, who leaves the SAM treatment program because they are cured, died, defaulted, or medically referred. Any other reasons to leave are lamped under exit. |
| Non-Response | A patient who fulfils the criteria for SAM as is set out in the SAM treatment guidelines, however, fails to respond to all treatment (both inpatient and outpatient) after keeping in the program for 3 months |
| A volunteer | A person living within the community itself who is willing to spend time providing services to their neighbors without formal employment or pay. Compensation, if any, can be given in kind or/and with regular training. |

* **New admission:** Patients directly admitted to the program to start the nutritional treatment. New admissions are recorded into three different columns:

*(B1) "Edematous patients" or Kwashiorkor patients*

(B2) *"Wasted patients" or Marasmic patients*

(B3) *"Others"* Patients clinically unwell with signs of malnutrition.




## Physiological Systems of concern

- Cardiovascular
- Gastrointestinal System
- Genitourinary System
- Immune
- Liver
- Cellular function
- Circulatory/Temperature regulation
- Skin, muscles, glands

## Cardiovascular System

Effects:

- ↓ cardiac output and stroke volume
- ↓ blood pressure
- ↓ renal perfusion

Concerns:

- An increase in blood volume can produce acute heart failure
- A further decrease in blood volume will compromise tissue perfusion

**Cardiac failure** may result because:

✓ In starvation, secretion of insulin is decreased

→ Due to reduced intake of carbohydrates, thus, Fat & protein stores are catabolised for energy

✓ Result: intracellular electrolytes loss e.g. Phosphate

✓ Depletion despite normal serum concentrations

**Once feeding resumes:**

✓ Sudden shift from fat to carbohydrate metabolism

✓ Secretion of insulin increases

✓ P uptake goes up – hypophosphatemia occurs

✓ P-dependent organs (e.g. heart) fail

## Gastrointestinal System

Effects:

- ↓ production of gastric acid
- ↓ intestinal motility
- ↓ production of digestive enzymes secondary to pancreatic atrophy
- ↓ secretion of digestive enzymes secondary to small intestinal mucosa atrophy
- ↓ absorption of nutrients when large amounts of food ingested

GI implication

- Sugar break down process is very slow
- Hormones have problems
- Receptors are irresponsive
- Nutrient intolerances happen
- Resulting in loose motions

## Genitourinary System

Effects:

- ↓ glomerular filtration
- ↓ ability for renal excretion of acid or water load
- ↓ sodium excretion; faulty Na+ pump
- ↓ urinary phosphate output
- ↑ incidence of UTI

## Genitourinary System continues

Concerns:

- Faulty Na+ pump causes a problem in absorption of anything that should cross cell membranes; both nutrients & drugs
- A large protein load may not be well tolerated by kidneys
- Further protein deprivation will lead to continued tissue breakdown; need specially designed feeds
- Inability for renal excretion of acid or water load

## Immune System

Effects:

- ↓ cell-mediated immunity
- ↓ secretion of serum IgA
- ↓ efficacy of phagocytes
- Atrophy of lymph glands, tonsils & thymus
- ↓ inflammatory response & migration of white cells to areas of tissue damage

Concerns:

- Typical signs of infection (↑ WBC count, fever) may be absent
- Lack energy to mount immune response (vaccines???)
- Lack essential a.a, the building blocks
- Hypoglycemia & hypothermia can be signs of severe infection

## Liver

Effects:

- ↓ synthesis of all proteins
- ↓ bile secretion
- ↓ ability of liver to take up, metabolize, and excrete toxins
- ↓ gluconeogenesis
- ↓ transferrin levels
- Fatty liver common in children with edema

Concerns:

- Risk of hypoglycemia is high, particularly with infection
- Protein intake should be about 1-2 g/kg/day so as to support synthesis of proteins but not to exceed metabolic capacity of liver
- Reduce dosage of meds that are dependent on hepatic metabolism
- Ensure sufficient carbohydrate intake to avoid need for gluconeogenesis
- **Do not give iron supplements**

## Cellular Function

Effects:

- ↓ synthesis of proteins
- ↓ activity of sodium pump
- ↑ permeability of cell membranes = leaky system

Concerns:

- **increase in intracellular sodium**
- **decrease in intracellular potassium & magnesium**

## Cellular Function continues

Concerns:

- **increase in intracellular sodium**
- **decrease in intracellular potassium & magnesium**

✓F75 starter feed during SAM management is designed to correct this imbalance
✓is low at sodium
✓Is low at proteins
✓Is high at potassium and magnesium

**Assists to resolve edema, without causing further stress since doesn't support ctach up growth**

### Circulatory System & Temperature Regulation

Effects:

- Heat generation as well as heat loss are impaired
- ↓ energy expenditure and basic metabolic rate

Concerns:

- Child becomes hypothermic in cold environment & hyperthermic in hot environment
- Children with skin lesions unable to sweat, may cause them high temperature!

### Skin, Muscles, Glands

Effects:

- Skin & subcutaneous fat are atrophied
- Atrophy of sweat, tear & salivary glands
- Respiratory muscles are fatigued easily
- Swallowing muscles too weak

**Concerns**

- children will vomit, have gas, aspirate, etc.; need supervised feeding

## 4. Weight for height table (WHO$_{2006}$)

| Use for both boys and girls | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Length | *Weight Kg – Z-score* | | | | | | Length | *Weight Kg – Z-score* | | | | | |
| cm | *-4.0* | *-3* | *-2* | *-1.5* | *-1* | *0* | cm | *-4.0* | *-3* | *-2* | *-1.5* | *-1* | *0* |
| Use Length for less than 87 cm | | | | | | | | | | | | | |
| **45** | 1.73 | **1.88** | 2.04 | **2.13** | 2.23 | 2.44 | **66** | 5.5 | **5.9** | 6.4 | **6.7** | 6.9 | 7.5 |
| **45.5** | 1.79 | **1.94** | 2.11 | **2.21** | 2.31 | 2.52 | **66.5** | 5.6 | **6** | 6.5 | **6.8** | 7 | 7.6 |
| **46** | 1.85 | **2.01** | 2.18 | **2.28** | 2.38 | 2.61 | **67** | 5.7 | **6.1** | 6.6 | **6.9** | 7.1 | 7.7 |
| **46.5** | 1.91 | **2.07** | 2.26 | **2.36** | 2.46 | 2.69 | **67.5** | 5.8 | **6.2** | 6.7 | **7** | 7.2 | 7.9 |
| **47** | 1.97 | **2.14** | 2.33 | **2.43** | 2.54 | 2.78 | **68** | 5.8 | **6.3** | 6.8 | **7.1** | 7.3 | 8 |
| **47.5** | 2.04 | **2.21** | 2.40 | **2.51** | 2.62 | 2.86 | **68.5** | 5.9 | **6.4** | 6.9 | **7.2** | 7.5 | 8.1 |
| **48** | 2.10 | **2.28** | 2.48 | **2.58** | 2.70 | 2.95 | **69** | 6.0 | **6.5** | 7 | **7.3** | 7.6 | 8.2 |
| **48.5** | 2.17 | **2.35** | 2.55 | **2.66** | 2.78 | 3.04 | **69.5** | 6.1 | **6.6** | 7.1 | **7.4** | 7.7 | 8.3 |
| **49** | 2.23 | **2.42** | 2.63 | **2.75** | 2.87 | 3.13 | **70** | 6.2 | **6.6** | 7.2 | **7.5** | 7.8 | 8.4 |
| **49.5** | 2.31 | **2.50** | 2.71 | **2.83** | 2.96 | 3.23 | **70.5** | 6.3 | **6.7** | 7.3 | **7.6** | 7.9 | 8.5 |
| **50** | 2.38 | **2.58** | 2.80 | **2.92** | 3.05 | 3.33 | **71** | 6.3 | **6.8** | 7.4 | **7.7** | 8 | 8.6 |
| **50.5** | 2.46 | **2.66** | 2.89 | **3.01** | 3.14 | 3.43 | **71.5** | 6.4 | **6.9** | 7.5 | **7.8** | 8.1 | 8.8 |
| **51** | 2.54 | **2.75** | 2.98 | **3.11** | 3.24 | 3.54 | **72** | 6.5 | **7** | 7.6 | **7.9** | 8.2 | 8.9 |
| **51.5** | 2.62 | **2.83** | 3.08 | **3.21** | 3.34 | 3.65 | **72.5** | 6.6 | **7.1** | 7.6 | **8** | 8.3 | 9 |
| **52** | 2.70 | **2.93** | 3.17 | **3.31** | 3.45 | 3.76 | **73** | 6.6 | **7.2** | 7.7 | **8** | 8.4 | 9.1 |
| **52.5** | 2.79 | **3.02** | 3.28 | **3.41** | 3.56 | 3.88 | **73.5** | 6.7 | **7.2** | 7.8 | **8.1** | 8.5 | 9.2 |
| **53** | 2.88 | **3.12** | 3.38 | **3.53** | 3.68 | 4.01 | **74** | 6.8 | **7.3** | 7.9 | **8.2** | 8.6 | 9.3 |
| **53.5** | 2.98 | **3.22** | 3.49 | **3.64** | 3.80 | 4.14 | **74.5** | 6.9 | **7.4** | 8 | **8.3** | 8.7 | 9.4 |
| **54** | 3.08 | **3.33** | 3.61 | **3.76** | 3.92 | 4.27 | **75** | 6.9 | **7.5** | 8.1 | **8.4** | 8.8 | 9.5 |
| **54.5** | 3.18 | **3.55** | 3.85 | **4.01** | 4.18 | 4.55 | **75.5** | 7.0 | **7.6** | 8.2 | **8.5** | 8.8 | 9.6 |
| **55** | 3.29 | **3.67** | 3.97 | **4.14** | 4.31 | 4.69 | **76** | 7.1 | **7.6** | 8.3 | **8.6** | 8.9 | 9.7 |
| **55.5** | 3.39 | **3.78** | 4.10 | **4.26** | 4.44 | 4.83 | **76.5** | 7.2 | **7.7** | 8.3 | **8.7** | 9 | 9.8 |
| **56** | 3.50 | **3.90** | 4.22 | **4.40** | 4.58 | 4.98 | **77** | 7.2 | **7.8** | 8.4 | **8.8** | 9.1 | 9.9 |
| **56.5** | 3.61 | **4.02** | 4.35 | **4.53** | 4.71 | 5.13 | **77.5** | 7.3 | **7.9** | 8.5 | **8.8** | 9.2 | 10 |
| **57** | 3.7 | **4** | 4.3 | **4.5** | 4.7 | 5.1 | **78** | 7.4 | **7.9** | 8.6 | **8.9** | 9.3 | 10.1 |
| **57.5** | 3.8 | **4.1** | 4.5 | **4.7** | 4.9 | 5.3 | **78.5** | 7.4 | **8** | 8.7 | **9** | 9.4 | 10.2 |
| **58** | 3.9 | **4.3** | 4.6 | **4.8** | 5 | 5.4 | **79** | 7.5 | **8.1** | 8.7 | **9.1** | 9.5 | 10.3 |
| **58.5** | 4.0 | **4.4** | 4.7 | **4.9** | 5.1 | 5.6 | **79.5** | 7.6 | **8.2** | 8.8 | **9.2** | 9.5 | 10.4 |
| **59** | 4.2 | **4.5** | 4.8 | **5** | 5.3 | 5.7 | **80** | 7.6 | **8.2** | 8.9 | **9.2** | 9.6 | 10.4 |
| **59.5** | 4.3 | **4.6** | 5 | **5.2** | 5.4 | 5.9 | **80.5** | 7.7 | **8.3** | 9 | **9.3** | 9.7 | 10.5 |
| **60** | 4.4 | **4.7** | 5.1 | **5.3** | 5.5 | 6 | **81** | 7.8 | **8.4** | 9.1 | **9.4** | 9.8 | 10.6 |
| **60.5** | 4.5 | **4.8** | 5.2 | **5.4** | 5.6 | 6.1 | **81.5** | 7.8 | **8.5** | 9.1 | **9.5** | 9.9 | 10.7 |
| **61** | 4.6 | **4.9** | 5.3 | **5.5** | 5.8 | 6.3 | **82** | 7.9 | **8.5** | 9.2 | **9.6** | 10 | 10.8 |
| **61.5** | 4.7 | **5** | 5.4 | **5.7** | 5.9 | 6.4 | **82.5** | 8.0 | **8.6** | 9.3 | **9.7** | 10.1 | 10.9 |
| **62** | 4.8 | **5.1** | 5.6 | **5.8** | 6 | 6.5 | **83** | 8.1 | **8.7** | 9.4 | **9.8** | 10.2 | 11 |
| **62.5** | 4.9 | **5.2** | 5.7 | **5.9** | 6.1 | 6.7 | **83.5** | 8.2 | **8.8** | 9.5 | **9.9** | 10.3 | 11.2 |
| **63** | 5.0 | **5.3** | 5.8 | **6** | 6.2 | 6.8 | **84** | 8.3 | **8.9** | 9.6 | **10** | 10.4 | 11.3 |
| **63.5** | 5.1 | **5.4** | 5.9 | **6.1** | 6.4 | 6.9 | **84.5** | 8.3 | **9** | 9.7 | **10.1** | 10.5 | 11.4 |
| **64** | 5.1 | **5.5** | 6 | **6.2** | 6.5 | 7 | **85** | 8.4 | **9.1** | 9.8 | **10.2** | 10.6 | 11.5 |
| **64.5** | 5.2 | **5.6** | 6.1 | **6.3** | 6.6 | 7.1 | **85.5** | 8.5 | **9.2** | 9.9 | **10.3** | 10.7 | 11.6 |
| **65** | 5.3 | **5.7** | 6.2 | **6.4** | 6.7 | 7.3 | **86** | 8.6 | **9.3** | 10 | **10.4** | 10.8 | 11.7 |
| **65.5** | 5.4 | **5.8** | 6.3 | **6.5** | 6.8 | 7.4 | **86.5** | 8.7 | **9.4** | 10.1 | **10.5** | 11 | 11.9 |

These tables are derived from the WHO$_{2006}$ standards for Boys. © Michael Golden

| Use for both boys and girls | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Height | Weight Kg – Z-score | | | | | | | Ht | Weight Kg – Z-score | | | | | |
| cm | -4.0 | -3 | -2 | -1.5 | -1 | 0 | | cm | -4.0 | -3 | -2 | -1.5 | -1 | 0 |
| Use Height for more than or equal to 87 cm | | | | | | | | | | | | | | |
| 87 | 9.0 | 9.6 | 10.4 | 10.8 | 11.2 | 12.2 | | 104 | 12.0 | 13 | 14 | 14.6 | 15.2 | 16.5 |
| 87.5 | 9.0 | 9.7 | 10.5 | 10.9 | 11.3 | 12.3 | | 104.5 | 12.1 | 13.1 | 14.2 | 14.7 | 15.4 | 16.7 |
| 88 | 9.1 | 9.8 | 10.6 | 11 | 11.5 | 12.4 | | 105 | 12.2 | 13.2 | 14.3 | 14.9 | 15.5 | 16.8 |
| 88.5 | 9.2 | 9.9 | 10.7 | 11.1 | 11.6 | 12.5 | | 105.5 | 12.3 | 13.3 | 14.4 | 15 | 15.6 | 17 |
| 89 | 9.3 | 10 | 10.8 | 11.2 | 11.7 | 12.6 | | 106 | 12.4 | 13.4 | 14.5 | 15.1 | 15.8 | 17.2 |
| 89.5 | 9.4 | 10.1 | 10.9 | 11.3 | 11.8 | 12.8 | | 106.5 | 12.5 | 13.5 | 14.7 | 15.3 | 15.9 | 17.3 |
| 90 | 9.5 | 10.2 | 11 | 11.5 | 11.9 | 12.9 | | 107 | 12.6 | 13.7 | 14.8 | 15.4 | 16.1 | 17.5 |
| 90.5 | 9.6 | 10.3 | 11.1 | 11.6 | 12 | 13 | | 107.5 | 12.7 | 13.8 | 14.9 | 15.6 | 16.2 | 17.7 |
| 91 | 9.7 | 10.4 | 11.2 | 11.7 | 12.1 | 13.1 | | 108 | 12.8 | 13.9 | 15.1 | 15.7 | 16.4 | 17.8 |
| 91.5 | 9.8 | 10.5 | 11.3 | 11.8 | 12.2 | 13.2 | | 108.5 | 13.0 | 14 | 15.2 | 15.8 | 16.5 | 18 |
| 92 | 9.9 | 10.6 | 11.4 | 11.9 | 12.3 | 13.4 | | 109 | 13.1 | 14.1 | 15.3 | 16 | 16.7 | 18.2 |
| 92.5 | 9.9 | 10.7 | 11.5 | 12 | 12.4 | 13.5 | | 109.5 | 13.2 | 14.3 | 15.5 | 16.1 | 16.8 | 18.3 |
| 93 | 10.0 | 10.8 | 11.6 | 12.1 | 12.6 | 13.6 | | 110 | 13.3 | 14.4 | 15.6 | 16.3 | 17 | 18.5 |
| 93.5 | 10.1 | 10.9 | 11.7 | 12.2 | 12.7 | 13.7 | | 110.5 | 13.4 | 14.5 | 15.8 | 16.4 | 17.1 | 18.7 |
| 94 | 10.2 | 11 | 11.8 | 12.3 | 12.8 | 13.8 | | 111 | 13.5 | 14.6 | 15.9 | 16.6 | 17.3 | 18.9 |
| 94.5 | 10.3 | 11.1 | 11.9 | 12.4 | 12.9 | 13.9 | | 111.5 | 13.6 | 14.8 | 16 | 16.7 | 17.5 | 19.1 |
| 95 | 10.4 | 11.1 | 12 | 12.5 | 13 | 14.1 | | 112 | 13.7 | 14.9 | 16.2 | 16.9 | 17.6 | 19.2 |
| 95.5 | 10.4 | 11.2 | 12.1 | 12.6 | 13.1 | 14.2 | | 112.5 | 13.9 | 15 | 16.3 | 17 | 17.8 | 19.4 |
| 96 | 10.5 | 11.3 | 12.2 | 12.7 | 13.2 | 14.3 | | 113 | 14.0 | 15.2 | 16.5 | 17.2 | 18 | 19.6 |
| 96.5 | 10.6 | 11.4 | 12.3 | 12.8 | 13.3 | 14.4 | | 113.5 | 14.1 | 15.3 | 16.6 | 17.4 | 18.1 | 19.8 |
| 97 | 10.7 | 11.5 | 12.4 | 12.9 | 13.4 | 14.6 | | 114 | 14.2 | 15.4 | 16.8 | 17.5 | 18.3 | 20 |
| 97.5 | 10.8 | 11.6 | 12.5 | 13 | 13.6 | 14.7 | | 114.5 | 14.3 | 15.6 | 16.9 | 17.7 | 18.5 | 20.2 |
| 98 | 10.9 | 11.7 | 12.6 | 13.1 | 13.7 | 14.8 | | 115 | 14.5 | 15.7 | 17.1 | 17.8 | 18.6 | 20.4 |
| 98.5 | 11.0 | 11.8 | 12.8 | 13.3 | 13.8 | 14.9 | | 115.5 | 14.6 | 15.8 | 17.2 | 18 | 18.8 | 20.6 |
| 99 | 11.1 | 11.9 | 12.9 | 13.4 | 13.9 | 15.1 | | 116 | 14.7 | 16 | 17.4 | 18.2 | 19 | 20.8 |
| 99.5 | 11.2 | 12 | 13 | 13.5 | 14 | 15.2 | | 116.5 | 14.8 | 16.1 | 17.5 | 18.3 | 19.2 | 21 |
| 100 | 11.2 | 12.1 | 13.1 | 13.6 | 14.2 | 15.4 | | 117 | 15.0 | 16.2 | 17.7 | 18.5 | 19.3 | 21.2 |
| 100.5 | 11.3 | 12.2 | 13.2 | 13.7 | 14.3 | 15.5 | | 117.5 | 15.1 | 16.4 | 17.9 | 18.7 | 19.5 | 21.4 |
| 101 | 11.4 | 12.3 | 13.3 | 13.9 | 14.4 | 15.6 | | 118 | 15.2 | 16.5 | 18 | 18.8 | 19.7 | 21.6 |
| 101.5 | 11.5 | 12.4 | 13.4 | 14 | 14.5 | 15.8 | | 118.5 | 15.3 | 16.7 | 18.2 | 19 | 19.9 | 21.8 |
| 102 | 11.6 | 12.5 | 13.6 | 14.1 | 14.7 | 15.9 | | 119 | 15.4 | 16.8 | 18.3 | 19.1 | 20 | 22 |
| 102.5 | 11.7 | 12.6 | 13.7 | 14.2 | 14.8 | 16.1 | | 119.5 | 15.6 | 16.9 | 18.5 | 19.3 | 20.2 | 22.2 |
| 103 | 11.8 | 12.8 | 13.8 | 14.4 | 14.9 | 16.2 | | 120 | 15.7 | 17.1 | 18.6 | 19.5 | 20.4 | 22.4 |
| 103.5 | 11.9 | 12.9 | 13.9 | 14.5 | 15.1 | 16.4 | | | | | | | | |

## 5. F-75 feeding chart for stabilization phase during inpatient treatment of SAM

### a) Volume of F-75 for Children without oedema

| Weight of Child (kg) | Volume of F-75 per feed (ml)[a] | | | Daily total (130 ml/kg) | 80% of daily total [a] (minimum) |
|---|---|---|---|---|---|
| | Every 2 hours[b] (12 feeds) | Every 3 hours[c] (8 feeds) | Every 4 hours (6 feeds) | | |
| 2.0 | 20 | 30 | 45 | 260 | 210 |
| 2.2 | 25 | 35 | 50 | 286 | 230 |
| 2.4 | 25 | 40 | 55 | 312 | 250 |
| 2.6 | 30 | 45 | 55 | 338 | 265 |
| 2.8 | 30 | 45 | 60 | 364 | 290 |
| 3.0 | 35 | 50 | 65 | 390 | 310 |
| 3.2 | 35 | 55 | 70 | 416 | 335 |
| 3.4 | 35 | 55 | 75 | 442 | 355 |
| 3.6 | 40 | 60 | 80 | 468 | 375 |
| 3.8 | 40 | 60 | 85 | 494 | 395 |
| 4.0 | 45 | 65 | 90 | 520 | 415 |
| 4.2 | 45 | 70 | 90 | 546 | 435 |
| 4.4 | 50 | 70 | 95 | 572 | 460 |
| 4.6 | 50 | 75 | 100 | 598 | 480 |
| 4.8 | 55 | 80 | 105 | 624 | 500 |
| 5.0 | 55 | 80 | 110 | 650 | 520 |
| 5.2 | 55 | 85 | 115 | 676 | 540 |
| 5.4 | 60 | 90 | 120 | 702 | 560 |
| 5.6 | 60 | 90 | 125 | 728 | 580 |
| 5.8 | 65 | 95 | 130 | 754 | 605 |
| 6.0 | 65 | 100 | 130 | 780 | 625 |
| 6.2 | 70 | 100 | 135 | 806 | 645 |
| 6.4 | 70 | 105 | 140 | 832 | 665 |
| 6.6 | 75 | 110 | 145 | 858 | 685 |
| 6.8 | 75 | 110 | 150 | 884 | 705 |
| 7.0 | 75 | 115 | 155 | 910 | 730 |
| 7.2 | 80 | 120 | 160 | 936 | 750 |
| 7.4 | 80 | 120 | 160 | 962 | 770 |
| 7.6 | 85 | 125 | 165 | 988 | 790 |
| 7.8 | 85 | 130 | 170 | 1014 | 810 |
| 8.0 | 90 | 130 | 175 | 1040 | 830 |
| 8.2 | 90 | 135 | 180 | 1066 | 855 |
| 8.4 | 90 | 140 | 185 | 1092 | 875 |
| 8.6 | 95 | 140 | 190 | 1118 | 895 |
| 8.8 | 95 | 145 | 195 | 1144 | 915 |
| 9.0 | 100 | 145 | 200 | 1170 | 935 |
| 9.2 | 100 | 150 | 200 | 1196 | 960 |
| 9.4 | 105 | 155 | 205 | 1222 | 980 |
| 9.6 | 105 | 155 | 210 | 1248 | 1000 |
| 9.8 | 110 | 160 | 215 | 1274 | 1020 |
| 10.0 | 110 | 160 | 220 | 1300 | 1040 |

[a] Volumes are rounded to the nearest 5 ml. [b] Feed two-hourly for at least the first day. Then, when the child has little or no vomiting, modest diarrhoea (< 5 watery stools per day), and is finishing most feeds, change to three-hourly feeds. [c] After a day on three-hourly feeds: If no vomiting, less diarrhoea, and finishing most feeds, change to four-hourly feeds.

## b) Volume of F-75 for Children with Severe Bilateral Pitting Oedema

| Weight with oedema (kg) | Volume of F-75 per feed (ml)[a] | | | Daily total (100 ml/kg) | 80% of daily total[a] (minimum) |
|---|---|---|---|---|---|
| | Every 2 hours[b] (12 feeds) | Every 3 hours[c] (8 feeds) | Every 4 hours (6 feeds) | | |
| 3.0 | 25 | 40 | 50 | 300 | 240 |
| 3.2 | 25 | 40 | 55 | 320 | 255 |
| 3.4 | 30 | 45 | 60 | 340 | 270 |
| 3.6 | 30 | 45 | 60 | 360 | 290 |
| 3.8 | 30 | 50 | 65 | 380 | 305 |
| 4.0 | 35 | 50 | 65 | 400 | 320 |
| 4.2 | 35 | 55 | 70 | 420 | 335 |
| 4.4 | 35 | 55 | 75 | 440 | 350 |
| 4.6 | 40 | 60 | 75 | 460 | 370 |
| 4.8 | 40 | 60 | 80 | 480 | 385 |
| 5.0 | 40 | 65 | 85 | 500 | 400 |
| 5.2 | 45 | 65 | 85 | 520 | 415 |
| 5.4 | 45 | 70 | 90 | 540 | 430 |
| 5.6 | 45 | 70 | 95 | 560 | 450 |
| 5.8 | 50 | 75 | 95 | 580 | 465 |
| 6.0 | 50 | 75 | 100 | 600 | 480 |
| 6.2 | 50 | 80 | 105 | 620 | 495 |
| 6.4 | 55 | 80 | 105 | 640 | 510 |
| 6.6 | 55 | 85 | 110 | 660 | 530 |
| 6.8 | 55 | 85 | 115 | 680 | 545 |
| 7.0 | 60 | 90 | 115 | 700 | 560 |
| 7.2 | 60 | 90 | 120 | 720 | 575 |
| 7.4 | 60 | 95 | 125 | 740 | 590 |
| 7.6 | 65 | 95 | 125 | 760 | 610 |
| 7.8 | 65 | 100 | 130 | 780 | 625 |
| 8.0 | 65 | 100 | 135 | 800 | 640 |
| 8.2 | 70 | 105 | 135 | 820 | 655 |
| 8.4 | 70 | 105 | 140 | 840 | 670 |
| 8.6 | 70 | 110 | 145 | 860 | 690 |
| 8.8 | 75 | 110 | 145 | 880 | 705 |
| 9.0 | 75 | 115 | 150 | 900 | 720 |
| 9.2 | 75 | 115 | 155 | 920 | 735 |
| 9.4 | 80 | 120 | 155 | 940 | 750 |
| 9.6 | 80 | 120 | 160 | 960 | 770 |
| 9.8 | 80 | 125 | 165 | 980 | 785 |
| 10.0 | 85 | 125 | 165 | 1000 | 800 |
| 10.2 | 85 | 130 | 170 | 1020 | 815 |
| 10.4 | 85 | 130 | 175 | 1040 | 830 |
| 10.6 | 90 | 135 | 175 | 1060 | 850 |
| 10.8 | 90 | 135 | 180 | 1080 | 865 |
| 11.0 | 90 | 140 | 185 | 1100 | 880 |
| 11.2 | 95 | 140 | 185 | 1120 | 895 |
| 11.4 | 95 | 145 | 190 | 1140 | 910 |
| 11.6 | 95 | 145 | 195 | 1160 | 930 |
| 11.8 | 100 | 150 | 195 | 1180 | 945 |
| 12.0 | 100 | 150 | 200 | 1200 | 960 |

## 6. F-75 therapeutic milk nutrient composition

| | **/Mean per 100 g** | minimum | maximum | | **/Mean per 100 g** | minimum | maximum |
|---|---|---|---|---|---|---|---|
| Energy | 446 kcal | 446 kcal | 452 kcal | Vitamin A | 0.9 mg | 0.9 mg | 1.3 mg |
| Proteins | 5.3 % % total | 4.5 % % total energy | 6 % % total energy | Vitamin D | 18 µg | 15 µg | 20 µg |
| Lipids | 31.5 % total energy | 28 % % total | 35 % % total | Vitamin E | 20 mg | 20 mg | 25 mg |
| Humidity | 5.0 g max | - | - | Vitamin C | 59 mg | 50 mg | 70 mg |
| Calcium | 560 mg | 500 mg | 600 mg | Vitamin B1 | 0.5 mg | 0.5 mg | 0.9 mg |
| Phosphorus | 330 mg | 300 mg | 400 mg | Vitamin B2 | 1.6 mg | 1.6 mg | 2.2 mg |
| Potassium | 775 mg | 740 mg | 810 mg | Vitamin B6 | 0.6 mg | 0.6 mg | 0.8 mg |
| Magnesium | 50 mg | 48 mg | 55 mg | Vitamin B12 | 1.6 µg | 1.6 µg | 2 µg |
| Zinc | 12.2 mg | 11 mg | 14 mg | Vitamin K | 24 µg | 20 µg | 30 µg |
| Copper | 1.7 mg | 1.4 mg | 1.8 mg | Biotin | 60 µg | 60 µg | 85 µg |
| Iron | < 0.3 mg | 0.10 mg | 0.3 mg | Folic acid | 200 µg | 200 µg | 230 µg |
| Iodine | 100 µg | 70 µg | 140 µg | Pantothenic acid | 3 mg | 3 mg | 4 mg |
| Selenium | 30 µg | 20 µg | 40 µg | Niacin | 5 mg | 5 mg | 7 mg |
| Sodium | < 87 mg | 30 mg | 87 mg | For the reconstituted F-75 therapeutic milk: **Osmolarity = 280 mOsm / Kg H2O** | | | |
| NUTRISET - B.P. 35 - 76770 MALAUNAY France **website: www.nutriset.fr** | | | | | | | |

## 7. F-100 feeding chart for catch up growth during inpatient treatment

| Weight of Child (kg) | Range per four-hourly feed (6 feeds daily) | | Range of daily volumes of F-100 | |
|---|---|---|---|---|
| | **Minimum (ml)** | **Maximum (ml) [a]** | **Minimum (150 ml/kg/day)** | **Maximum (220 ml/kg/day)** |
| 2.0 | 50 | 75 | 300 | 440 |
| 2.2 | 55 | 80 | 330 | 484 |
| 2.4 | 60 | 90 | 360 | 528 |
| 2.6 | 65 | 95 | 390 | 572 |
| 2.8 | 70 | 105 | 420 | 616 |
| 3.0 | 75 | 110 | 450 | 660 |
| 3.2 | 80 | 115 | 480 | 704 |
| 3.4 | 85 | 125 | 510 | 748 |
| 3.6 | 90 | 130 | 540 | 792 |
| 3.8 | 95 | 140 | 570 | 836 |
| 4.0 | 100 | 145 | 600 | 880 |
| 4.2 | 105 | 155 | 630 | 924 |
| 4.4 | 110 | 160 | 660 | 968 |
| 4.6 | 115 | 170 | 690 | 1012 |
| 4.8 | 120 | 175 | 720 | 1056 |
| 5.0 | 125 | 185 | 750 | 1100 |
| 5.2 | 130 | 190 | 780 | 1144 |
| 5.4 | 135 | 200 | 810 | 1188 |
| 5.6 | 140 | 205 | 840 | 1232 |
| 5.8 | 145 | 215 | 870 | 1276 |
| 6.0 | 150 | 220 | 900 | 1320 |
| 6.2 | 155 | 230 | 930 | 1364 |
| 6.4 | 160 | 235 | 960 | 1408 |
| 6.6 | 165 | 240 | 990 | 1452 |
| 6.8 | 170 | 250 | 1020 | 1496 |
| 7.0 | 175 | 255 | 1050 | 1540 |
| 7.2 | 180 | 265 | 1080 | 1588 |
| 7.4 | 185 | 270 | 1110 | 1628 |
| 7.6 | 190 | 280 | 1140 | 1672 |
| 7.8 | 195 | 285 | 1170 | 1716 |
| 8.0 | 200 | 295 | 1200 | 1760 |
| 8.2 | 205 | 300 | 1230 | 1804 |
| 8.4 | 210 | 310 | 1260 | 1848 |
| 8.6 | 215 | 315 | 1290 | 1892 |
| 8.8 | 220 | 325 | 1320 | 1936 |
| 9.0 | 225 | 330 | 1350 | 1980 |
| 9.2 | 230 | 335 | 1380 | 2024 |
| 9.4 | 235 | 345 | 1410 | 2068 |
| 9.6 | 240 | 350 | 1440 | 2112 |
| 9.8 | 245 | 360 | 1470 | 2156 |
| 10.0 | 250 | 365 | 1500 | 2200 |

[a] Volumes per feed are rounded to the nearest 5 ml.

**8. F100 therapeutic milk nutrient composition**

| | Mean/ 100 g | min | max | /1litre of F-100 | | Mean/ 100 g | min | max | /1litre of F-100 |
|---|---|---|---|---|---|---|---|---|---|
| Energy (kcal) | 520 | 520 | 527 | 988 | Biotin (µg) | 60 | 60 | 85 | 116 |
| Proteins (% of) | > 10 | 10 | 10 | > 10 | Pantothenic acid (mg) | 3 | 3 | 4 | 5.8 |
| Lipids (% of) | > 45 | 45 | 51 | > 45 | Vitamin K (µg) | 15 | 15 | 30 | 29 |
| Moisture | 2.5 g max | - | - | - | Sodium (mg) | <290 | 140 | 290 | <560 |
| Vitamin A (µg) | 800 | 800 | 1100 | 1544 | Calcium (mg) | 300 | 300 | 600 | 579 |
| Vitamin D (µg) | 15 | 15 | 20 | 29 | Phosphate (mg) | 300 | 300 | 600 | 579 |
| Vitamin E (mg) | 20 | 20 | 25 | 38.6 | Magnesium (mg) | 80 | 80 | 120 | 154 |
| Vitamin C (mg) | 50 | 50 | 70 | 96.5 | Zinc (mg) | 11 | 11 | 14 | 21.2 |
| Vitamin B1 (mg) | 0.5 | 0.5 | 1.0 | 0.97 | Iodine (µg) | 70 | 70 | 140 | 135 |
| Vitamin B2 (mg) | 1.6 | 1.6 | 2.2 | 3.1 | Potassium (mg) | 1100 | 1100 | 1400 | 2123 |
| Niacin (mg) | 5 | 5 | 7 | 9.7 | Copper (mg) | 1.1 | 1.4 | 1.8 | 2.7 |
| Vitamin B6 (mg) | 0.6 | 0.6 | 0.9 | 1.2 | Selenium (µg) | 20 | 20 | 40 | 38.6 |
| Folic acid (µg) | 200 | 200 | 300 | 386 | Iron (mg) | < 0.2 | 0.1 | 0.2 | < 0.4 |
| Vitamin B12 (µg) | 1.6 | 1.6 | 4 | 3.1 | For the reconstituted F-100 therapeutic milk: Osmolarity < 320 mOsm / Kg H2O | | | | |
| | NUTRISET - B.P. 35 - 76770 MALAUNAY France website: www.nutriset.fr | | | | | | | | |

## 9. Monthly Report form

**Monthly Nutrition Registration -Management of Severe Acute Malnutrition**

| | | | | | |
|---|---|---|---|---|---|
| Program Start Date (mm/yyyy) | Month: | | Year: | | |
| Province | | | | | |
| District | | | | | |
| Name of Facility | | | | | |
| Facility Level | | | | | |

| | | | |
|---|---|---|---|
| Report Date (dd/mm/yyyy) | | | |
| Report Period (mm/yyyy) | Month: | Year | |
| Report Prepared by | | Designation | |
| Contact Phone # | | Email | |
| Type of service | Inpatient | Outpatient | |

| Age Group | Total beginning of the month (A) | New Admissions | | | Re-admission after defaulting (B4) | Relapse (B5) | Transfer in from ITP/OTP (B6) | Total admissions C=(B1+B2+B3+B4+B5+B6) | | | Discharges (D) | | | | Total discharges E = (D1+D2+D3+D4) | Transfer to ITP or OTP (F) | Total end of the month G = (A+C-E-F) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Oedema (B1) | MUAC <11.5 cm, WFH < -3SD and/or WFA <60% (B2) | Others (MAM) (B3) | | | | Total (C) | By gender M | By gender F | Cured (D1) | Death (D2) | Defaulter (D3) | Non respondet (D4) | | | |
| <6 Months | | | | | | | | | | | | | | | | | |
| 6-59 months | | | | | | | | | | | | | | | | | |
| 5-14 years | | | | | | | | | | | | | | | | | |
| Total | | - | - | - | | - | - | - | - | - | - | - | - | - | - | - | - |
| | | | | | | | | | Performance indicators 6-59 months | | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | | | |
| | | | | | | | | | Target | | > 75% | < 10% | < 15% | | | | |

**Additional Patient Data (For New admissions only)**

| Age group | HIV Status | | | | On ART | | |
|---|---|---|---|---|---|---|---|
| | HIV +ve | HIV -ve | Unknown Status | No. diagnosed with TB | M | F | Total |
| < 6 months | | | | | | | |
| 6-59 months | | | | | | | |
| 5 - 14 years | | | | | | | |
| Total | - | - | - | - | - | - | |

Cure rate = (D1/E) X 100
Death rate = (D2/E) X 100
Defaulter rate = (D3/E) X 100

**Stock Monitoring**

| Commodities | Packaging & Unit | Stock on first day of month (H) | Stocks received in the month (I) | Total in Stock (J =H+ I) | Quantity distributed (K) | Quantity wasted (L) | Stock end of month (M = J-K-L) | Quantity requested for next month |
|---|---|---|---|---|---|---|---|---|
| F 75 | Sachets | | | - | | | - | |
| F 100 | Sachets | | | - | | | - | |
| RUTF | Sachets | | | - | | | - | |
| CMV | Tins | | | - | | | - | |
| ReSoMal | Sachets | | | - | | | - | |
| Others | | | | - | | | - | |
| Others | | | | - | | | - | |

Report Certified By:.....

Reason(s) for loss.....

General Remarks: .....
.....
.....