SEVERE ACUTE MALNUTRITION

A guideline to the treatment protocol

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

October 2014

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 malnutrition in children 6-59 months old', adapted by the Paediatric 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, nutrition and medical care and support. However, the content ought not to be seen as rigid, given that, locally, conditions can differ. The way in nutritional services are integrated 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, once it is acute malnutrition, 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 risk 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 once a child is in the hospital. Since 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, then six, that incorporates how hospital and community care for SAM can link to each other.

At an international level, adhering to treatment protocols for SAM should reduce infant and child mortality, indirectly, contributing to all MDGs, majorly, No. 4 and 1, in that order. Nationally, SAM treatment efforts should contribute to the newly developed PNG's nutrition policy (2014-2023) 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.

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. 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.

Quick steps to follow

a. Record the child's date of birth – date of birth (age) and sex
b. Examine for and grade bilateral pitting edema
c. Take 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

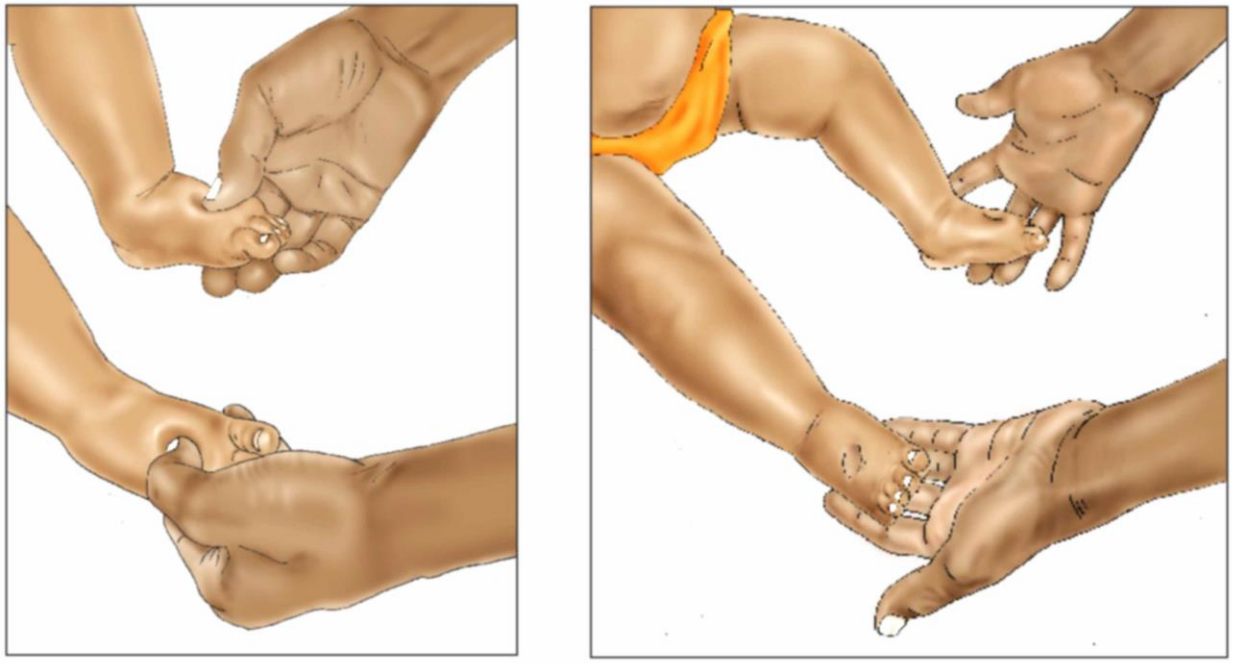
The age of the child can be obtained from the child health card, immunization card or birth certificate or other official documents. Otherwise: -

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:
Edema in both feet: + (Grade 1)
Edema in both feet plus legs: + + (Grade 2)
Edema in both feet, legs and hands or face: + + + (Grade 3)
Note: Other than SAM, generalized edema is can be caused by nephritis, intestinal parasites, liver disease, renal problems and heart failure.

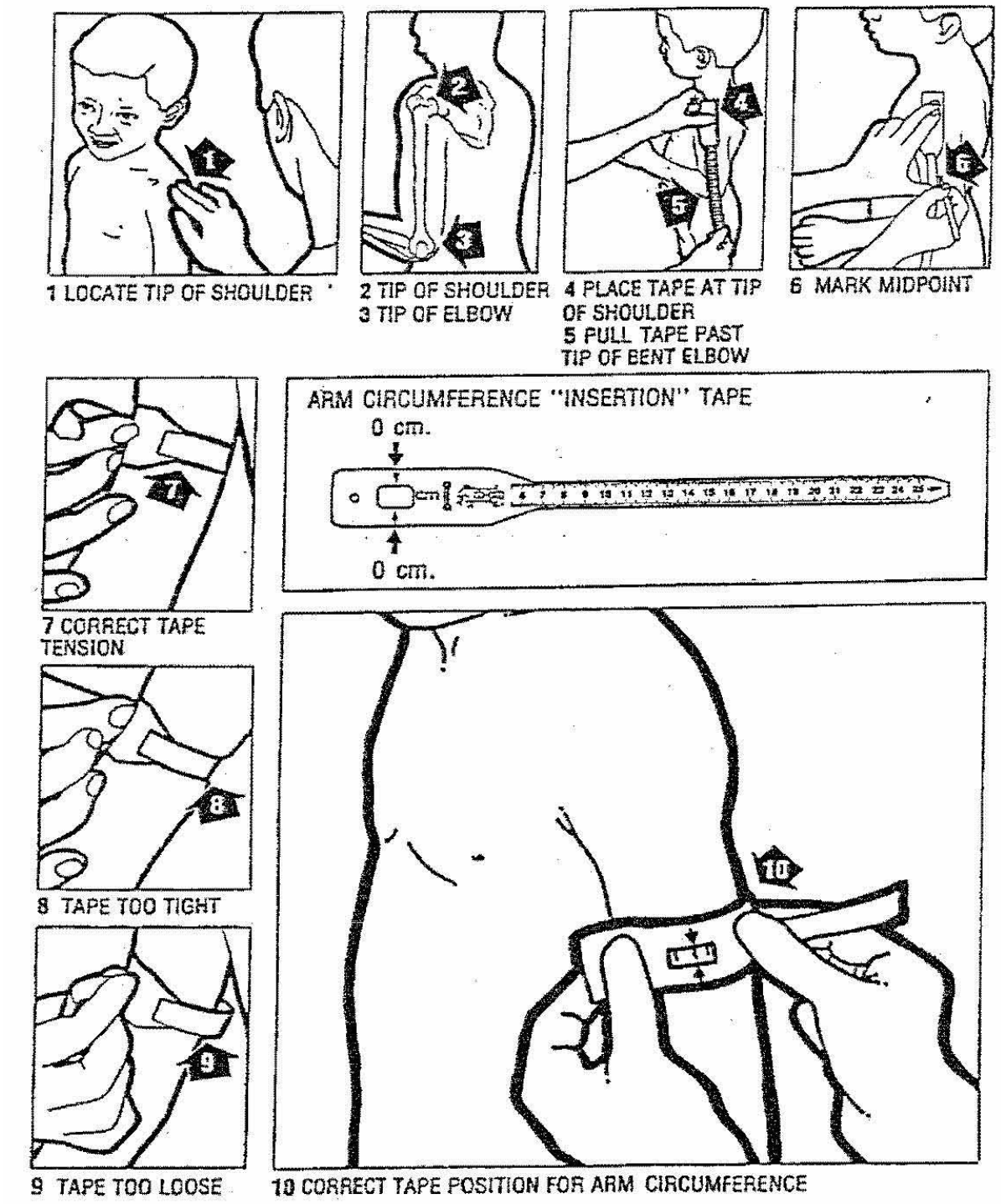
c. Take mid upper arm circumference (MUAC)

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) as shown on the next picture (Figure 2)
- Place the tape measure around the LEFT arm or the less active one (the arm should be relaxed and hang down the side of the body)

- 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 or from the tape
- Record the MUAC to the nearest 0.1 cm or 1 mm. tapes can differ depending on source; either in cm or mm
- For a 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).

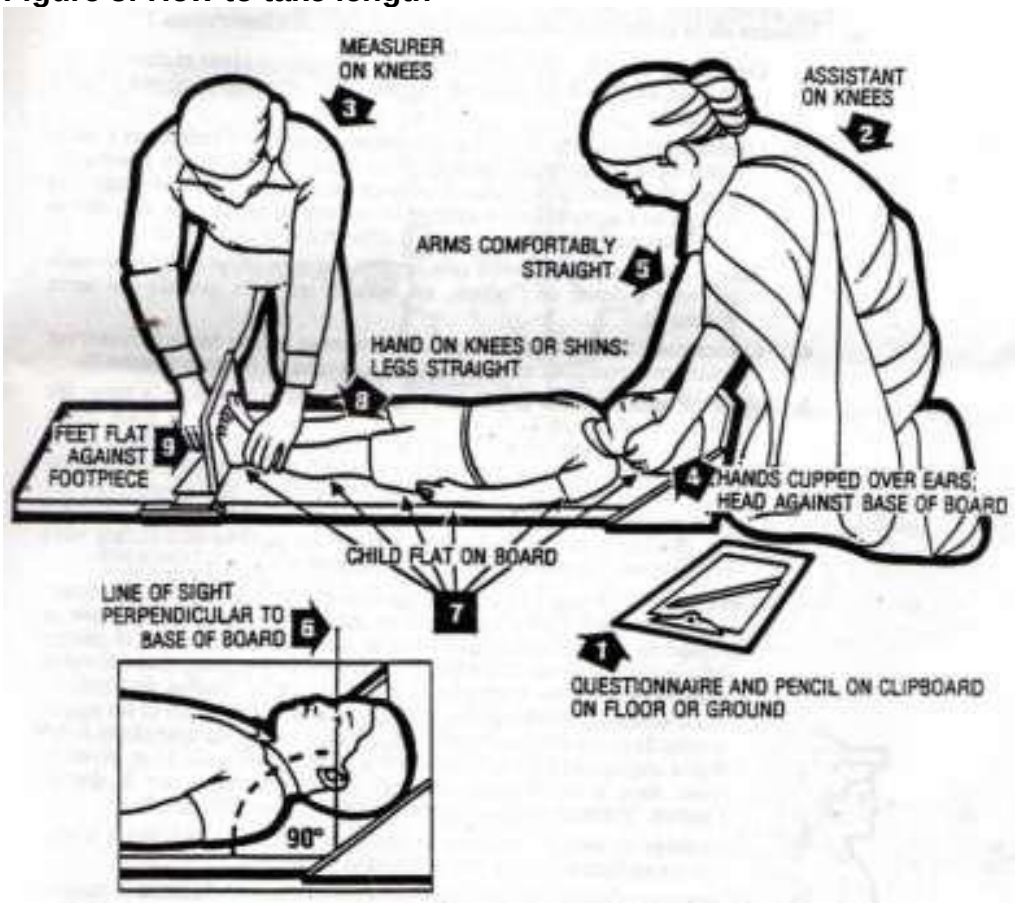
e. Take length/ height

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. 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.

f. Diagnose for SAM in children who are 6–59 months of age

The diagnosis for SAM is defined based on:

— Presence of bilateral edema or,

— Anthropometric indices

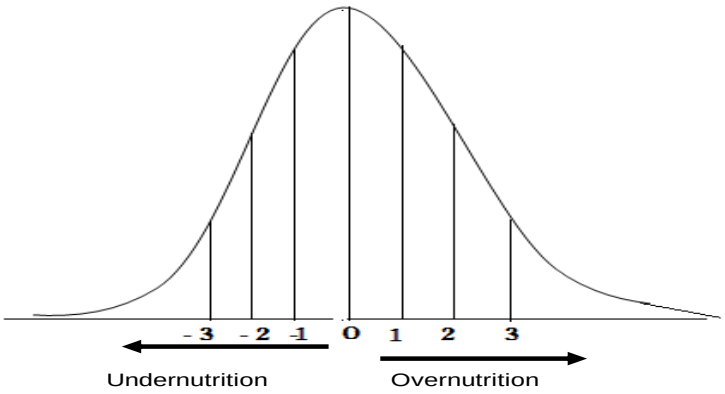
Anthropometric indicators are assumed to be derived from the new WHO growth standards, which use weight for height Z-scores for children under the age of five years or MUAC. A child has SAM if: -

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)

   "*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) and 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 clarification.



How to determine the weight for height Z-score
Using the weight for height table (appendix 4), find the length/ height in cm going across (on the horizontal or x axis). Then find the point of the child's weight in kg in that horizontal line; after which, look up the y axis to the point directly above 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.

Case study on how to interpret weight for length/ height Z-score
A child 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 and dietary history. In all, a health worker tries to get as much information as possible starting from current situation. 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 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 medical and dietary factors to review.

Table 1: Points to consider during history taking

Medical history	**Dietary history**
• Presenting complaints • Birth weight and progressive weight • How the growth millstone is progressing with respect age (sitting up, standing, etc.) • Immunization of the child right from birth • Attendance of antenatal • Blood test for HIV for mother and child • Contact with people with measles or tuberculosis • Any deaths of siblings • The type of stool of the child • Illness or diseases in the past two weeks	• How the baby is feeding • Exclusive breastfeeding • When complementary feeding was started • Quality – types of food • Quantity - how much • Frequency/ interval of feeding – how often • Type of feeding; active or passive • Type of feeding – bottle or cup feeding • Appetite • Method of cooking • Ask whether that is the mother's first born, then ask about the previous feeding of the first children • Is the baby a twin • Hygiene practices; hand washing **Economic situation History** • Family size • Family and social situation • 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 4 next for a reminder on non-edematous features).

Figure 4: 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 5 next for an impression of edematous malnutrition).

Figure 5: 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. 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 step ups where SAM management is already at scale, children with SAM who have bilateral edema ++ or +, but with an appetite, are often rehabilitated as outpatients. Given that PNG 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 –
If a child is in shock you must act quickly:
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)

Emergency 2: 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 –
If a child is in heart failure you must act much more quickly:
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 anemia and severe anemia

Diagnosis – Hb <4 g/dL or <6 g/dL with signs of respiratory distress
Treat and monitor – use packed cells
Blood transfusions should only be given in SAM within the first 24 h of admission
Otherwise, transfuse at 10 mL/kg slowly over at least 3 hours
Give furosemide 1mL/kg IV at the start of the transfusion (unless there is history of diarrhea).

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

Step 1 - Treat hypoglycemia

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.

To make sugar water: To 100 mL clean drinking water (slightly warm if possible to help dilution), add 10 g (2 heaped teaspoons of) sugar and shake or stir vigorously.

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).

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 6: Eye signs of dehydration

Treatment (rehydration)

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:

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

b. Some dehydration **(Plan B)** – replace losses
- Children with SAM and who have some or severe dehydration but no shock should receive 5 mL/kg ReSoMal every 30 min for the first 2 h.
- Then, if the child is still dehydrated, 5–10 mL/kg/h ReSoMal should be given in alternate hours with F-75, up to a maximum of 10 h; signs of improved hydration status and over hydration should be checked every half hour for the first 2 h, then hourly

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.

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

Serious caution about hydrating children with SAM

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, 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, the 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-edematous

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

Edematous

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

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

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.

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 2: 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 2 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.

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 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 3: 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 in 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, 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. Both the two cases have left the ward; one as fully recovered, another as a transfer to outpatients’ program for SAM.

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, including children who have + or ++ 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 or bilateral pitting edema (+ or ++) evident, 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) 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 4: Appetite test chart (similar to table 2)

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	

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 5: 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 6) 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 6: 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. State that breastfeeding should be continued and offered *ad libitum.* Emphasize that the malnourished child (for whom prescription is made) should consume RUTF steadily throughout the day and separate from usual food; the latter 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 health, 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. 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 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.
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 < 5%, defaulters < 10% and recovery > 75%.

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.

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 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 7: Feeding volume for children < 6 months being treated for SAM

Baby weight (Kg)	Therapeutic feed (mL) for the 8 feeds/day plan
≥ 1.2	25
1.3-1.5	30
1.6-1.7	35
1.8-2.1	40
2.2-2.4	45
2.5-2.7	50
2.8-2.9	55
3.0-3.4	60
3.5-3.9	65
4.0-4.4	70

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 transferred to outpatient care 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.

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, identify such children and taking quick action.

In order to achieve early identification of children with SAM in the community, trained community health workers 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. Infants and children who are 6–59 months of age and have a MUAC <11.5 cm, or who have any degree of bilateral edema should be immediately referred for full assessment at a treatment center for the treatment of SAM.

With PNG's geographical challenges, diverse culture and languages, it is expected that SAM management implementation will need careful planning, as there is likely to be systemic challenges. Non-government service providers, the NGOs and churches, will be instrumental to the success of the implementation. Church health service providers play a prominent role in primary health care service delivery in PNG. They are responsible for up to 50% of rural and remote health facilities and also for a number of training facilities for nurses and community health workers.

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.

1. 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 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).

- The approach makes treatment of SAM a public health intervention, and this would definitely strengthen the rural health system in PNG.

What makes non-state service providers such as NGOs a reliable choice to link communities and facilities in PNG?

- They have long years of providing effective health services in the rural areas. For instance, Western medical care in PNG began with the missions, thus Churches are well respected for their contribution
- They reach remote and un-served areas that have no access to government health services, thus, offer services with more holistic community health approach which is a very good entry to integrate SAM management. Often regarded to be more people focused − genuinely concerned about the people, respecting their dignity and delivering services in accordance with the cultural values and traditions.
- In PNG, they operate approximately half of the rural health centers and sub-centers
- They have introduced appropriate approaches like village birth attendants as part of an integrated, effective, and sustainable quality basic family health care delivery system. Their experience in these can inform possible ways of integrating SAM management into the already established activities within communities they serve, plus, the service will be delivered anyway, because they are in these communities
- Using existing and already established systems is cheaper than rather than simply scaling up through establishment of new operational structures
- Considering that non-state service providers are already within the community, it shows strong motivation, a willingness to serve in remote areas, they are often non-bureaucratic and use a flexible style which allows quick integration of SAM activities through their ability to innovate
- Even where there are no formal organizations, opinion leaders can serve to an extent, some countries including Mozambique have succeeded in training traditional healers, who will offer services of their specialty but also screen for SAM and refer the child for medical attention.
- Above all, health is everybody's business in PNG

What is needed to make this happen?

Once non-state stakeholders like; NGOs and churches are willing, roles and responsibilities can be arranged to complement public health system; at national, province/ district and facility level. All facilities can treat SAM, regardless of the level of expertise – the actual activities will however be 'dictated' by resources in the facility. For instance, it is possible for all facilities to undertake activities for treating SAM in outpatient programs (chapter three) but requires extra expertise for inpatient management (chapter two) owing to medical complications that the children with severe malnutrition present with. It is possible for all facilities, regardless of level, to link with communities in a bid to confront SAM. Each government health service level will need

to work with non-state service providers called the stakeholders (or NGOs), that can subsequently operate from otherwise hard to reach corners of the community. Then specific responsibilities are assigned among these (a - d next) and would change to suit prevailing circumstances:

National level/NDoH

- Responsible to give clear definition of roles and responsibilities and this helps to create a predictable and transparent environment in which the provincial, district, facilities and non-government actors can operate to confront SAM
- Resource planning and mobilization for stocking up not only therapeutic feeds (RUTF) for SAM children that will be treated from home, but also F75, F100, CMV and ReSoMal for any others that require hospital admission
- Build sufficient national capacity to respond in emergencies (due to natural catastrophes and disease epidemics like measles) and in conflict areas where SAM cases are expected to rise
- The central government that has overall responsibility over health services should ensure that the other resources of the state such as central medical Stores are facilitated to incorporate SAM treatment supplies and activities, plus, extend them to where they are required, timely
- Coordinate relational ‘contracts’, if required’, whose main focus is on preserving relationships and harmony in endeavors of providing SAM management services rather than stipulating terms

Provincial and local level services

- By law, primary health care is the responsibility of provincial governments (Organic Law on Provincial Governments and Local Level Governments 1995; National Health Administration Act 1997). These are statutory corporations with administrative and financial responsibility for hospitals and public health (including PHC) services and integrating government and non-government service providers
- Their role in SAM management shall be to strengthen capacity and coordination for health service provision. Given the nature of the problem of SAM, both medical but at the same time a public health concern, Provincial Nutritionists and Senior Medical workers need to work together to integrate SAM activities in their work plans.
- Ensure transparency in all dealings of health service provision to integrate SAM management starting way up at the Provinces through down to sub-national levels
- Ensure effective utilization of SAM related supplies to meet the needs for which they have been purchased
- Be in-charge to attract and retain staff and the capacity in whom SAM management skills have been built, in such places that require the skills

Facility (referring to national referral, provincial and district hospitals, health centers, health sub-centers and aid posts)

- Fully assess all children below five years for malnutrition. The steps of how to assess are well described in chapter one
- Treat children with SAM based on level of facility and patient needs – either as inpatients (chapter two) or out patients (chapter three)
- Link patients to their communities, for continued support – adherence to SAM treatment prescriptions, reminder on follow up clinical appointments, follow up defaulters and counsel immediate care takers to consider SAM treatment a priority. Referrals from the community can be given priority to increase motivation to honor clinic visits. Communities can further assess the family for vulnerability to malnutrition and provide support to prevent re-occurrence; not only in the child determined with SAM but any other(s) since there is always such risk.
- Provide technical support to community service providers engaged in SAM management programs.
- Create awareness on the problem of malnutrition in their communities. This requires a formal introduction to the leaders about the nature and purpose of the program and the nature of their involvement. While in the communities, it must be clear about how SAM treatment will affect the children and their community in practice: what will it do, who will be eligible to benefit and why they will be selected, who will not benefit or be excluded. If this is not stated from the start, problems arise once some families think their children are being 'segregated'
- Together with the community leaders, suggest and promote behavioral change activities to prevent malnutrition. There is need for sufficient involvement so communities can take ownership; for success and sustainability.
- Provide full time outreach services even in places without community health posts that would ordinarily serve as the most peripheral facility. Where there are village volunteers they liaise with the village focal points, build capacity to integrate SAM activities into their usual voluntary work, oversee their activities and support them; where there is no village volunteers, the NGO personnel themselves can perform the screening using MUAC tapes, refer those that need the service and follow-up those that have returned from hospitals. This aims at encouraging families to consider SAM treatment as a priority and motivate such families where children already in the program have improved.
- Whenever necessary, and if feasible, recruit volunteers, particularly where the burden of work is high and the community poor and not easily accessible
- Provide support supervision to the village volunteers so the activity morale continues and enrich them with updates, successes and together work out solutions for challenges while implementing including efforts to instill discipline among during their service delivery. Some of the challenges will include having to identify defaulters (where treating SAM is a low priority for the family, child has died or moved away) and work out solutions for better outcomes of such children that may still be alive. NGOs may already know, but remains important that activities based on volunteers work best in 'better-off villages', in times of stability and when there is less urgent family activity (planting, harvesting, market days, etc.). There may be need to support volunteers with transport, even if in kind, uniform or other means of identification, communication just to avoid them feeling

isolated since they can call and inquire if they have a problem while conducting SAM activities. Doing so may benefit children to receive the intended care in communities without burdening them with un-agreed-to user fees.

- Coordination with other partners involved to allow integrating screening for SAM in existing activities already or coming to the community and not overwhelm particular volunteers as this can result in poor output if they feel over stretched.
- There is need to understand information about RUTF as much as possible since it is inevitable that myths and misuse will happen in communities. It is the role of the NGOs and their staff or volunteers to demystify about SAM treatment and products used. At any support visits in communities, volunteers and NGO staff should ask mothers/ caretakers of children in outpatient management of SAM to repeat back the messages that were given at the facility where the child received RUTF, just to check that the messages have been correctly understood. All information about RUTF is consolidated in the outpatients section on SAM treatment in this guideline.
- Consider community linkage for SAM management a success, if coverage is > 50% for rural areas and > 70% for urban areas.

Community screening activities for SAM

Screen all the children in the community using a MUAC tape and check for bilateral edema going from house to house, and at any other opportunity (particularly "national Days" when vaccinations are given, Vitamin A, Deworming, VCT, IMCI, child health days, community development programs, Church activities, etc.). Specifically:

- Examine each child for bilateral edema
- Measure MUAC
- Re-check all MUAC measurements in a red color
- Refer those with a edema or red MUAC color to the nearest center with an out patients program for SAM management
- Record every child's screening outcome (e.g. edema, red MUAC color or other circumstances) and action (e.g. referred to nearest facility)
- Provide a monthly report to the supervisor (from government service)
- Participate in periodic coordination/ experience sharing meetings organized at different levels
- Do not limit services to where there may be growing needs of long-term conditions such as AIDS and TB but generally in the entire population

At start, it is useful to work with such non-state actors that are willing to partner in the fight against SAM. However, there is need for regular mapping since new players may come or even old ones change their core objectives, in which case, SAM 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)

- 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:	20 g
Water to make:	1000 mL

MOF ≈ F100

Dried whole milk:	110 g
Sugar:	50 g
Vegetable oil:	30 g
CMV:	20 g
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:	20 g = (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: 20 g = (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

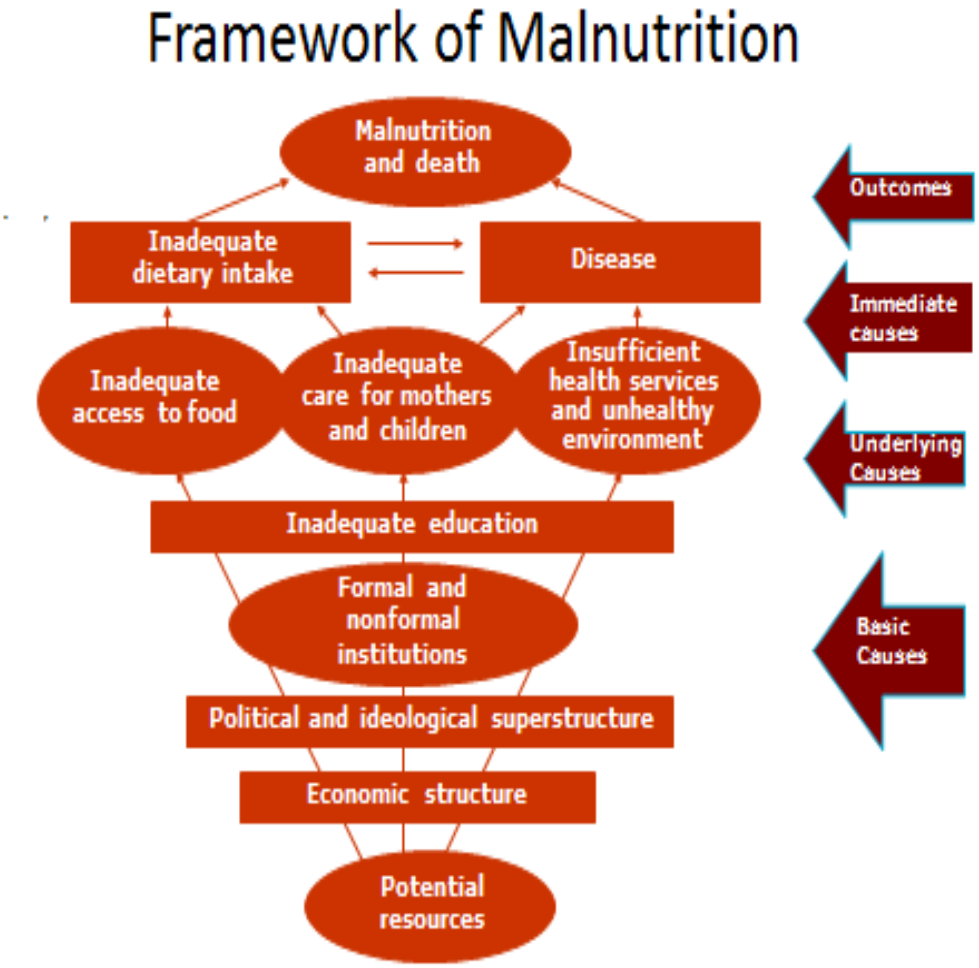
1. Acronyms

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

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
Relapse	where a patient is admitted for SAM that has been previously treated for SAM and has been discharged from the program as cured but returns with SAM and is fit for the program again
Cure	Cure is defined as a patient reaching the criteria for discharge
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.

3. Causes, physiology, signs & consequences of SAM



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

2. 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.

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

Weight of child (kg)	8 feeds/day (ml for each feed)	6 feeds/day (ml for each feed)
2.0 to 2.1 kg	40 ml /feed	50 ml /feed
2.2 - 2.4	45	60
2.5 - 2.7	50	65
2.8 – 2.9	55	70
3.0 - 3.4	60	75
3.5 – 3.9	65	80
4.0 – 4.4	70	85
4.5 – 4.9	80	95
5.0 – 5.4	90	110
5.5 – 5.9	100	120
6 – 6.9	110	140
7 – 7.9	125	160
8 – 8.9	140	180
9 – 9.9	155	190
10 – 10.9	170	200
11 – 11.9	190	230
12 – 12.9	205	250
13 – 13.9	230	275
14 – 14.9	250	290
15 – 19.9	260	300
20 – 24.9	290	320

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

Weight of child (kg)	8 feeds/day in mL for each feed	6 feeds/day in mL for each feed
Under 3 kg	Refer to diluted F100 in the chapter on children < 6 months	
3.0 to 3.4 kg	60 ml 1 feed	75 ml 1 feed
3.5 – 3.9	65	80
4.0 – 4.4	70	85
4.5 – 4.9	80	95
5.0 – 5.4	90	110
5.5 – 5.9	100	120
6 – 6.9	110	140
7 – 7.9	125	160
8 – 8.9	140	180
9 – 9.9	155	190
10 – 10.9	170	200
11 – 11.9	190	230
12 – 12.9	205	250
13 – 13.9	230	275
14 – 14.9	250	290
15 – 19.9	260	300
20 – 24.9	290	320
The above table is the amount of F100 needed for patients in transitional phage if they cannot eat RUTF.		

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				
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Appendix 9 Enrolment details for SAM patients

Appendix 10: Follow up for outpatients during SAM management

Appendix 11: Inpatient daily record for SAM patients

Appendix 12: Inpatient weight chart for SAM patients

Appendix 13: Monthly report format for SAM management