



Government of Malawi
Ministry of Health

Training Course on
**INPATIENT
MANAGEMENT OF
SEVERE ACUTE
MALNUTRITION**

**Module 3.
Initial Management**



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Preface

The *Malawi Inpatient Management of Severe Acute Malnutrition Training Package* includes training modules, training guides, training aids, training planning tools, and job aids. The training package is based on the 2002 WHO Training Course on the Management of Severe Malnutrition (SAM) and has been updated to include the 2013 WHO update on management of SAM in infants and children. The training package guides participants in applying the National Guidelines for the Community-based Management of Acute Malnutrition (CMAM), 2016.

This *Module* is one of a set of training guides and modules for conducting the *Training Course on Inpatient Management of Severe Acute Malnutrition*:

Guides

Facilitator Guide

Clinical Instructor Guide

Course Director Guide

Modules

Module 1—Introduction

Module 2—Principles of Care

Module 3—Initial Management

Module 4—Feeding

Module 5—Daily Care

Module 6—Monitoring, Problem Solving and Reporting

Module 7—Involving Mothers in Care

Acronyms and Abbreviations

AWD	Acute Watery Diarrhoea
AWG	Average Daily Weight Gain
BCG	Bacillus Calmette Guerin
cm	Centimetre(s)
CMAM	Community-Based Management of Acute Malnutrition
CMV	Combined Mineral and Vitamin Mix
CSF	Cerebro-Spinal Fluid
dl	Decilitre(s)
ETAT	Emergency Triage Assessment and Treatment
g	Gram(s)
Hb	Haemoglobin
HFA	Height-for-Age
HIV	Human Immunodeficiency Virus
IGF	Insulin Growth Factor
IM	Intramuscular
IMCI	Integrated Management of Childhood Illness
IU	International Unit(s)
IV	Intravenous
IYCF	Infant and Young Child Feeding
kcal	Kilocalorie(s)
kg	Kilogram(s)
L	Litre(s)
LOS	Length of Stay
M&R	Monitoring and Reporting
MAM	Moderate Acute Malnutrition
mg	Milligram(s)
ml	Millilitre(s)
mm	Millimetre(s)
MOH	Ministry of Health
MUAC	Mid-Upper Arm Circumference
NG	Nasogastric
NRU	Nutrition Rehabilitation Unit
OPD	Outpatient Department
ORS	Oral Rehydration Solution
PCR	Polymerase Chain Reaction
PCV	Packed Cell Volume
QI	Quality Improvement
RDT	Rapid Diagnostic Test
ReSoMal	Rehydration Solution for Malnutrition
RUTF	Ready-to-Use Therapeutic Food
SAM	Severe Acute Malnutrition
SD	Standard Deviation

SFP	Supplementary Feeding Programme
TB	Tuberculosis
WFH	Weight-for-Height
WFL	Weight-for-Length
WFP	World Food Programme
WHO	World Health Organisation
WHZ	Weight-for-Height Z-Score
µg	Microgram(S)

Introduction

In the process of treating a child with severe acute malnutrition (SAM) who is admitted to inpatient care, the focus of initial management is on preventing death and stabilising the child. The first step is to rapidly screen the child for emergency signs and provide emergency treatment as necessary. This is called emergency triage assessment and treatment (ETAT). Any child presenting to the inpatient care should be checked and treated for emergency signs as part of standard procedure¹.

The focus of initial management is on emergency triage, assessment and treatment, and stabilising the child with SAM.

In an emergency, many procedures must be done very quickly, almost simultaneously. Much practice and experience is needed to perform efficiently in an emergency room as a team. This course cannot teach the entire process of emergency management, but instead focuses on the steps that must be added or adjusted to treat a child with SAM.

The ETAT procedures described in this module may be performed in the emergency room, before a child is admitted to the inpatient management of severe acute malnutrition. It is very important that emergency room health workers know to treat the child as quickly as possible and how treatment for children with SAM is differently. They must be taught to recognise children with SAM based on presence of oedema and severe wasting (mid-upper arm circumference [MUAC] < 115mm or weight-for-height z-score [WHZ] < -3 standard deviations [SD]). They should understand that these children might be seriously ill even without showing signs of infection. For instance, emergency room staff must understand that they should not start a rapid intravenous (IV) flow, but should rather follow procedures as outlined in this module, and the SAM Guidelines. It is important to train staff working in emergency room on management of SAM so that they can carry out emergency management and stabilise children with SAM before being moved to the paediatric ward or NRU. Moving children with SAM in shock or critically ill from one area (emergency room) to NRU without first implementing emergency lifesaving treatment is a leading cause of death.

After necessary emergency treatment has been provided, the child should be moved to the NRU. As soon as the child responds to the emergency treatment and his/her condition improves, the child will be submitted to a full assessment with a comprehensive examination and differential diagnoses leading to a treatment plan.

For several days, it is critical to watch for and treat or prevent life-threatening problems such as hypoglycaemia, hypothermia, shock, dehydration and infection, as these signs can re-develop during treatment. Only after these problems are under control and the child is stabilised and the appetite has returned is the child ready for rehabilitation and catch-up growth. This module describes the life-saving tasks that are essential to the emergency management of a child with SAM.

¹ Basic emergency treatment is taught in medical schools and will not be taught in this course. However, the emergency signs in case of severe acute malnutrition will be covered for the child with SAM whenever they are different than in a well-nourished child. For additional information, you may refer to the 2000 WHO *Management of the Child with a Serious Infection or Severe Malnutrition: Guidelines for care at the first-referral level in developing countries (WHO/FCH/CAH/00.1)* and the WHO 2005 *Pocket Book of Hospital Care: Guidelines for the management of common illness with limited resources*.

Learning Objectives

This module describes how and allows you to practise the skills needed to identify children with SAM. By the end of the module, you will be able to:

- Identify and manage a child with SAM with:
 - Hypoglycaemia
 - Hypothermia
 - Shock
 - Very severe anaemia
 - Corneal ulceration
 - Dehydration
- Prepare ReSoMal
- Give antibiotics
- Complete the initial assessment
- Keep a written record of initial findings and treatments

1.0 Managing Hypoglycaemia

1.1 What Is Hypoglycaemia?

Hypoglycaemia is a low level of glucose in the blood. In children with SAM, < 3 mmol/L (or < 54 mg/dl) is considered 'low'. The hypoglycaemic child is usually hypothermic (low temperature) as well. Other signs of hypoglycaemia include lethargy, limpness and loss of consciousness. Sweating and pallor may not occur in malnourished children with hypoglycaemia. Often the only sign before death is drowsiness.

The short-term cause of hypoglycaemia is lack of food. Children with SAM are more at risk of hypoglycaemia than other children and need to be fed more frequently, including during the night. Malnourished children may arrive at the hospital hypoglycaemic if they have been vomiting, if they have been too sick to eat or if they have had a long journey without food. Children may develop hypoglycaemia in the hospital if they are kept waiting for admission or if they are not fed regularly. Hypoglycaemia (and hypothermia) are also signs that the child has a serious infection.

Hypoglycaemia is extremely dangerous. The child may die if not given glucose (and then food) quickly, or if there is a long time between feeds.

1.2 Testing Blood Glucose Level

If blood was not taken during emergency procedures, take a sample on admission to the NRU. The same sample can be used to determine blood glucose level, haemoglobin (Hb) level and blood type, in case a transfusion is needed.

Blood glucose level is tested using a glucometer. Follow the manufacturer's instructions on how to test for blood glucose, an illustration of a glucometer is provided below.



Testing blood glucose level

If the blood glucose test cannot be done, assume that the child has hypoglycaemia and give treatment immediately without blood glucose test confirmation.

1.3 Preventing Hypoglycaemia: Begin F-75

If the child's blood glucose is not low, begin feeding the child F-75 right away. Feed the child every 2–4 hours, even during the night. Appropriate amounts are given in the F-75 Reference Chart based on 130 ml/kg/day or in Module 4. Feeding. These frequent, small feeds will prevent hypoglycaemia and provide nutrients for the child during the initial period of stabilisation.



Look at the F-75 Reference Chart

Notice that the first column shows the weight of the child and the next column shows the amount of F-75 to give every 2 hours. The remaining columns, which show amounts for 3-hourly and 4-hourly feeds, will be used later, as the child progresses, or now if the context is appropriate.

Note: The F-75 look-up tables in the job aid show one table with F-75 amounts for children with severe wasting and moderate or mild oedema and another table with F-75 amounts for children with severe (+++) bilateral pitting oedema. Amounts for children with severe oedema are less because the amount is based on a body weight that is corrected for the increased weight from the oedema.



*Feeding with F-75 should begin as soon as possible. Feeding with cup and saucer is discussed in detail in **Module 4. Feeding.***

1.4 Treating Hypoglycaemia

If blood glucose is low or hypoglycaemia is suspected, immediately give the child a 50 ml (infant less than 6 months 25 ml) bolus of 10 percent glucose or sucrose (i.e., sugar water²) orally or by nasogastric (NG) tube. Although 50 ml is a very small amount, it can make a big difference to the child.

Glucose is preferable because the body can use it more easily; sucrose must be broken down by the body before it can be used. However, give whichever is available most quickly. If only 50 percent glucose solution is available, dilute one part to four parts sterile or boiled water to make a 10 percent solution.

² Prepare 10% sucrose or sugar water with dissolving 1 one teaspoon (10 g) of sugar in 100 ml of water.

If the child can drink, give the 50 ml bolus orally. If the child is alert but not drinking, give the 50 ml by NG tube.

If the child is lethargic, unconscious or convulsing, give sterile 10 percent glucose 5 ml/kg IV (over about 10 minutes), followed by 10 percent glucose or sucrose 50 ml by NG tube to prevent rebound hypoglycaemia³. If the IV dose cannot be given immediately, give the NG dose first.

If the child will be given IV fluids for shock, there is no need to follow the 10 percent glucose IV with a NG bolus, because the child will continue to receive 5 percent glucose in the IV fluids.

If after giving glucose the child is alert, start feeding F-75 after half an hour, and give it every half hour during the first 2 hours. For a hypoglycaemic child, the amount to give every half hour is one-quarter of the 2-hourly amount shown on the F-75 look-up table in your job aid.

Take another blood sample after 2 hours and check the child's blood glucose again.

- If blood glucose is now 3 mmol/L or higher, change to 2-hourly feeds of F-75.
- If still low, make sure antibiotics and F-75 have been given. Keep giving F-75 every half hour until the child is stable.

Example

Ali weighs 7.4 kg, has severe wasting but no oedema, and is alert. He has hypoglycaemia and is given a 50 ml bolus of 10 percent glucose orally shortly after arrival at the hospital. One half hour after taking the glucose, Ari should be given one-quarter of the 2-hourly amount of F-75 for his weight. The 2-hourly amount is 80 ml, so Ari should be given 20 ml every half hour for 2 hours. If his blood glucose is 3 mmol/L or higher, then he should receive 80 ml of F-75 every 2 hours.

³ Rebound hypoglycaemia could occur when primary hypoglycaemia is treated with glucose, which stimulates the release of insulin to decompose glucose, which gives a sudden drop in blood glucose.

2.0 Managing Hypothermia

2.1 What Is Hypothermia?

Hypothermia is low body temperature. A child with SAM is hypothermic if the axillary temperature is below 35° C or if the rectal temperature is below 35.5° C.

Children with SAM are at greater risk of hypothermia than other children and need to be kept warm. The hypothermic child has not had enough calories to warm the body. If the child is hypothermic, he is probably also hypoglycaemic. Both hypothermia and hypoglycaemia are signs that the child has a serious systemic infection.

All hypothermic children should be treated for both hypoglycaemia and infection.

2.2 Taking the Temperature

Rectal temperatures more accurately reflect core body temperature; however, risk of nosocomial infection by handling unclean thermometers is high. If axillary temperatures are used for routine monitoring, one can convert axillary temperatures to rectal temperatures by adding 0.5° C.

A digital thermometer may be used to take an axillary temperature. It is a small hand-held device with a 'window' showing your temperature in numbers. There are many kinds of digital thermometers. Most digital thermometers are easy to use and measure body temperature in less than a minute. Carefully read the instructions before using your digital thermometer

Steps for Using a Digital Thermometer to Take Axillary Temperatures

- Clean the pointed end (probe) of the thermometer with soap and warm water or rubbing alcohol. Rinse it with cool water.
- Switch on the thermometer.
- Put the end with the covered tip securely in the child's armpit.
- Keep the thermometer in the child's armpit until the digital thermometer beeps.
- Remove the thermometer when numbers show up in the 'window'.
- Read the numbers in the window.



2.3 Warming the Child

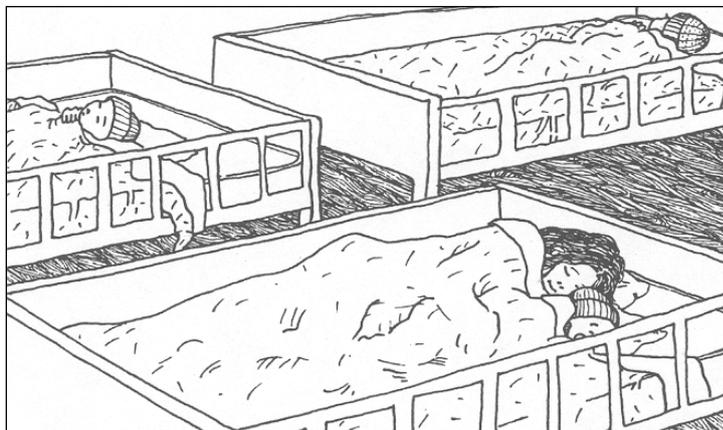
Children with SAM have difficulty controlling their body temperature. As a result, it is important to keep them warm and fed frequently. Keeping them warm also saves their energy.

Hypothermia is very dangerous. If the child is hypothermic, re-warming is needed to raise the temperature.

Maintaining Temperature (Preventing Hypothermia)

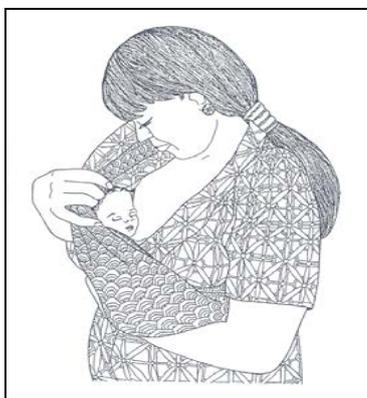
The following measures are important for all children with SAM:

- Give 2–3 hourly feeds (if possible); start feeds immediately on admission.
- Always give feeds throughout the day and night.
- Keep the child covered, including the head. Keep the child covered at night.
- Stop draughts in the room by closing windows and doors.
- Move the child away from windows.
- Maintain room temperature of 25° C–30° C if possible.
- Warm your hands before touching the child.
- Avoid leaving the child uncovered while being examined, weighed and so on.
- Promptly change wet clothes or bedding.
- Dry the child thoroughly after bathing.
- Let the child sleep with the mother⁴ in an adult bed, covered with a blanket.



Keep children warmly covered, especially at night.

In



Actively Re-Warm the Hypothermic Child

In addition to keeping the child covered and keeping the room warm, use one of the following re-warming techniques if the child is hypothermic:

- Have the mother hold the child with her/his skin next to the mother's skin when possible (kangaroo technique, as shown), and cover both of them. Keep the child's head covered. Give a warm drink to the mother.
- Use a heater or incandescent lamp with caution. Use indirect heat (not too close). Monitor rectal temperature every 30 minutes to make sure the child does not get too hot. Stop re-warming when the child's temperature becomes normal.

⁴ The term 'mother' is used throughout this module. However, it is understood that the person who is responsible for the care of the child might not always be that child's mother, but rather some other caregiver. For the sake of readability, however, 'mother' means 'mother/caregiver' throughout this module, 'she' means 'she or he' and 'her' means 'her or his'.

- ⊗ **Do not use hot water bottles (or fluorescent lamps) to re-warm the child due to the danger of burning fragile skin.**

a Treatment Card Treatment Card

The next page shows the first page of a Treatment Card: The Initial Management Chart. Information has been entered about a child's presenting signs and initial management. So far, the steps in this module have been related to the sections of the Initial Management Chart titled *Signs of SAM, Temperature, Blood Glucose, and Feeding*. As the module continues, you will learn about the other sections of this part of the Treatment Card.

A complete, blank Treatment Card can be found in Annex A. The Treatment Card will be used in this course as both a teaching aid and a record of care.

Tell a facilitator when you have reached this point in the module. When everyone is ready, your facilitator will present a brief introduction on how to use the Treatment Card. In the meantime, you may study the example on the next page.

CHILD NAME: Karen M/F (F) AGE: 18 Months HOSPITAL NUMBER: 46 Date: 15/08/16 Time: 10:15



INITIAL MANAGEMENT CHART

Comments on pre-referral and/or emergency treatment already given: Referred by health centre

SIGNS OF SAM Severe wasting? <u>(Yes) No</u> Bilateral Pitting Oedema? <u>0</u> + ++ +++ Dermatitis? <u>0</u> + ++ +++ (raw skin, fissures) Weight: <u>6.3</u> kg Height / length: <u>72</u> cm WFH: <u><-3</u> z-score MUAC: <u>103</u> mm TEMPERATURE: <u>36</u> °C axillary / <u>rectal</u> Cover child. If axillary <35° C or rectal <35.5° C, actively warm child. Check temperature every 30 min.		SIGNS OF SHOCK: <u>None</u> Lethargic/unconscious Cold hands Slow capillary refill (> 3 seconds) Weak or fast pulse If lethargic or unconscious, cold hands, plus either slow capillary refill or weak or fast pulse, give oxygen. Give IV glucose as described under Blood Glucose (left). Then give IV fluids: Amounts IV fluids per hour: 15 ml X _____ kg (child's wt.) = _____ ml																																																																																																																																																									
BLOOD GLUCOSE (<3 mmol/L or <54 mg/dl) <u>4 mmol/L</u> (If no test, treat for hypoglycaemia.) (Alert, give 10% glucose 50 ml (infant 25 ml) orally or by NG. If lethargic/unconscious, give sterile 10% glucose 5 ml/kg IV, then 50 ml (25 ml infant) by NG. Amount IV: 5 ml x _____ kg (child's weight) = _____ ml. Amount oral: _____ ml Time glucose given: <u>10:30</u> H Route: <u>Oral</u> NG IV		1 st hr Start Monitor every 10 minutes 2 nd hr Monitor every 10 minutes Time Respiratory rate Pulse rate *If improvements after 1 hour (respiratory and pulse rates are slower), repeat same amount IV fluids for second hour; then alternate ReSoMal and F-75 for up to 10 hours. If no improvement after 1 hour, treat for septic shock (transfuse whole fresh blood, see 'Haemoglobin'), give maintenance IV fluids (4 ml/kg/hour) while waiting for blood.																																																																																																																																																									
HAEMOGLOBIN (Hb): <u>9</u> g/dl (or PCV: _____ %) Blood type: <u>A+</u> If Hb <4 g/dl (or Hb 4-6 g/dl AND respiratory distress), transfuse 10 ml/kg whole fresh blood slowly over 3 hours (or 7 ml/kg packed cells in case of suspected heart failure). Amount: _____ Time started: _____ H Ended: _____ H		SIGNS OF DEHYDRATION: Watery diarrhoea? <u>Yes No</u> Blood in stool? <u>Yes No</u> Vomiting? <u>Yes No</u> Number of days with diarrhoea: _____ If diarrhoea, circle signs present: Restless/irritable Lethargic Thirsty Recent sunken eyes Dry mouth/tongue No tears																																																																																																																																																									
EYE SIGNS: None <u>Left</u> Right MEASLES: Yes No Bitot's spots, Corneal clouding, Corneal ulceration <u>Pus</u> or inflammation If eye signs (Bitot's spots, corneal clouding and corneal ulceration) or measles, give vitamin A treatment dose and atropine immediately. Record vitamin A in box below, and on Daily Care Chart.		If diarrhoea and/or vomiting, give ReSoMal orally (or by NG tube if too ill) every 30 minutes for first 2 hours and monitor * ** . Amount: 5 ml x _____ kg (child's weight) = _____ ml ReSoMal For up to 10 hours, give ReSoMal and F-75 orally (or by NG tube) in alternate hours and monitor every hour * ** . Amount: 5-10 ml x _____ kg (child's weight) = _____ to _____ ml ReSoMal every 2 hours																																																																																																																																																									
VITAMIN A: If eye signs or recent measles, give treatment dose on day 1, 2, and 14. Time first dose: _____ (Do not give vitamin A if the child does not have eye signs.)		<table border="1"> <tr> <td>< 6 months</td> <td>50,000 IU</td> </tr> <tr> <td>6-12 months</td> <td>100,000 IU</td> </tr> <tr> <td>> 12 months</td> <td>200,000 IU</td> </tr> </table>		< 6 months	50,000 IU	6-12 months	100,000 IU	> 12 months	200,000 IU																																																																																																																																																		
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FEEDING: Begin feeding with F-75 as soon as possible. If child is rehydrated, reweigh before determining amount to feed. New weight: _____ kg. Amount for 2-hourly feedings: <u>70</u> ml of F-75* Time first fed: <u>10:45</u> Record all feeds on 24-Hour Food Intake Chart. * If hypoglycaemic, feed ¼ of this amount every half hour for first 2 hours; continue until blood glucose reaches 3 mmol/L. or 54 mg/dl		<table border="1"> <thead> <tr> <th>Time</th> <th>Start</th> <th></th> </tr> </thead> <tbody> <tr> <td>Respiratory rate* (breaths/minute)</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>Pulse rate* (beats/minute)</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>Passed urine (YES/NO)</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>Number of stools</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>Number of vomits</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>Hydration signs (Yes/No)**</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>Amount ReSoMal taken (ml)</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>F-75</td><td></td><td>F-75</td><td></td><td></td><td>F-75</td><td></td><td></td><td>F-75</td><td></td> </tr> </tbody> </table>		Time	Start																		Respiratory rate* (breaths/minute)																			Pulse rate* (beats/minute)																			Passed urine (YES/NO)																			Number of stools																			Number of vomits																			Hydration signs (Yes/No)**																			Amount ReSoMal taken (ml)									F-75		F-75			F-75			F-75	
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ANTIBIOTICS: Prescription/Route <u>Benzyl penicillin IV</u> <u>Gentamicin IV</u>		Dose/Frequency/Duration <u>300,000 IU x 4/day</u> <u>45 mg once/day</u>																																																																																																																																																									
MALARIA TEST (Type/Date/Outcome):		Time of 1 st Dose																																																																																																																																																									
HTS Date: ___/___/___ Outcome: NR R Exposed DNA PCR: Positive Negative Not done N/A Date started cotrimoxazole: ___/___/___ Date started ART: ___/___/___																																																																																																																																																											

3.0 Managing a Child with SAM who is in Shock

3.1 What Is Shock?

Shock is a dangerous condition with cold extremities, slow capillary refill (longer than 3 seconds) and fast, weak pulse. Usually there is severe weakness, and lethargy or unconsciousness. It is caused by diarrhoea with dehydration, haemorrhage, burns or sepsis. In children with SAM, some of the signs of shock may appear all the time, so it is difficult to diagnose. Shock in SAM is confirmed only if the child meets the criteria listed in the box below.

A child with SAM is considered to have shock if he/she:

- Is lethargic or unconscious, *and*
- Has cold hands

plus, either:

- *Slow* capillary refill (longer than 3 seconds), *or*
- Weak or fast pulse

To check capillary refill:

- Press the nail of the thumb or big toe for 2 seconds to produce blanching of the nail bed.
- Count the seconds from release until return of the pink colour. If it takes longer than 3 seconds, capillary refill is slow.

For a child 0–12 months of age, a fast pulse is 160 beats or more per minute. For a child 12 months–5 years of age, a fast pulse is 140 beats or more per minute; for a child 6–12 years of age, a fast pulse is 120 beats or more per minute and for a child > 12 years, fast pulse is 100 beats or more per minute.

3.2 Giving Oxygen, IV Glucose and IV Fluids for Shock

If the child is in shock (meets criteria in box above):

- Give oxygen 1–2 litre per minute.
- Give sterile 10 percent glucose 5 ml/kg IV over about 10 minutes.
- Give IV fluids as described below.
- Keep the child warm.

Giving IV Fluids

Shock from dehydration and sepsis are likely to coexist in children with SAM. They are difficult to differentiate on clinical signs alone. Children with dehydration will respond to IV fluids. Those with septic shock and no dehydration will not respond. The amount of IV fluids given must be guided by the child's response. Over-hydration can cause heart failure and death.

To give IV fluids:

1. Check the starting respiratory and pulse rates and record them on the Treatment Card. Also, record the starting time.
2. Infuse IV fluid at 15 ml/kg over 1 hour. **DO NOT GIVE IV FLUIDS AS BOLUS.** Use one of the following solutions, listed in order of preference:
 - Half-strength Darrow's solution with 5 percent dextrose
 - Ringer's lactate solution with 5 percent dextrose

- If the above fluids are not available, give half-normal (0.45 percent) saline solution with 5 percent dextrose.

Note: To prepare half-strength Darrow's, Ringer's lactate, or half-normal (0.45 percent) saline solution with 5 percent glucose, take out 50 ml of the solution from a 500 ml bag and replace with 50 ml of 50 percent dextrose solution.

3. Observe the child and check respiratory and pulse rates every 10 minutes.
4. If the respiratory rate increases by 5 breaths/minute and the pulse rate increases by 25 beats/minute, stop the IV.
5. If respiratory rate and pulse rate are slower after 1 hour, the child is improving. Repeat the same amount of IV fluids for another hour. Continue to check respiratory and pulse rates every 10 minutes.
6. Assess the perfusion status: capillary refill, quality of the pulse, temperature of the extremities and so on.
7. After 2 hours of IV fluids, switch to oral or NG rehydration with ReSoMal. Give 5–10 ml/kg ReSoMal in alternate hours with F-75 for up to 10 hours. Leave the IV line in place in case it is needed again.

You will learn more about giving ReSoMal later in this module.

Notice that the steps for checking for shock and giving IV fluids are all written on the Treatment Card (excerpted below) as a reminder.

Important note: The Treatment Card is not a flow chart; thus it does not indicate steps of priority.

SIGNS OF SHOCK	None	Lethargic/unconscious	Cold hands	Slow capillary refill (> 3 seconds)	Weak or fast pulse					
<i>If lethargic or unconscious, cold hands, plus either slow capillary refill or weak or fast pulse</i>										
Give oxygen 1-2 L per hour. Give sterile 10% glucose 5 ml/kg IV over 10 minutes. Amount 5 ml x ____ kg (child's weight) = _____ ml										
Give IV fluids half-strength Darrow's with 5% glucose OR Ringer's lactate with 5% glucose solution an added sterile potassium chloride 20 mmol/L) 15 ml/kg over 1 hour. Amount 15 ml x ____ kg (child's weight) = _____ ml										
	Start:	Monitor every 10 minutes				2 hr:	Monitor every 10 minutes			
Time										
Resp. rate										
Pulse rate										
*If improvements (respiratory and pulse rates are slower) after 1 hour, repeat same amount IV fluids for second hour; then alternate ReSoMal and F-75 for up to 10 hours. If no improvement after 1 hour, treat for septic shock (transfuse whole fresh blood, see 'Haemoglobin'), give maintenance IV fluids (4 ml/kg/hour) while waiting for blood.										

3.3 If No Improvement with IV Fluids, Give Blood Transfusion

If the child fails to improve after the first hour of IV fluids, then assume that the child has septic shock. A blood transfusion is indicated. Give maintenance IV fluids (4 ml/kg/hour) while waiting for blood. When blood is available, stop all oral intake and IV fluids, give a diuretic to make room for the blood and then transfuse whole fresh blood at 10 ml/kg slowly over 3 hours. If there are signs of heart failure, give packed cells instead of whole blood since these have a smaller volume. (See steps below under very severe anaemia for more details.)

Also, give IV Ceftriaxone if suspecting septic shock.

4.0 Managing Very Severe Anaemia

4.1 What Is Very Severe Anaemia?

Anaemia is a low concentration of Hb in the blood. Very severe anaemia is a Hb concentration of < 4 g/dl (or packed cell volume < 12%) or Hb concentration of 4–6 g/dl and respiratory distress. Very severe anaemia can cause heart failure (because there is ‘high output’ failure with an overactive circulation) and must be treated with a blood transfusion. As malnutrition is usually not the cause of very severe anaemia, it is important to investigate other possible causes, such as malaria and intestinal parasites (for example, hookworm).

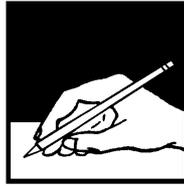
Mild or moderate anaemia is very common in children with SAM and should be treated presumptively with iron, after the child has stabilised and is taking F-100 or F-100 Diluted. Do NOT give iron now as it can damage cell membranes and make infections worse. Also, iron is not given when the child receives RUTF because it contains the daily iron requirements.

If Hb is < 4 g/dl (or Hb is 4–6 g/dl and there are signs of respiratory distress), give a blood transfusion⁵.

1. Stop all oral intake and IV fluids during the transfusion.
2. Look for signs of heart failure, such as fast breathing, respiratory distress, rapid pulse and engorgement of the jugular vein, cold hands and feet and cyanosis of the fingertips and under the tongue.
3. Get blood ready. If there are no signs of heart failure, give 10 ml/kg whole fresh blood over 3 hours. If there are signs of heart failure, give packed cells (5–7 ml/kg) over 3 hours instead of whole blood.
4. Give a diuretic⁶ at the start of the transfusion to make room for the blood. Furosemide (1 mg/kg, given by IV) is the most appropriate choice.

⁵ Where testing for HIV and viral hepatitis B is not possible, or where HIV is very common, give transfusion only when Hb falls below 3 g/dl (or packed cell volume < 10%), or when there are signs of life-threatening heart failure.

⁶ Diuretics should never be used to reduce oedema in children with severe acute malnutrition. The purpose of giving a diuretic before a blood transfusion is to prevent congestive heart failure from overloading the circulation with the transfusion.



Exercise A

In this exercise, you will be given some information and partially completed Treatment Cards for several children. You will then answer questions about treatment needed. Use the job aids as needed.

Case 1 – Chisomo

Chisomo is an 18-month-old girl who was referred from a health centre. Her arms and shoulders appear very thin. She has moderate oedema (both feet and lower legs). She does not have diarrhoea or vomiting, and her eyes are clear. Chisomo did not pass the appetite test and was admitted to hospital. Additional information is provided on the Treatment Card sections below.

SIGNS OF SAM: Severe wasting?	Yes	No
Bilateral Pitting Oedema?	0	+ ++ +++
Dermatosis?	0	+ ++ +++ (raw skin, fissures)
Weight (kg):	6.2	Height/length (cm): 70
WFH z-score:	< -3	MUAC (mm): 107

TEMPERATURE: 35.5° C	axillary	rectal
If axillary < 35° C or rectal < 35.5° C, actively warm child. Check temperature every 30 minutes.		

BLOOD GLUCOSE <3 mmol/L or <54 mg/dl If no test available, treat for hypoglycaemia. If alert, give 10% glucose 50 ml (infant 25 ml) orally or by NG: Yes No Glucose level: 3.5 mmol/L If lethargic/unconscious, give sterile 10% glucose 5 ml/kg IV, then give 50 ml (25 ml) by NG. Amount: 5 ml x ___ kg (child's weight) = _____ ml. Time glucose given: Oral NG IV		
HAEMOGLOBIN (Hb): 9 g/dl or PCV: _____ % Blood type: B+ If Hb <4 g/dl (or Hb 4–6 g/dl AND respiratory distress), transfuse 10 ml/kg whole fresh blood slowly over 3 hours (or 7 ml/kg packed cells in case of suspected heart failure) Amount: _____ Time started: _____ Ended: _____		

- 1a. What is Chisomo's nutritional status? Explain why.

- 1b. Should Chisomo be admitted to the NRU for management of SAM in inpatient care? Why or why not?

- 1c. Is Chisomo hypothermic?

- 1d. Is Chisomo hypoglycaemic?

- 1e. Does Chisomo have very severe anaemia?

- 1f. Chisomo is alert and does not have cold hands. Her capillary refill is 2 seconds. Her pulse seems weak. According to the definition given in this module, is Chisomo in shock?

- 1g. What two things should be done for Chisomo immediately based on the above findings?

When you have finished this case, discuss your answers with a facilitator.

Case 2 – Tamanda

Tamanda is a 3-year-old girl. She is very pale when she is brought to the hospital, but she is alert and can drink. She has no signs of shock, no diarrhoea, no vomiting and no eye problems. Additional findings are described in the Treatment Card sections below.

SIGNS OF SAM: Severe wasting?	<u>Yes</u>	No
Bilateral Pitting Oedema?	<u>0</u>	+ ++ +++
Dermatosis?	<u>0</u>	+ ++ +++ (raw skin, fissures)
Weight (kg):	<u>8.0</u>	Height/length (cm): <u>83</u>
WFH z-score:	<u>< -3</u>	MUAC (mm): <u>109</u>

TEMPERATURE: <u>36.0° C</u>	<u>axillary</u>	rectal
If axillary < 35° C or rectal < 35.5° C, actively warm child. Check temperature every 30 minutes.		

<p>BLOOD GLUCOSE <3 mmol/L or <54 mg/dl If no test available, treat for hypoglycaemia. If alert, give 10% glucose 50 ml (infant 25 ml) orally or by NG: Yes No Glucose level: <3.0 mmol/L If lethargic/unconscious, give sterile 10% glucose 5 ml/kg IV, then give 50 ml (25 ml) by NG. Amount: 5 ml x ___ kg (child's weight) = _____ ml. Time glucose given: Oral NG IV</p>		
<p>HAEMOGLOBIN (Hb): <u>3.9</u> g/dl or PCV: _____ % Blood type: <u>A+</u> If Hb <4 g/dl (or Hb 4–6 g/dl AND respiratory distress), transfuse 10 ml/kg whole fresh blood slowly over 3 hours (or 7 ml/kg packed cells in case of suspected heart failure) Amount: _____ Time started: _____ Ended: _____</p>		

2a. What should Tamanda be given immediately to treat her hypoglycaemia?

How should it be given?

2b. When should Tamanda begin taking F-75?

How often and how much should she be fed?

2c. Does Tamanda have very severe anaemia?

If yes, what should be done? Tamanda has no signs of congestive heart failure.

Case 3 – John

John is a 15-month-old boy who has been unwell since the rains fell 5 weeks ago. For the last 3 days, he has had no food but has been given some fluids for diarrhoea. John is lethargic and limp on arrival at the hospital, and the physician assumes his blood glucose is low without taking time for a blood sample and dextrostix test. John’s temperature does not record on a standard thermometer. His gums, lips and inner eyelids appear normal in colour (not pale). Additional information is given below.

SIGNS OF SAM: Severe wasting?	Yes	No
Bilateral Pitting Oedema?	0	+ ++ +++
Dermatosis?	0 +	++ +++ (raw skin, fissures)
Weight (kg):	5.8	Height/length (cm): 69
WFH z-score:	< -3	MUAC (mm): 111

TEMPERATURE: Assumed <35° C	axillary	rectal
If axillary < 35° C or rectal < 35.5° C, actively warm child. Check temperature every 30 minutes.		

BLOOD GLUCOSE <3 mmol/L or <54 mg/dl If no test available, treat for hypoglycaemia. If alert, give 10% glucose 50 ml (infant 25 ml) orally or by NG: Yes No Glucose level: assumed < 3 If lethargic/unconscious, give sterile 10% glucose 5 ml/kg IV, then give 50 ml (25 ml) by NG. Amount: 5 ml x ___ kg (child’s weight) = _____ ml. Time glucose given: Oral NG IV		
HAEMOGLOBIN (Hb): <u>Assumed normal</u> g/dl or PCV: _____ % Blood type: If Hb <4 g/dl (or Hb 4–6 g/dl AND respiratory distress), transfuse 10 ml/kg whole fresh blood slowly over 3 hours (or 7 ml/kg packed cells in case of suspected heart failure) Amount: _____ Time started: _____ Ended: _____		

SIGNS OF SHOCK	None	Lethargic/unconscious	Cold hands	Slow capillary refill (> 3 seconds)	Weak or fast pulse					
If lethargic or unconscious, cold hands, plus either slow capillary refill or weak or fast pulse, Give oxygen 1–2 L per minute. Give sterile 10% glucose 5 ml/kg IV over 10 minutes. Amount 5 ml x ___ kg (child’s weight) = _____ ml Give IV fluids half-strength Darrow’s with 5% glucose OR Ringer’s lactate with 5% glucose solution and added sterile potassium chloride 20 mmol/L 15 ml/kg over 1 hour. Amount 15 ml x ___ kg (child’s weight) = _____ ml										
	Start:	Monitor every 10 minutes				2 hr:	Monitor every 10 minutes			
Time						*				
Resp. rate						*				
Pulse rate						*				
*If improvements (respiratory and pulse rates are slower) after 1 hour, repeat same amount IV fluids for second hour; then alternate ReSoMal and F-75 for up to 10 hours. If no improvement after 1 hour, treat for septic shock (transfuse whole fresh blood, see ‘Haemoglobin’), give maintenance IV fluids (4 ml/kg/hour) while waiting for blood.										

3a. What are four treatments that John needs immediately?

-
-
-
-

3b. What amount of sterile 10 percent glucose should be given by IV?

3c. What amount of IV fluids should be given over the first hour?

John is given IV fluids starting at 9:45. His respiratory rate at that time is 60 breaths per minute, and his pulse rate is 130. John is monitored every 10 minutes over the next hour, and both his respiratory and pulse rates slow down during this time. At 10:45, his respiratory rate is 40 and his pulse rate is 105.

3d. What should be done for the next hour?

After 2 hours of IV fluids, John is alert enough to drink, although he still appears unwell. His blood glucose has been tested and is now up to 5 mmol/L. His Hb is 8 g/dl. He is weighed again, and his new weight is 6.0 kg.

3e. What should John be given in alternate hours over the next period of up to 10 hours?

3f. How much F-75 should be given at each feed? (*Hint: Use John's new weight to determine amount.*)

When you have finished this exercise, discuss your answers with a facilitator.

5.0 Giving Emergency Eye Care for Corneal Ulceration

5.1 What Is Corneal Ulceration?

Corneal ulceration is a break in the surface of the cornea (membrane covering the pupil and the iris of the eye). The eye may be extremely red or bleeding. A child with corneal ulceration may keep the affected eye shut.

Corneal ulceration is very dangerous. If there is an opening in the cornea, the lens of the eye can extrude (push out) and cause blindness. Photograph 12 in the *Photographs* booklet shows corneal ulceration.

5.2 Examining the Eyes

Wash your hands. Touch the eyes extremely gently and as little as possible. The child's eyes may be sensitive to light and may be closed. If the eyes are closed, wait until the child opens his/her eyes to check them, or gently pull down the lower eyelids to check. Wash your hands again after examining the eyes.

5.3 Giving Vitamin A Treatment and Atropine Eye Drops Immediately for Corneal Ulceration

If the child has corneal clouding or corneal ulceration, give vitamin A immediately on day 1. The dose will be repeated on day 2 and day 14.

Child's age	Frequency	Vitamin A oil-based (Oral Dose)
< 6 months	Day 1, 2, 14	50,000 IU
6–12 months	Day 1, 2, 14	100,000 IU
> 12 months	Day 1, 2, 14	200,000 IU

Also instil one drop atropine (1 percent) into the affected eye(s) (3 times a day) to relax the eye and prevent the lens from pushing out. Atropine also will relieve the pain.

Chloramphenicol eye drops (4 times a day) or tetracycline ointment (3 times a day) and bandaging are needed, but can wait until later in the day. If the child falls asleep with his eyes open, close them gently to protect them. Continuing treatment of corneal clouding and corneal ulceration is described in Module 5. Daily Care.

Note:

- All children with SAM and eye signs of vitamin A deficiency or with measles or had measles in the last 3 months should receive the vitamin A treatment dose
- All children with SAM without eye signs of vitamin A deficiency or without recent measles (now or in past 3 months) and receive the therapeutic foods that comply with the World Health Organisation (WHO) specifications **should NOT** receive additional vitamin A supplementation. Therapeutic foods that comply with WHO specifications include commercial (pre-packaged) F-75, F-100, RUTF and ReSoMal, and feeds prepared using a combined vitamin and mineral mix described in Module 2.
- Pus in the eyes may hide signs of vitamin A deficiency, so additional doses of vitamin A should be given to be on the safe side.

5.4 What Is Corneal Clouding?

Although corneal ulceration is an emergency sign, *corneal clouding* is a less severe eye condition that can quickly aggravate and evolve into corneal ulceration. Corneal clouding is loss of epithelial tissue from the surface of the conjunctiva and cornea (eye's surface) due to progressive erosion and necrosis of the tissue. The eye's surface looks dry, opaque and dull, with or without Bitot's spots⁷.

⁷ Bitot's spot is a foamy material on the conjunctiva.

6.0 Managing Watery Diarrhoea and/or Vomiting

6.1 What Is ReSoMal?

The oral rehydration solution for malnutrition (ReSoMal) is recommended by the WHO for use with dehydration in children with SAM. It is a modification of the standard low-osmolarity oral rehydration solution (ORS). ReSoMal contains less sodium, more sugar and more potassium than standard low-osmolarity ORS and is intended for children with SAM with signs of dehydration. ReSoMal should be given by mouth or by NG tube in case the child is too ill to drink.

Except in SAM cases with profuse diarrhoea and in suspected cholera, then the standard low-osmolarity ORS should be used to replenish important sodium losses.

Commercially procured (pre-packaged) ReSoMal is commonly available in health facilities, but it may also be prepared from standard low-osmolarity ORS with some additional ingredients listed in the box below.

Contents of ReSoMal Prepared from standard low-osmolarity ORS:

Water	2,000 ml
Standard low-osmolarity ORS	1 L packet
Sugar	50 g
CMV	1 levelled red scoop

6.2 Recognising the Need for Rehydration

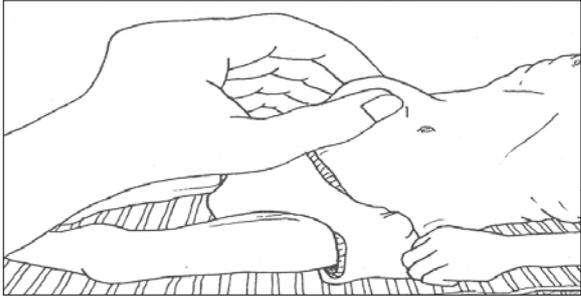
It is difficult to determine the dehydration status of children with SAM, because the usual signs of dehydration such as lethargy, very slow skin pinch, sunken eyes may be present in children with SAM all the time, whether or not they are dehydrated.

Ask the mother whether the child has had watery diarrhoea or vomiting. If the child has had recent fluid loss (usually watery diarrhoea with a sudden onset or vomiting), and there is a recent change in the child's appearance (if the eyes are sunken and if they became sunken since the diarrhoea started) assume dehydration and give ReSoMal. Also, ask about blood in the stool, because this will affect the choice of antibiotics.

Even if a child with SAM has oedema, he or she may be dehydrated, and ReSoMal should be given. The oedema indicates a loss of control of fluid distribution in the body, rather than too much fluid.

Note the following signs of dehydration so that improvements can be detected later. Even though the signs may be misleading, if they go away after giving ReSoMal, you will know that the ReSoMal has had a good effect.

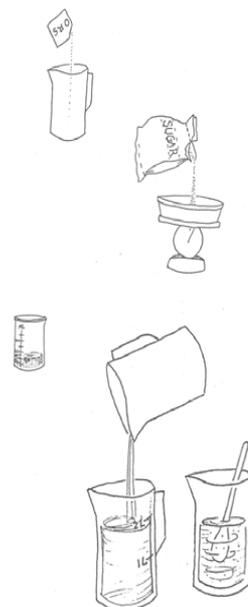
Signs of Dehydration in Children with SAM

Sign	Description or action
Recent history of diarrhoea	Note any sudden onset of watery diarrhoea and/or vomiting that accompanies a recent change in the child's appearance.
Lethargic	A lethargic child is not awake and alert when he or she should be. The child is drowsy and does not show interest in what is happening around him or her.
Restless, irritable	The child is restless and irritable all the time or whenever she or he is touched or handled.
Absence of tears	Observe whether the child has tears when he or she cries.
Sunken eyes	The eyes of a child with SAM may always appear sunken, regardless of whether the child is hydrated. Ask the mother whether the child's eyes appear unusual or if the eyes became sunken with the onset of the diarrhoea. Photographs 6, 30 and 31 in the Photographs booklet show sunken eyes.
Dry mouth and tongue	Feel the child's tongue and the inside of the mouth with a clean, dry finger to determine if they are dry.
Thirsty	See if the child reaches out for the cup when you offer ReSoMal. When it is taken away, see if the child wants more.
Skin pinch goes back slowly	<p>Using your thumb and index finger, pinch the skin on the child's abdomen half-way between the umbilicus and the side of the abdomen. Place your hand so that the fold of skin will be in a line up and down the child's body, not across the body. Firmly pick up all the layers of skin and tissue under them. Pinch the skin for 1 second and then release. If the skin stays folded for a brief time after you release it, the skin pinch goes back slowly. (Important note: <i>The skin pinch may always go back slowly in a wasted child.</i>)</p> 

6.3 Preparing ReSoMal from Standard Low-Osmolarity ORS

When preparing ReSoMal from standard ORS and combined mineral and vitamin mix (CMV), prepare as follows.

1. Wash hands.
2. Empty 1 L standard low-osmolarity ORS packet into container that can hold more than 2 L.
3. Measure and add 50 grams of sugar. It is best to weigh the sugar on a dietary scale that weighs to a precision of 5 g.
4. Measure and add 1 level scoop of CMV to the other ingredients (or 40 ml of the mineral mix solution).
5. Measure and add 2 L cooled, boiled water.
6. Stir until dissolved.
7. Use within 24 hours.



6.4 Preparing ReSoMal from Commercially (Pre-packaged) Product

When using commercial (pre-packaged) ReSoMal, follow the package instructions. Below is a summary of the instructions:

1. Wash hands.
2. Empty 1 packet (42 grams) of pre-packaged ReSoMal into a container that can hold up to 1 L.
3. Add 1 L of clean, boiled water into the container.
4. Stir until dissolved.
5. Use within 24 hours.

6.5 Calculating the Amount of ReSoMal to Give and the Frequency to Give It

Give oral ReSoMal to a child with SAM and signs of dehydration, in amounts based on the child's weight.

How Often to Give ReSoMal	Amount to Give
Every 30 minutes for first 2 hours	5 ml/kg
Alternate hours for up to 10 hours	5-10 ml/kg*

* The amount offered in this range should be based on the child's willingness to drink. F-75 10 ml/kg/2-hours (or 130 ml/kg/day) is given in alternate hours during this period until the child is rehydrated.

If the child has already received IV fluids for shock and is switching to ReSoMal, omit the first 2-hour treatment and start with the amount for the next period of up to 10 hours. If the child cannot take ReSoMal orally, give by NG tube. Monitor the child's condition carefully, and stop when signs of hydration appear (e.g., making tears, saliva, passing urine).

When signs of hydration appear, continue to replace the fluid loss after each loose stool (see in section 6.8).



Fill in the blanks in the following case studies.

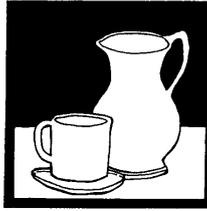
1. Suzgo has watery diarrhoea and is severely wasted. He weighs 6.0 kg. He should be given _____ ml ReSoMal every _____ minutes for _____ hours. Then he should be given _____–_____ ml ReSoMal in _____ hours for up to _____ hours. In the other hours during this period, _____ should be given.
2. Towera, who is severely wasted, arrived at the hospital in shock and received IV fluids for 2 hours. She has improved and is now ready to switch to ReSoMal. Towera weighs 8.0 kg. For up to _____ hours, she should be given ReSoMal and F-75 in alternate hours. The amount of ReSoMal to offer is _____–_____ ml per hour.

Answer the question below:

3. After the first 2 hours of ReSoMal, a child with severe wasting is offered 5–10 ml/kg of ReSoMal in alternate hours. What two factors affect how much to offer in this range?

Check your own answers to this exercise by comparing them to the answers given on page 54 at the end of the module

Tell a facilitator when you are ready for the group exercise on the next page.



Exercise B

In this exercise, the group will prepare and taste ReSoMal and will measure appropriate amounts to give to children with SAM.

A facilitator will lead this exercise. When the group has prepared and tasted the ReSoMal, each person should answer the following questions individually. Then a facilitator will ask each person to measure the amount of ReSoMal given in one of the answers.

1. Mphatso has severe wasting and has watery diarrhoea and is just starting ReSoMal. He weighs 7.3 kg.
 - a. How much ReSoMal should Mphatso be given every 30 minutes for the next 2 hours?
 - b. After 2 hours, what is the least amount of ReSoMal that Mphatso should be offered in alternate hours?
 - c. What is the greatest amount of ReSoMal that Mphatso should be offered in alternate hours?

2. Tiwone has severe wasting and has vomiting and watery diarrhoea. She weighs 11.6 kg.
 - a. How much ReSoMal should Tiwone be given every 30 minutes for the next 2 hours?
 - b. After 2 hours, what is the least amount of ReSoMal that Tiwone should be offered in alternate hours?
 - c. What is the greatest amount of ReSoMal that Tiwone should be offered in alternate hours?

Tell a facilitator when you have answered the above questions and are ready to measure the amounts of ReSoMal.

6.6 Giving ReSoMal Slowly

It is essential to give ReSoMal slowly, much more slowly than you would give ORS to a well-nourished child. Too much fluid too quickly can cause heart failure.

The best way to give ReSoMal is by cup, even with a very sick child. The child may need to be coaxed, or you may need to use a spoon.

If the mother is able to give the ReSoMal, she should be taught to give it slowly.

An NG tube can be used for giving ReSoMal at the same rate if the child is too weak to take enough fluid voluntarily. An NG tube should be used in weak or exhausted children, or in those who vomit, have fast breathing or painful mouth sores.



IV fluids should not be used to treat dehydration (except in case of shock as discussed earlier). Since clinical signs cannot determine the degree of dehydration, and too much fluid could cause heart failure, it is very important that fluids not be forced on the child. When fluids are given orally, the child's thirst helps regulate the amount given.

6.7 Monitoring the Child Who Is Taking ReSoMal

Monitor the child's progress every 30 minutes for the first 2 hours; then monitor hourly, that is, every time the child takes F-75 or ReSoMal.

Signs to Check

- Clinical signs of improvement
- Clinical signs of overhydration
- Respiratory rate—count for a full minute.
- Pulse rate—count for 30 seconds and multiply by 2.
- Urine frequency—ask: Has the child urinated since last checked?
- Stool or vomit frequency—ask: Has the child had a stool or vomited since last checked?
- Signs of hydration—Have tears returned? Is the mouth less dry? Is the child less lethargic or irritable? Are the eyes less sunken? Does a skin pinch go back faster?

Record the above information on the Treatment Card; then give ReSoMal and record the amount taken. Notice any changes when you check the signs above.

Signs of Improving Hydration Status

- Fewer or less pronounced signs of dehydration, for example:
 - Less thirsty
 - Skin pinch not as slow (however, this sign is not reliable)
 - Less lethargic

- Note: Although these changes indicate that rehydration is proceeding, many children with SAM will not show these changes even when fully rehydrated.
- Slowing of rapid respiratory and pulse rates
- Passing urine
- Not thirsty

If a child has three or more of the above signs of improving hydration status, stop giving ReSoMal routinely in alternate hours. Instead, offer ReSoMal after each loose stool, as described in the section below.

Signs of Over-Hydration

Stop ReSoMal if any of the following signs appear:

- Increased respiratory rate and pulse rate (both must increase to consider it a problem)
- Jugular veins engorged (pulse wave can be seen in the neck)
- Increasing oedema (e.g., puffy eyelids)

Encourage and support mothers to continue breastfeeding the child during rehydration.

6.8 After Rehydration, Offering ReSoMal after Each Loose Stool

When the child has three or more signs of improving hydration (see above), stop giving ReSoMal routinely in alternate hours. However, watery diarrhoea may continue after the child is rehydrated. If diarrhoea continues, give ReSoMal after each loose stool to replace stool losses and prevent dehydration.

Severely Wasted Children

- For children < 2 years, give 30–50 ml after each loose stool.
- For children 2 years and older, give 100 ml after each loose stool.

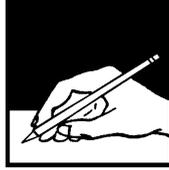
Base the amount given in these ranges on the child's willingness to drink and the amount of stool loss. Amounts will be around 15–30 ml/kg/loose stool.

Oedematous Children

- Give 30 ml after each loose stool.

6.9 Case with Profuse Watery Diarrhoea

In case of profuse watery diarrhoea (e.g., cases of cholera or diarrhoea due to *Cryptosporidium Parvum*), ReSoMal should not be given and should be replaced by the standard low-osmolality ORS without changing the amounts and frequency as described above.



Exercise C

In this exercise, you will be given information and a partially completed Treatment Card or a blank Treatment Card for several children. You will then answer questions about treatment needed or complete the Treatment Card.

Case 1 – Yamikani

Yamikani is an 11-month-old boy. Additional information is given on the Treatment Card parts below. Yamikani is awake, has no signs of shock and has no diarrhoea or vomiting. His dextrostix shows blood sugar in the range of < 3 mmol.

SIGNS OF SAM: Severe wasting?	Yes	No
Bilateral Pitting Oedema?	0	+ ++ +++
Dermatosis?	0 +	++ +++ (raw skin, fissures)
Weight (kg):	6.2	Height/length (cm): 70
WFH z-score:	< -3	MUAC (mm): 109

TEMPERATURE:	< 35° C	axillary	rectal
If axillary < 35° C or rectal < 35.5° C, actively warm child. Check temperature every 30 minutes.			

BLOOD GLUCOSE (mmol/L) <i>If no test, treat for hypoglycaemia.</i>			
<i>If < 3 mmol/L and alert, give 50 ml bolus of 10% glucose or sucrose (oral or NG). Yes No</i>			
<i>If < 3 mmol/L and lethargic, unconscious or convulsing, give sterile 10% glucose IV:</i>			
5 ml x ___ kg (child's weight) = ___ ml. Then give 50 ml bolus NG.			
Time glucose given:	Oral	NG	IV
HAEMOGLOBIN (Hb) (g/dl):	or Packed Cell Vol (PCV):	Blood type:	
<i>If Hb < 4 g/dl (or Hb 4–6 g/dl AND respiratory distress), transfuse 10 ml/kg whole fresh blood (or 5–7 ml/kg packed cells) slowly over 3 hours.</i>			
Time started:	Amount:		
Time ended:	Ended:		

EYE SIGNS	None	Left	Right
Bitot's spots	Pus/Inflammation	Corneal clouding	Corneal ulceration
<i>If eye signs (bitot's spot, corneal clouding and corneal ulceration), give vitamin A and atropine immediately. Record on Daily Care Chart. If no ulceration, give vitamin A preventive dose on week 4 or upon discharge.</i>			
ORAL DOSES VITAMIN A	< 6 months*		50,000 IU
* Treatment dose on days 1, 2, 15	6–12 months* **		100,000 IU
** Preventive dose on week 4 or upon discharge	> 12 months* **		200,000 IU
MEASLES	Yes	No	Vaccination upon admission: Yes No (Record on Outcome page)

*** 'Yes' is circled if the child has measles now or has had measles in the past 3 months. This affects the number of doses of vitamin A given (to be discussed in Module 5. Daily Care).

1a. What are three things that should be done immediately for Yamikani?

-
-
-

1b. In a half hour, what should be given to Yamikani? How much should be given?

Case 2 – Khama (For this case, use the first page of a blank Treatment Card, available in your classroom.)

Khama is a 9-month-old boy. He has not been feeding well in the last 3 weeks. He has had loose stools and vomiting in the last 3 days. There has been no blood in the stool. Khama is severely wasted and has some mild dermatosis. He has no oedema. His MUAC is 104 mm. His weight is 4.4 kg and length is 64 cm.

Khama's rectal temperature is 38° C, and his blood glucose is 5 mmol/L. His Hb is 12 g/dl. His eyes appear clear, and he has not had measles. He has no signs of shock.

When the physician does a skin pinch, Khama cries but he has no tears. The skin pinch goes back slowly. Khama has a dry mouth and drinks eagerly.

2a. Using the above information about Khama, complete as many parts of the Treatment Card as you can.

Note: You will not complete the section of the Treatment Card for 'ANTIBIOTICS' in this exercise. Although it is important to give antibiotics quickly, you will learn about these later. In the 'DIARRHOEA' section, complete only the top part now and the amount of ReSoMal to give. Do not complete the 'FEEDING' section yet.

Since Khama has diarrhoea but no signs of shock, he needs ReSoMal. Khama is first given ReSoMal at 9:00. His respiratory rate is 28 and his pulse rate is 105. He eagerly takes the full amount. At 9:30, his respiratory rate is still 28 and his pulse rate is 105. Khama has not passed urine. He has had one loose stool but no vomiting. There has been no change in hydration signs. Again, Khama takes the full amount of ReSoMal.

2b. In the 'DIARRHOEA' section of Khama's Treatment Card, complete the 'Start' (9:00) column and the column for 9:30. (You will need to abbreviate or write briefly in the row for hydration signs. Since Khama has had no change in hydration signs, write 'same'.)

The columns below show Khama's progress during the next hour. He continues to take the full amount of ReSoMal. You may transfer this information to Khama's Treatment Card if you want to.

Time	10:00	10:30
Respiratory rate	28	25
Pulse rate	105	100
Passed urine? Yes/No	No	No
Number stools	0	1
Number vomits	1	0
Hydration signs	Same	Moist mouth

2c. At 11:00, Khama is ready to begin the next period of treatment, during which ReSoMal and F-75 are given in alternate hours. How much ReSoMal should Khama be given in alternate hours? Enter this information on the Treatment Card.

2d. What signs of over-hydration should be watched for during this period?

At 11:00, Khama's respiratory rate remains at 25 and his pulse rate at 100. He has passed no urine, but he has had one loose stool in the past hour. He has not vomited. Khama takes the maximum amount of ReSoMal in his range, but he no longer seems thirsty and eager to drink.

2e. Complete the column in the 'DIARRHOEA' section of Khama's Treatment Card for 11:00.

At 12:00, Khama's respiratory rate remains at 25 and his pulse rate at 100. He has passed no urine or stools in the past hour, and he has not vomited. When a skin pinch is done, it returns normally. Khama now has tears as well as a moist mouth. Khama is weighed again. He now weighs 4.5 kg. Khama continues to be willing to drink within the recommended range, although he does not drink eagerly.

2f. What signs of improving hydration does Khama show?

2g. Should ReSoMal be continued routinely in alternate hours? Why or why not?

2h. What should be given to Khama in the next hour (starting at 12:00)? How much should be given? Record this information in the 'FEEDING' section of the Treatment Card.

Khama should continue taking F-75 every 2 hours, even during the night. He must also be kept warm. Khama should also be given antibiotics, which you will learn about in the next section of this module.

2i. If Khama's diarrhoea continues, what should he be given after each loose stool? How much should he be given?

When you have finished this case, discuss your answers with a facilitator.

Case 3 – Ellen (For this case, use the first page of a blank Treatment Card available in your classroom. This case will be done as a group.)

Ellen is a 25-month-old girl. She arrives at the hospital at 10:00 on March 3. She has had diarrhoea and vomiting for 10 days. She is severely wasted. She has no oedema and no dermatosis. She weighs 6.1 kg and is 74 cm in length. Her MUAC is 109 mm.

Ellen has a rectal temperature of 36° C and a blood glucose level of 4 mmol/L. Her Hb has not been tested. Her left eye appears normal, but her right eye has some pus draining from it. She has not had measles.

Ellen has cold hands and is lethargic. When the physician presses her thumbnail, it takes longer than 3 seconds for the pink colour to return to the nail bed. Her pulse is fast (140 per minute).

Although Ellen has had steady diarrhoea, her mother says there has been no blood in the stool. When the physician pinches the skin of Ellen's abdomen, it stays folded for 2 seconds. Ellen does not cry or respond to the pinch, so the physician cannot tell if she has tears. She seems to have sunken eyes, but her mother says they are always that way. She has a dry mouth.

3a. Using the information about Ellen, complete as many parts of the Treatment Card as you can.

Note: You will not complete the section for 'ANTIBIOTICS' in this exercise. Although it is important to give antibiotics quickly, you will learn about these later. In the 'DIARRHOEA' section, complete only the top part at this point (through 'dehydration signs'). Do not complete the 'FEEDING' section yet.

3b. Is Ellen hypoglycaemic?

Is she hypothermic?

3c. Does Ellen need vitamin A?

Does she need it immediately?

3d. What signs of shock does Ellen have?

What amount of sterile 10 percent glucose should she be given by IV? Enter the amount on the Treatment Card in the 'BLOOD GLUCOSE' section.

What amount of IV fluids should Ellen be given in the first hour? Enter the amount on the Treatment Card in the 'SIGNS OF SHOCK' section.

Ellen’s IV is started at 10:30. Her respiratory rate is 40 breaths per minute and her pulse rate is 140 per minute. The nurses monitor Ellen every 10 minutes. The results of monitoring are as follows.

Time	Respiratory rate	Pulse rate	
10:40	38	130	
10:50	36	120	
11:00	35	100	Ellen sits up, seems alert
11:10	33	90	
11:20	32	85	
11:30	30	80	

3e. Enter Ellen’s starting time and rates on her Treatment Card. Then enter the information from monitoring. What should be done next for Ellen?

Ellen is given IV fluids for another hour. During the second hour, her respiratory rate remains steady at 30 and her pulse rate at 80. After receiving IV fluids, Ellen weighs 6.2 kg.

3f. Finish completing the ‘IV’ section of Ellen’s Treatment Card.

3g. What should be given to Ellen at 12:30?

How much should be given? Enter the range of amounts on the Treatment Card in the second (right-hand) part of the ‘DIARRHOEA’ section.

At 12:30, Ellen’s respiratory rate is still 30 and her pulse rate is still 80. She has not passed urine. She has had one diarrhoeal stool, but no vomiting. She is alert, but her skin pinch still goes back slowly. Her eyes are still sunken.

3h. Complete the column for 12:30 in the right-hand part of the ‘DIARRHOEA’ section of the Treatment Card. The nurse offers Ellen the maximum amount of ReSoMal in her range, and Ellen eagerly takes it all. Write this amount in the space for ‘AMOUNT TAKEN’ at the bottom of the 12:30 column.

At 13:30, Ellen’s respiratory rate is still 30 and her pulse rate is still 80. She has had one diarrhoeal stool, no vomiting and no urine. Her eyes still appear sunken. Her skin pinch goes back quickly.

3i. Complete the 13:30 column of the ‘DIARRHOEA’ section of the Treatment Card.

3j. Using Ellen’s new weight of 6.2 kg, look on your F-75 Look-Up Tables Job Aid to find the amount of F-75 to give at 13:30. Record this amount in the ‘FEEDING’ section of the Treatment Card.

3k. At 14:30 what should Ellen be given?

Twelve hours after her arrival at the hospital, Ellen is much better. She responded well to IV fluids and ReSoMal. It is clear that she is rehydrated. She needs to continue 2-hourly feeds of F-75, but she no longer needs ReSoMal routinely. She needs antibiotics, which you will learn about in the next section of the module.

3l. Ellen's diarrhoea continues after she is rehydrated. What does she need after each loose stool?
How much does she need?

7.0 Giving Antibiotics

Give all children with SAM antibiotics for presumed infection. Give the first dose of antibiotics while other initial treatments are going on, as soon as possible.

Antibiotic recommendations may vary from place to place based on local patterns of resistance. The recommendations given in this module may need to be adapted locally. The important principle is that all children with SAM should be given appropriate antibiotics.

7.1 Selecting Antibiotics and Prescribing the Regimen

Selection of antibiotics depends on the presence or absence of medical complications in SAM, and on local resistance patterns. Complications include: severe pneumonia, shock, hypoglycaemia, hypothermia, lethargy or unconsciousness, dehydration, corneal ulceration, skin infections or dermatosis (+++ with raw skin/fissures), urinary tract infections, sickly appearance.

The summary chart on the next page and the Medicine Protocols for Children with SAM in Inpatient Care Job Aid show the following guidance:

- If no medical complications, give first-line broad spectrum antibiotic:
 - Amoxicillin 15 mg/kg/dose every 8 hours orally for 5 days (infants < 2 months amoxicillin 15 mg/kg/dose every 12 hours).
- If medical complications⁸, give first-line broad spectrum antibiotic:
 - Benzyl penicillin 50,000 IU/kg/dose IV (or IM) every 6 hours for 2 days; switch to oral amoxicillin 15 mg/kg/dose every 8 hours for 5 days; if not possible, continue benzyl penicillin IV for a total of 7 days.

PLUS

- Gentamicin, 7.5 mg/kg IV (or IM) once a day for 7 days (infants from second week of life onwards included).
- If the child fails to improve within 48 hours, conduct thorough review and investigations to look for focus of infection before switching antibiotics.
- Give second-line broad spectrum antibiotic:
 - Ceftriaxone 100 mg/kg/dose IV (or intramuscular [IM]) once a day for 5 days (infants < 3 kg: 50 mg/kg).
- If the child fails to improve within 48 hours and if suspected staphylococcal infection, give:
 - Cloxacillin 25–50 mg/kg/dose IV (or IM) every 6 hours for 5 days (infants < 3 kg: 25–50 mg/kg/dose every 8 hours).
- In the case of sepsis or septic shock:
 - Give IV/IM ceftriaxone (for children/infants beyond 1 month: 100 mg/kg once a day)
- If specific infections are identified that require a specific antibiotic not already being given, give an additional antibiotic to address that infection. For example, dysentery and pneumonia may require additional antibiotics. Certain skin infections such as Candidiasis require specific antibiotics. Antibiotics required for specific infections are described on the drug kits for management of SAM with medical complications (see support materials).

⁸ Complications include respiratory distress or pneumonia, lethargy or unconsciousness, shock, hypoglycaemia, hypothermia, convulsions, severe anaemia, dehydration, blinding eye signs, high fever and sickly appearance.

- If a specific infection is identified that requires a specific antibiotic not already being given, give the appropriate antibiotic to address that infection. For example, dysentery may require other antibiotics. Certain skin infections, such as Candidiasis, require specific antifungals.
- If the child is HIV-positive, in addition to the above antibiotic and antiretroviral therapy (ART), give cotrimoxazole prophylaxis and link to care in line with the national guidelines for HIV/AIDS.



Look at the Medicine Protocols for Children with SAM in Inpatient Care Job Aids (Annex C) and the list of drugs for inpatient management of SAM in Module 1. Introduction. The management of common medical conditions associated with SAM are introduced in the section below and discussed in Annex C.

Different formulations of drugs (e.g., tablets or syrups of varying strengths) are available. The formulation of the drug will affect the amount to measure for a dose. Some common formulations are given in the Summary Chart: Antibiotics for Children with SAM in Inpatient Care Job Aid. For each formulation of a drug, the tables have recommended doses to use for children of different weights. Refer to the job aid as you read the following steps and example.

Summary Chart: Antibiotics for Children with SAM in Inpatient Care

IF:	GIVE:	
NO MEDICAL COMPLICATIONS	Amoxicillin oral (15 mg/kg) every 8 hours for 5 days	
MEDICAL COMPLICATIONS (shock, hypoglycaemia, hypothermia, dermatosis with raw skin/fissures, respiratory or urinary tract infections, or lethargic/sickly appearance)	Gentamicin IV or IM (7.5 mg/kg) once daily for 7 days, PLUS:	
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Benzyl penicillin IV or IM (50,000 IU/kg) every 6 hours for 2 days</td> <td style="width: 50%;">Followed by: Amoxicillin oral (15 mg/kg) every 8 hours for 5 days</td> </tr> </table>	Benzyl penicillin IV or IM (50,000 IU/kg) every 6 hours for 2 days
Benzyl penicillin IV or IM (50,000 IU/kg) every 6 hours for 2 days	Followed by: Amoxicillin oral (15 mg/kg) every 8 hours for 5 days	
Resistance to amoxicillin and benzyl penicillin, and presence of medical complications	In the case of sepsis or septic shock , give: IV/IM ceftioxone (children or infants over 1 month of age (100 mg/kg once a day)	
	If suspected staphylococcal infections , add: IV/IM cloxacillin (25–50 mg/kg/dose 4 times a day, depending on the severity of the infection). If out of stock, give oral flucloxacillin 25–50 mg/kg every 6 hours	
No improvement after 48 hours on benzyl penicillin and gentamicin	CEFTRIAXONE 100 mg/kg IV or IM once a day for 5 days (infants < 3 kg: 50 mg/kg)	
Specific infection requires an additional antibiotic	Add specific antibiotic as per standard treatment guidelines for Malawi	
Child is HIV positive or exposed	Cotrimoxazole oral according to the Malawi Guidelines for Clinical Management of HIV	

Specific Formulations and Body Weight Ranges for Antibiotics for SAM Children in Inpatient Care

ANTIBIOTIC	ROUTE/DOSE/ FREQUENCY/ DURATION	FORMULATION	DOSE ACCORDING TO CHILD'S WEIGHT		
			3 up to 6 kg	6 up to 8 kg	8 up to 10 kg
Amoxicillin	Oral: 15 mg/kg body weight every 8 hours for 5 days	Syrup, 125 mg/5 ml	2.5 ml	5 ml	5 ml
		Syrup, 250 mg/5 ml	1.5 ml	2 ml	2.5 ml
Benzyl penicillin	IV or IM: 50,000 units/kg body weight every 6 hours for 5 days	IV: vial of 600 mg mixed with 9.6 ml sterile water to give 1,000,000 units/10 ml	2 ml	3.5 ml	4.5 ml
		IM: vial of 600 mg mixed with 1.6 ml sterile water to give 1,000,000 units/2 ml	0.4 ml	0.7 ml	0.9 ml

ANTIBIOTIC	ROUTE/DOSE FREQUENCY/ DURATION	FORMULATION	DOSES FOR SPECIFIC BODY WEIGHTS <i>(Use closest weight)</i>									
			3 kg	4 kg	5 kg	6 kg	7 kg	8 kg	9 kg	10 kg	11 kg	12 kg
Gentamicin	IV or IM: 7.5 mg/kg once daily for 7 days	IV/IM: vial containing 20 mg (2 ml at 10 mg/ml), undiluted	2.25 ml	3 ml	3.75 ml	4.5 ml	5.25 ml	6 ml	6.75 ml	7.5 ml	8.25 ml	9 ml
		IV/IM: vial containing 80 mg (2 ml at 40 mg/ml) mixed with 6 ml sterile water to give 80 mg/8 ml	2.25 ml	3 ml	3.75 ml	4.5 ml	5.25 ml	6 ml	6.75 ml	7.5 ml	8.25 ml	9 ml
		IV/IM: vial containing 80 mg (2 ml at 40 mg/ml), undiluted	0.5 ml	0.75 ml	0.9 ml	1.1 ml	1.3 ml	1.5 ml	1.7 ml	1.9 ml	2 ml	2.25 ml

Steps to Determine the Dose

1. Refer to the summary table above to determine what drug is needed and by what route it should be given.
2. Determine the child's weight. Never base the dose for a child with SAM on age.
3. Determine what formulation of the drug (e.g., tablet or syrup) is available and the strength.
4. Look up the formulation on the dosage tables, and find the amount to give for the child's weight. For most drugs, the dosages are given for weight ranges. For gentamicin, doses are given for specific weights

Example of Determining the Dose

Apatsa is 82 cm in height and weighs 8.6 kg. He is severely wasted with a z-score of < -3 and MUAC of 107 mm. He has mild oedema. His rectal temperature is 36°C and his blood glucose is about 4 mmol/L. He is alert and irritable. He has no dermatosis. He has no signs of shock. He has had some loose stools but no blood in the stools. There is no evidence of respiratory or urinary tract infections.

1. Apatsa has no complications, so he should be given amoxicillin. It should be given orally every 8 hours for 5 days.
2. Apatsa's body weight is 8.6 kg.
3. The hospital has amoxicillin syrup containing 125 mg per 5 ml.
4. The physician looks up the dose for this strength amoxicillin syrup and Apatsa's weight. The dose is 5 ml. He prescribes 5 ml amoxicillin syrup to be taken orally every 8 hours for 5 days.

7.2 Choosing and Using the Best Route of Administration

Sometimes there is a choice of whether to give a drug by IV or by IM injection. IM injections are very painful for a child with SAM. If an IV line is in, and being used for giving fluid, then use it for the antibiotic(s) as well. If there is no IV line in, and only one IM injection is needed, give the IM injection, but take special care to avoid bruising tender skin. Use lidocaine to reduce the pain. The child will not have much muscle, so look for the sites with the most muscle and rotate sites (e.g., buttocks, thighs). If more than 2 ml is to be injected, divide the dose between two sites.

If frequent injections are needed, it is preferable to use a 21-gauge or 23-gauge butterfly needle to keep a vein open for injecting antibiotics. Use the IV dose. This option allows the staff to conveniently give the antibiotic intravenously without leaving an IV bag up, and it is less painful for the child.

Heparinised cannulas can also be used to keep a vein open for giving antibiotics.



Exercise D

In this exercise, you will select antibiotics and determine dosages for several children.

Refer to the Summary Chart: Antibiotics for Children with SAM in Inpatient Care Job Aid as needed. When there are different drug formulations listed, choose the drug formulation that is most likely to be available in your hospital.

Case 1 – Pempho

Pempho is 77 cm long, weighs 8.0 kg and has a MUAC reading of 102 mm. He has oedema of both feet and mild dermatosis. He has no hypoglycaemia, no hypothermia, no signs of shock and no other complications.

- 1a. What antibiotic does Pempho need? By what route should it be given?

- 1b. Look at the formulations listed on the dosage tables. What formulation is most likely to be available in your hospital? (*Use this formulation to answer the next question.*)

- 1c. Given Pempho's weight, what should his dose be?

- 1d. Summarise the prescription for Pempho in the table below:

Drug	Route	Dose	Frequency	Duration

Case 2 – Ana

Ana weighs 6.0 kg. She has SAM and hypoglycaemia, hypothermia and mild dermatosis. She does not have shock and will not be given IV fluids.

- 2a. What two antibiotics should Ana be given now?
- 2b. By what possible routes may these antibiotics be given?
- 2c. Assuming that all of the necessary supplies are available, what route should be chosen?
- 2d. For each drug, list the formulation to be used. *(If there is a choice, choose the formulation most likely to be available in your hospital.)*
- 2e. Given Ana’s body weight, determine the dose of each antibiotic.
- 2f. For each antibiotic to be given to Ana, summarise the prescription below:

Drug	Route	Dose	Frequency	Duration

Ana improves within 48 hours. Her temperature rises and stays above 35.5° C, and her blood glucose level rises above 3 mmol/L. She has not gained weight, but she is alert and is taking F-75 well.

- 2g. After 2 days, how should Ana’s drug regimen change?
- 2h. What formulation of the new drug is most likely to be available in your hospital?
- 2i. Given the formulation listed in 2h, what is the appropriate dose for Ana?

2j. Summarize the prescription for the new drug below:

Drug	Route	Dose	Frequency	Duration

Case 3 – Mtisunge (optional)

Mtisunge is 82 cm long and weighs 7.9 kg. She is 2 years old. She appears sickly and has fast breathing (55 breaths per minute) and chest in-drawing.

3a. Mtisunge has signs of a specific infection (pneumonia) that require a specific antibiotic. Look on the Summary Chart: Antibiotics for Children with SAM in Inpatient Care Job Aid to see what antibiotic is required first and record it below.

3b. Mtisunge will be given IM injections. What is the dose?

3c. Summarise the prescription for Mtisunge in the table below:

Drug	Route	Dose	Frequency	Duration

3d. After 5 days, Mtisunge’s breathing is normal and there is no chest in-drawing. She is taking F-75 well. She still weighs 7.9 kg. Does Mtisunge need other antibiotics to be given next?

When you have finished this exercise, discuss your answers with a facilitator.

When everyone is ready, the group will view a video segment about emergency treatment: Video 2, Emergency Treatment. This video will show many of the steps described so far in this module.

8.0 Management of Common Medical Conditions Associated with SAM

Individuals with SAM are very susceptible to infections and other medical conditions. The management of some medical conditions is altered when associated with SAM, and, therefore, discussed in this annex. Treatment is based on diagnosis and complements the emergency and routine treatment as described in the latest Malawi Standard Treatment Guidelines.

The following medical conditions that are associated with children with SAM (in alphabetical order):

- Candidiasis
- Dysentery
- Helminthiasis
- High fever
- HIV
- Malaria
- Measles
- Meningitis
- Nosocomial infections
- Otitis media
- Persistent diarrhoea
- Pneumonia
- Profuse watery diarrhoea and cholera; persistent diarrhoea (add some notes on this too)
- Skin infections
- Tuberculosis (TB)
- Urinary tract infections
- Other vitamin and mineral deficiencies

CANDIDIASIS

Children with SAM are severely immunocompromised, even when HIV negative, and Candidiasis is common. Oral Candidiasis causes creamy-white lesions in the mouth and may be painful, making feeding difficult. The diagnosis of superficial (oral, skin) Candidiasis is confirmed by the presence of typical yeast forms on Gram staining of scrapings from the lesion.

- Give 100,000 units/ml of nystatin suspension 1–2 ml orally every 6 hours for 7 days. If nystatin suspension is not available, apply 1 percent gentian violet solution. If both these treatments are ineffective and if available, apply 2 percent miconazole gel 5 ml every 12 hours for 7 days.

Suspect Oesophageal Candidiasis if the child has difficulty or pain while vomiting or swallowing, is reluctant to take food, has excessive salivation or cries during feeding. Candidiasis can also involve the stomach, rectum and moist tissues (e.g., in the axillae or groin). In systemic candidiasis, the respiratory tract and blood may be involved.

- Give fluconazole 3–6 mg/kg/day orally once a day for 7 days. If the child has active liver disease, does not respond to or tolerate oral therapy or is at risk of disseminated Candidiasis, give amphotericin B 0.5 mg/kg IV once a day for 10–14 days.

DYSENTERY

Shigella: Most episodes of dysentery are due to Shigella and require antibiotic treatment. Findings on examination are diarrhoea presenting with loose, frequent stools with blood and may include abdominal pain, fever, convulsions, lethargy, dehydration and rectal prolapse. Treatment is with an oral antibiotic to which most local strains of Shigella are sensitive. Unfortunately, the choice of antimicrobials for treating Shigellosis has narrowed a great deal in recent years as antimicrobial resistance has become widespread. Resistance is now widespread to ampicillin and cotrimoxazole (sulfamethoxazole trimethoprim), formerly the drugs of choice.

- Give ciprofloxacin 10–15 mg/kg/day orally every 12 hours for 5 days as a first-line antibiotic. If there are no signs of improvement (no fever, fewer stools with less blood, improved appetite) after 2 days, give ceftriaxone, 80 mg/kg/day IV (or IM) once a day given over 30 minutes for 3–5 days as a second-line antibiotic where local antimicrobial sensitivity is not known.
- Examine the young infant less than 2 months for surgical causes for blood in the stools. Otherwise give ceftriaxone 100 mg/kg IV (or IM) once daily for 5 days.
- Health facilities in areas with a high incidence of bloody diarrhoea should keep in stock several antimicrobials known to be effective against most local strains of Shigella.
- Give supportive care, including preventing dehydration with continued feeding, and/or correction of additional losses with ORS and zinc supplement.
- Treat children with SAM first for Shigella and then for amoebiasis.

Amoebiasis: Amoebiasis can cause dysentery, liver abscess and other systemic complications but is rare in children under 5 years of age. Treat children for amoebiasis if motile trophozoites of *Entamoeba histolytica* containing ingested erythrocytes are found in a fresh stool sample or if bloody diarrhoea continues after successive treatment with two antibiotics that are usually effective for Shigella. The finding of amoebic cysts in the stools is not sufficient for a diagnosis of amoebiasis.

- Give metronidazole, 7.5 mg/kg orally every 8 hours for 5 days.

Giardiasis: Intestinal infection with giardia is common and may have no adverse effect on well-nourished children. However, children with SAM should be treated for giardiasis when cysts or trophozoites of *Giardia* are seen in the stool.

- Give metronidazole, 7.5 mg/kg orally every 8 hours for 5 days.

HELMINTHIASIS

Ascaris (hookworm infection and trichuriasis): Children who play outside are commonly infected with *Ascaris lumbricoides* (roundworm), *Ancylostoma duodenale* or *Necator americanus* (hookworm) or *Trichuris trichiura* (whipworm). Hookworm infections can cause severe anaemia. Whipworm infections can cause dysentery, anaemia and occasionally prolapse of the rectum. In areas where hookworm and whipworm are common, treatment of these infections in the child of 1 year or older with SAM is routinely provided. Treatment is delayed until the child is stable and/or has regained appetite and/or is in outpatient care for one week, unless the infestation is severe and life-threatening.

For children who weigh less than 10 kg, or are less than 1 year of age, and if infection is confirmed:

- Give pyrantel 10 mg/kg orally single dose

For children who weigh 10 kg or more, or are 1 year of age and older and if infection is confirmed:

- Give albendazole 200 mg (children 1–2 years) or 400 mg (children > 2 years) orally once a day for three days, or mebendazole 100 mg once a day (children 1–2 years) or 100 mg twice a day (children > 2 years) orally for 3 days with inpatient care.

In environments where worm infestation is prevalent and no evidence of infestation:

- Give albendazole 200 mg (children 1–2 years) or 400 mg (children > 2 years), or mebendazole 250 mg (children 1–2 years) or 500 mg (children > 2 years) orally single dose.

Strongyloidiasis: Infection with *Strongyloides stercoralis* is also common in children who play outside. Diagnosis is made by detecting typical larvae in the faeces. In children whose immune systems are depressed by other diseases, the larva may become widely disseminated, giving rise to life-threatening pulmonary, cerebral and hepatic complications.

For children who weigh less than 10 kg, or are less than 1 year of age:

- Give albendazole 200 mg orally once a day before food for 3 days.

For children who weigh 10–15 kg, or are 1–3 years of age:

- Give albendazole 400 mg orally once a day before food for 3 days.

For children who weigh more than 15 kg, or are 4 years of age or older:

- Give ivermectin 200 µg/kg orally once a day for 2 days.

Note: Tiabendazole is effective but should be avoided because it causes severe anorexia, which is dangerous for children with SAM.

HIGH FEVER

If a child with SAM has high fever (body temperature 39.5° C or 103° F) or persistent fever, sponge the child's body with tepid (lukewarm) water. Use paracetamol only if the fever causes the child distress and be cautious of the risk of hepatic damage at normal doses. Dosages of paracetamol (120 mg/5 ml syrup or 1/2 500 mg tablet replaces 10 ml syrup) every 6 hours are 2 ml for children 4–6 kg, 2.5 ml for children 6–10 kg, 5 ml for children 10–12 kg, 7.5 ml for children 12–14 kg, and 10 ml for children 14–19 kg.

HIV

HIV-positive children commonly present with MAM or SAM. The exact causes are probably multifactorial but include altered glucose and lipid metabolism, raised basal metabolic rate, especially when opportunistic infections are present, multiple micronutrient deficiencies, higher rates of diarrhoea and malabsorption, frequent co-infections and higher rates of food insecurity and poverty. As a result of their compromised immune systems, HIV-positive children suffer high mortality rates. HIV-positive children with SAM have a three times higher risk of dying than HIV-negative children.

Testing children who have SAM for their HIV status is important to determine whether they need to start life-saving cotrimoxazole prophylaxis and antiretroviral therapy (ART).

- Routinely test all children with SAM with medical complications treated in inpatient care.

Treatment of SAM is the same whether the children are HIV-positive or HIV-negative. Treatment of HIV is the same in children with or without SAM: cotrimoxazole and ART regimens are provided in the same doses, and should follow the Malawi Guidelines on Clinical Management of HIV. However, the treatment of HIV in children with SAM is slightly altered:

- Give immediate prophylactic treatment with cotrimoxazole against pneumocystis jirovecii pneumonia and other infections and start lifelong ART as soon as possible after stabilisation of metabolic complications and sepsis, indicated by return of appetite and resolving severe oedema.

For HIV-positive children with SAM who start on ART in outpatient or inpatient care:

- Give routine antibiotic and antihelminthic treatment, and vitamin and mineral supplementation in the same way as for HIV-negative children. Examine and treat for other infections.
- Give therapeutic feeding in the same way as for HIV-negative children.
- Monitor closely metabolic complications and opportunistic infections during the first 6–8 weeks after initiation of ART for early diagnosis and treatment.
- Investigate children with persistent diarrhoea that does not resolve with standard management to exclude carbohydrate intolerance and infective causes that may require different management such as modification of fluid and feed intake or antibiotics.
- Treat swallowing difficulties because of oesophageal candidiasis, herpes simplex or aphthous ulcers.
- Evaluate children with symptoms of poor weight gain, fever, current cough or contact history with a TB case for TB and other conditions.

Refer to the current Malawi Guidelines for Clinical Management of HIV in Children and Adults

MALARIA

Malaria in children with SAM is routinely diagnosed on admission regardless of their body temperature, or later if signs of malaria appear (fever and no runny nose, no measles and no other cause of fever). Malaria is diagnosed by a rapid diagnostic test (RDT) or microscopic examination of a blood smear for malarial parasites. Also, insecticide-treated bednets should be made available for the prevention of malaria infection in young children and pregnant women, and provided to all children with SAM in inpatient care.

Treatment of malaria in children with or without SAM is the same. Follow the National Malaria Guidelines on the treatment for simple and severe malaria.

Children with signs of very severe febrile disease (fever and any danger sign or stiff neck) need immediate referral and emergency treatment in hospital. Start treatment before referral.

Avoid the use of quinine because quinine is toxic in children with SAM

MEASLES

Measles is a highly contagious viral disease with serious complications (e.g., blindness in children with pre-existing vitamin A deficiency) and high mortality. Because children with severe malnutrition (and/or HIV infection) may not present with clinical measles signs (fever, generalized maculopapular rash and either cough, runny nose or red eyes), diagnosis of measles may be difficult. Always look for danger signs, fever, or clouding of cornea or pus, or deep or extensive mouth ulcers.

As a preventive measure, always:

- Check the health passport to see whether the child received measles vaccine (if 9 months and older). If not, give vaccine according to national immunisation schedule.
- If child is less than 9 months of age, on discharge from inpatient care, give an appointment for the child to receive measles vaccination at 9 months of age.

- Complete the child's immunisation schedule following the national immunisation schedule.

All children with SAM and measles now or within the last 3 months need immediate referral and treatment in hospital.

There is no specific treatment for measles, but most children with measles may develop secondary systemic bacterial infections such as pneumonia, otitis media, diarrhoea, conjunctivitis, corneal and retinal damage and septic shock.

- Give eye care, see Blinding Eye Problems, and Eye Infections.
- Give the routine antibiotic treatment for SAM.
- Give vitamin A treatment, also in the absence of clinical eye signs: vitamin A 50,000 IU (infants less than 6 months), 100,000 IU (infants 6–12 months) or 200,000 IU (children 1 year and older), on day 1, day 2 and day 14 (after 2 weeks). Check whether the first dose was already given before arrival.
- Examine and treat any infection immediately.
- Apply tepid sponging for fever, and only give paracetamol if high fever is causing the child distress.
- Encourage continued breastfeeding during illness.
- Start therapeutic feeding in small amounts every 2–3 hours.
- Treat mouth ulcers with gentian violet.

MENINGITIS

Suspect meningitis in children with signs of serious bacterial infection (drowsiness, lethargy, unconsciousness, stiff neck, anorexia, irritability, a high-pitched cry, petechial or purpuric rash, and, in young infants, apneic episodes, convulsions or a bulging fontanelle). When meningitis is suspected and where possible, do a lumbar puncture to confirm infection. Children with meningitis are treated in hospital according to the national or WHO guidelines.

NOSOCOMIAL INFECTIONS

Children with SAM are susceptible to infection and exposed to other children with transmissible infections. Such children, especially when treated in inpatient care, have a high incidence of nosocomial infections (hospital-acquired).

- Put into place a high level of infection control, including hand washing for health workers, mothers, carers and children and hygiene measures for bedding and environment.
- Carefully consider using antibiotics that rapidly induce antimicrobial resistance of clinical importance.

OTITIS MEDIA

Otitis media occurs frequently in children, often in connection with hospital-acquired upper respiratory infection. There are no specific clinical signs except when the eardrum has ruptured, causing drainage from the ear. Diagnosis usually requires examining the ears with an otoscope, looking for loss of the tympanic light reflex or perforation of the eardrum. Typical signs of inflammation may not be present.

- Give the routine antibiotic treatment for SAM; examine and treat for other infections. Check for tender swelling behind the ear.
- Use a cotton wick to dry any drainage from the ear.

In case of signs of mastoiditis—ear pain, pus draining from ear and tender swelling behind the ear—the child needs immediate referral and treatment in hospital.

PNEUMONIA

Pneumonia in children who have SAM is manifested by cough or difficult or fast breathing. Cough, coarse crackly breath sounds, nasal flaring and abnormalities on a chest X-ray are frequently absent. The cut-off for fast breathing is 60 breaths/minute in infants less than 2 months, 50 breaths/minute or more in infants 2–11 months and 40 breaths/minute or more in children 1–5 years.

- Give the routine antibiotic treatment for SAM; examine and treat for other infections.
- If wheezing (even if it disappeared after rapidly acting bronchodilator), give an inhaled bronchodilator for 5 days, or if not available give oral salbutamol.
- If coughing for more than 3 weeks, or if having recurrent wheezing, refer for assessment for TB or asthma.

Severe pneumonia in children who have SAM is manifested by cough or difficult breathing plus at least one of the following: central cyanosis, inability to breastfeed or drink or vomiting everything, convulsions, lethargy or unconsciousness, severe respiratory distress (e.g., very laboured breathing, fast breathing, not able to eat, using auxiliary muscles for breathing, or head nodding). Some or all of the other signs may be present: nasal flaring, grunting in young infants, lower chest wall indrawing (i.e., lower chest wall goes in when the child breaths in), chest auscultation signs of pneumonia may be absent, decreased breath sounds or bronchial breath sounds, crackles, abnormal vocal resonance, pleural rub. Central cyanosis may also be due to respiratory insufficiency or sepsis. If fingertip pulse oximetry is available, hypoxia (i.e., SaO₂ of < 90 percent) could be checked. In severe pneumonia, there is no central cyanosis or respiratory distress, but emergency treatment is equally needed.

- Give oxygen through nasal prongs or a nasal catheter, with a flow of 1–2 litres/minute. Oximetry is useful to guide the oxygen therapy if available.
- Give the routine antibiotic treatment for SAM; examine and treat for other infections.
- For children who are not improving within two days, give second line antibiotic. If possible, obtain a chest X-ray, and examine and treat for staphylococcus pneumonia, empyema, TB and HIV.
- Start therapeutic feeding with starter F-75 and continue breastfeeding.

Aspiration pneumonia may develop because of aspiration of milk feeds, especially if the children have swallowing difficulties (e.g., cerebral palsy). Health workers should be aware of this complication, and should acknowledge this risk during the therapeutic milk feeds, but aspiration of feeds can also occur at home. Aspiration pneumonia is suspected if a child's condition suddenly becomes worse, and treatment should be given immediately because it can be fatal.

- Place the child on his/her side.
- Give oxygen 1-2 litres/minute if the SaO₂ is < 90 percent, or in the absence of oximetry if there is cyanosis, severe lower chest wall indrawing, fast breathing.
- Give ceftriaxone or metronidazole.

SERIOUS UNDERLYING DISEASE

Malnutrition may result from unrecognised congenital abnormalities, inborn errors of metabolism, malignancies, immunological diseases and other diseases of the major organs. Include a search for serious underlying disease when examining a child who fails to respond to treatment. Treat any problem identified appropriately, but manage the related SAM according to the national guidelines.

SKIN INFECTIONS

Bacterial skin infections include pustules, impetigo, infected fissures (especially behind the ears) and indolent ulcers.

- Wash the affected area with soap and water and gently remove debris and crusts by soaking in warm saline or clean warm water. Dry the child carefully.
- Apply 10 percent polyvidone iodine ointment, or 5 percent chlorhexidine lotion to the affected area.
- Widespread superficial and deep-seated infections could be a sign of osteomyelitis that needs to be confirmed by X-ray. Treatment may require an anti-staphylococcal antibiotic: cloxacillin 25–50 mg/kg IV or orally every 6 hours (infants 25–50 mg/kg/dose every 12 hours in first week of life or every 8 hours in 2–4 weeks of life) (or flucloxacillin or oxacillin) as staphylococcus aureus is a common cause of skin infection.
- Drain any abscesses surgically.

Scabies is caused by a mite that burrows superficially into the skin and causes intense itching. The scratched lesions often become secondarily infected.

- Apply 0.3 percent lindane lotion once daily for 2 days to the affected areas.
- Avoid 25 percent benzyl benzoate lotion, which is more irritating in children with SAM, unless there is no alternative.

Also treat family members to prevent infestation or re-infestation.

TUBERCULOSIS

Tuberculosis (TB) is an important cause of failure-to-respond-to-treatment in children with SAM. HIV-positive children are at increased risk of TB. Diagnosis of TB in children is based on clinical features, supported by a chest X-ray and examination or culture of induced sputum (i.e., mucous secretion from the lungs, bronchi and trachea that is ejected through the mouth). Obtaining suitable sputum samples from children could be difficult, and the growth in culture of mycobacterium tuberculosis takes weeks. The tuberculin skin test and other tests for immune memory response are often negative owing to anergy (i.e., inability of an immune cell to respond against its target) and may not tell the difference between latent and active TB. Therefore, use clinical scoring systems to support diagnosis.

Diagnosing TB in children relies on a thorough assessment of all the evidence from a careful history, clinical examination and relevant investigations. Most children with TB have pulmonary TB. A recommended scoring system to use in children with SAM with suspicion of TB is the presence of *three or more* of the following key features, which should prompt treatment:

1. Chronic symptoms that suggest TB (e.g., constant cough for more than 21 days, prolonged fever for more than 14 days, weight loss or failure to thrive, SAM),
2. Physical signs that suggest TB (e.g., gibbus or angulation of spine, non-painful cervical lymphadenopathy, non-painful pleural/pericardial effusion, meningitis not responding to

antibiotic for more than 15 days, ascites, non-painful enlarged joints for which no cause is known, phlyctenular conjunctivitis, erythema nodosum),

3. History of recent close contact with persons infected with TB (close = person in same household; recent = last 2 years),
4. Positive tuberculin skin test (for children with SAM induration is 5 mm or more, in normal children 10 mm or more),
5. Chest x-ray that suggests TB.

The decision to treat a child should be carefully considered. Once such a decision is made, the child should be treated with a full course of therapy. Refer to the National Guidelines for the Management of Tuberculosis.

URINARY TRACT INFECTIONS

Urinary tract infections occur often in children with SAM, with a similar incidence in boys and girls. Such infections are usually asymptomatic, but clinical features could include fever, hematuria, strong smelling urine, increased frequency of urination, urinary incontinence, abdominal or back pain, or painful urination. Urinary tract infections are diagnosed using dip-stick tests, or by finding large numbers of leukocytes on microscopic examination of fresh urine (at least 10 leukocytes per microscope field with X40 magnification), however performance of the tests could be altered because of differing leukocytes responses to infection in children with SAM.

Routine testing for urinary tract infections could be considered; however, all children with SAM receive a routine broad-spectrum antibiotic that covers urinary tract infections. Children who are still febrile after 48-hours should be given a second-line antibiotic that targets Gram negative organisms. These children should receive ciprofloxacin, 15 mg/kg/dose, orally every 12 hours for 5 days or ceftriaxone, 80 mg/kg/day (infants < 3 kg: 50 mg/kg), IV (or IM) as a single dose given over 30 minutes.

OTHER VITAMIN AND MINERAL DEFICIENCIES

Many children with SAM are deficient in riboflavin; ascorbic acid; pyridoxine; thiamine; fat-soluble vitamins D, E and K; and zinc, magnesium, potassium and selenium. Knowing the levels of serum electrolytes rarely changes the management of children with SAM. These values are often misinterpreted, leading to inappropriate treatment. It is usually not helpful to measure serum electrolytes.

- Give therapeutic foods that comply with WHO specifications, since they are sufficiently fortified with these minerals and vitamins. Otherwise, add an electrolyte and mineral solution and vitamin mix to the feed to provide the daily requirements for children with SAM.

The following disorders are adequately prevented by outpatient therapeutic feeding and oral rehydration with standard low-osmolality ORS in outpatient care or by ReSoMal in inpatient care if there are signs of dehydration:

Hypernatraemia: Some children with diarrhoea develop hypernatraemic dehydration, especially when given drinks that are hypertonic owing to their high sugar content (e.g., soft drinks, commercial fruit drinks, too-concentrated infant formula) or salt. These draw water from the child's tissues and blood into the bowel, raising the concentration of sodium in extra-cellular fluid. If the solute in the drink is not fully absorbed, the water remains in the bowel, causing osmotic diarrhoea. Children with hypernatraemic dehydration (serum Na >150 mmol/l) have thirst that is out of proportion to other

signs of dehydration. Their most serious problem is convulsions, which usually occur when the serum sodium concentration exceeds 165 mmol/l, especially when IV therapy is given. Seizures are much less likely when hypernatraemia is treated with an oral rehydration solution, which usually causes the serum sodium concentration to become normal slowly. It is crucial to bring down the sodium very slowly to avoid the risk of central pontine myelinolysis. The serum sodium drop should not exceed 12 mmol/L per 24 hours (or 0.5 mmol/L/hour).

Hyponatraemia: Children with diarrhoea who drink mostly water or watery drinks that contain little salt may develop hyponatraemia (serum Na <130 mmol/l). Hyponatraemia is especially common in children with Shigellosis and in children with oedema. Severe hyponatraemia can be associated with lethargy and, less often, seizures. Oral rehydration is safe and effective therapy for nearly all cases.

Hypokalaemia: Inadequate replacement of potassium losses during diarrhoea can lead to potassium depletion and hypokalaemia (serum K⁺ <3 mmol/l), especially in children with SAM. This can cause muscle weakness, paralytic ileus, impaired kidney function and cardiac arrhythmia. Giving a base (bicarbonate or lactate) to treat acidosis without simultaneously providing potassium worsens hypokalaemia. To prevent hypokalaemia and correct the potassium deficit, use oral rehydration solution and give food rich in potassium during diarrhoea and after it has stopped.

9.0 Completing the Assessment

9.1 Recording the History

After the initial management of the child with SAM, do a full assessment that will lead to a comprehensive treatment plan.

The checklist in box 1 guides the full assessment. A printed treatment chart is useful to take the child's medical history and conduct the physical examination to collect and record the information in a standardised way. The standard recording form of the health facility may be adequate or may be adapted for this purpose. In Annex A, the first two pages of the Treatment Card show how demographic information, and medical and dietary history can be recorded. Results of examinations and laboratory tests and other investigation results are recorded on the Initial Management Chart.

Box 1. Checklist for a full assessment

Demographic information

- Basic information on the child, the family and living and environment conditions

Medical history

- Any complaints
- Diarrhoea: duration, recent sinking of eyes, appearance of stools, presence of intestinal parasites
- Vomiting: duration and frequency, appearance of vomit
- Loss of appetite
- Cough
- Recent measles (in past 3 months)
- Contact with tuberculosis
- Skin and hair changes
- Weight loss
- Any deaths or chronic illness of siblings and parents
- Birth weight
- Milestones reached (e.g., sitting up, standing)
- Immunisation history

Dietary history

- Recent intake of food and fluids
- Breastfeeding
- Usual diet before current episode of illness

Examination

- Danger signs, if not yet done
- Presence of bilateral pitting oedema, MUAC, weight, height/length and weight-for-height/length
- Enlargement or tenderness of liver, jaundice
- Abdominal distension, bowel sounds, “abdominal splash”
- Respiratory rate and type of respiration
- Body temperature
- Thirst

- Eyes: corneal lesions indicative of vitamin A deficiency
- Ears, mouth, throat: evidence of infection
- Mouth ulcers
- Skin changes: evidence of infection or rupture, dermatosis, purpura
- Appearance of faeces and urine
- Signs of HIV and TB infection
- Appetite test

Laboratory tests and other investigations' results (see section 9.2)

9.2 Doing Laboratory Tests and Other Investigations

Where health facilities permit, the tests given in the table below should help diagnose specific medical problems. Some of the tests should be performed routinely. However, do not delay the start of initial treatment unless confirmed diagnosis is required. The interpretation of test results is frequently altered by SAM, may misguide health workers and may need to be repeated later if indicated. The most important guide to treatment remains frequent careful clinical assessment of the child and monitoring the treatment's progress.

Routine laboratory and other investigation in inpatient care

Routine tests	Result and significance
Haemoglobin (Hb) or packed-cell volume (PCV)	Hb < 4 g/dl (or PCV < 12%) or Hb 4–6 g/dl and respiratory distress indicate very severe anaemia.
Blood grouping and cross matching	Preparation in case blood transfusion is needed.
Blood glucose	Glucose concentration 54 mg/dl or 3 mmol/l indicates hypoglycaemia.
Malaria rapid diagnostic test (RDT) or blood smear by microscopy	A positive RDT or blood smear with presence of malaria parasites indicates infection.
Dipstick test or culture of urine specimen	A positive dipstick test indicates urinary tract infection. The presence of bacteria on microscopy (or > 10 leukocytes specimen per high-power field) indicates infection. Protein in urine may indicate nephrotic syndrome.
Human immunodeficiency virus (HIV) RDT or polymerase chain reaction (PCR) test	A positive RDT or PCR indicates infection in children 18 months and older. A positive RDT for infants less than 18 months must be repeated with a PCR or interpreted with mother's status. A negative RDT is useful and confirms the absence of infection.
Other tests if indicated	
Skin test for tuberculosis	Often negative or false positive in children with tuberculosis or previously vaccinated with Bacillus Calmette Guerin (BCG) vaccine.
Examination of faeces by microscopy	The presence of blood indicates dysentery. The presence of giardia cysts or trophozoites indicates infection.
Chest x-ray	Pneumonia causes less shadowing of the lungs in malnourished

	children than in well-nourished children. Vascular engorgement indicates heart failure. Bones may show rickets or fractures of the ribs.
Pulse oximetry	Used to guide oxygen therapy.
Lumbar puncture and microscopy of cerebrospinal fluid (CSF)	If meningitis is suspected, a positive lumbar puncture indicates infection.
Serum proteins	Not useful in management of SAM but may guide prognosis.
Electrolytes	Rarely helpful on admission and may lead to inappropriate treatment.

9.3 Making Differential Diagnoses

The full assessment should identify infections, other medical conditions or underlying illness that need prompt treatment in addition to the routine treatment that the child with SAM should receive. Based on the findings, a comprehensive treatment plan is drawn. Section 9.0 discusses testing and treatment for malaria, HIV and TB in SAM specifically. Annex C gives a complete overview of treatment of common medical conditions in SAM.

Note that if the child with SAM is referred to hospital and is considered clinically well and alert, upon admission the health worker may (re-) consider the need to treat the child as inpatient or outpatient. If the child has good appetite (passed the observed appetite test with RUTF) and has no complications then management can be done on an outpatient basis. Outpatient management is always preferred to inpatient management, if the health condition of the child allows, and if the mother or carer agrees. This is aimed at reducing, e.g., exposure to nosocomial infections, crowding and opportunity costs to the mother or carer, without compromising the quality of care for the child.

10.0 Recording of Initial Findings and Treatments, and Communicating to Staff

In all cases, but especially if a child is being transferred from an emergency room, it is important to communicate in writing and orally to key staff:

- The child's signs and symptoms
- Emergency treatments already given
- What needs to be done to continue care and feeding
- Whether or not the child has complications that require being near the nurses' station for careful, constant observation

The Treatment Card, provided in Annex A, is an example of a tool to help communicate what has been done and what needs to be done for the child. You may use different forms or case records in your hospital, but some type of written record is essential.



Exercise E

In this exercise, there will be a role-play in which the admitting physician briefs the head nurse on a child's conditions and needs. Use the first page of a blank Treatment Card, available in your classroom. Use this module and job aids as needed.

1. Use the information below to complete the first page of the Treatment Card for a child named Melina. Be sure to record any treatments that should be given, including the specific antibiotic needed. (When determining the dose, use a formulation available in your hospital.)

Melina is a 13-month-old girl. She is admitted on October 3 at 9:00. She is severely wasted. She has mild oedema but no dermatosis. She is 72 cm long and weighs 6.3 kg. Her MUAC is 106 mm.

Melina's rectal temperature is 36.8° C. Her blood glucose level appears to be between 3 and 4 mmol/L. Her Hb is 9.5 g/dl. She has no signs of eye problems. She has not had measles.

Melina has no signs of shock, no diarrhoea, no blood in the stool and no vomiting. The admitting physician is ready to give the head nurse instructions for Melina's care, including her first feed and first dose of antibiotic. It is 9:15.

2. When you have finished with the Treatment Card, briefly show it to a facilitator to ensure that it is correct. Then list below the key points that you would discuss with the head nurse if you were the admitting physician.
3. List some questions that you might ask if you were the head nurse.

Tell a facilitator when you are ready for the role-play.

Answers to Exercises

Answers to Short Exercises, page 23

The answers to the short exercise are written in the blanks below:

1. Suzgo has watery diarrhoea and SAM. He weighs 6.0 kg. He should be given 30 ml ReSoMal every 30 minutes for 2 hours. Then he should be given 30 – 60 ml ReSoMal in alternate hours for up to 10 hours. In the other hours during this period, F-75 should be given.
2. Towera, who has severe wasting, arrived at the hospital in shock and received IV fluids for 2 hours. She has improved and is now ready to switch to ReSoMal. Towera weighs 8.0 kg. For up to 10 hours, she should be given ReSoMal and F-75 in alternate hours. The amount of ReSoMal to offer is 40 – 80 ml per hour.
3. Answers:
 - The child's willingness to drink.
 - The amount of ongoing losses in the stool.

Annex A: Inpatient Care Treatment Card

INITIAL MANAGEMENT CHART Comments on pre-referral and/or emergency treatment already given: _____

<p>SIGNS OF SAM Severe wasting? Yes No</p> <p>Bilateral Pitting Oedema? 0 + ++ +++ (raw skin, fissures)</p> <p>Dermatosis? 0 + ++ +++ (raw skin, fissures)</p> <p>Weight: _____ kg Height /Length: _____ cm</p> <p>WFH: _____ z-score MUAC: _____ mm</p> <p>TEMPERATURE: _____ °C axillary / rectal Cover child. If axillary <35° C or rectal <35.5° C, actively warm child. Check temperature every 30 min.</p> <p>BLOOD GLUCOSE (< 3 mmol/L or < 54 mg/dl): _____ (If no test, treat for hypoglycaemia.) If alert, give 10% glucose 50 ml (infant 25 ml) orally or by NG. If lethargic/unconscious, give sterile 10% glucose 5 ml/kg IV, then 50 ml (25 ml infant) by NG. Amount IV: 5 ml x _____ kg (child's weight) = _____ ml. Amount oral: _____ ml Time glucose given: _____ H Route: Oral NG IV</p> <p>HAEMOGLOBIN (Hb): _____ g/dl (or PCV: _____ %) Blood type: _____ If Hb <4 g/dl (or Hb 4–6 g/dl AND respiratory distress), transfuse 10 ml/kg whole fresh blood slowly over 3 hours (or 7 ml/kg packed cells in case of suspected heart failure). Amount: _____ Time started: _____ H Ended: _____ H</p> <p>EYE SIGNS: None Left Right MEASLES: Yes No Bitot's spots, corneal clouding, corneal ulceration, pus or Inflammation</p> <p>If eye signs (Bitot's spots, corneal clouding and corneal ulceration) or measles, give vitamin A treatment dose and atropine immediately. Record vitamin A in box below, and on Daily Care Chart.</p> <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:20%;">VITAMIN A: If eye signs or recent measles, give treatment dose on day 1, 2, and 14. Time first dose: _____</td> <td style="width:20%;">< 6 months</td> <td style="width:20%; text-align: center;">50,000 IU</td> </tr> <tr> <td></td> <td>6–12 months</td> <td style="text-align: center;">100,000 IU</td> </tr> <tr> <td>(Do not give vitamin A if the child does not have eye signs.)</td> <td>> 12 months</td> <td style="text-align: center;">200,000 IU</td> </tr> </table> <p>FEEDING: <i>Begin feeding with F-75 as soon as possible.</i> <i>If child is rehydrated, reweigh before determining amount to feed. New weight: _____ kg.</i> Amount for 2-hourly feedings: _____ ml of F-75* Time first fed: _____ Record all feeds on 24-Hour Food Intake Chart. <i>* If hypoglycaemic, feed ¼ of this amount every half hour for first 2 hours; continue until blood glucose reaches 3 mmol/L. or 54 mg/dl</i></p>	VITAMIN A: If eye signs or recent measles, give treatment dose on day 1, 2, and 14. Time first dose: _____	< 6 months	50,000 IU		6–12 months	100,000 IU	(Do not give vitamin A if the child does not have eye signs.)	> 12 months	200,000 IU	<p>SIGNS OF SHOCK: None, lethargic/unconscious, cold hands, slow capillary refill (> 3 seconds), weak or fast pulse</p> <p>If lethargic or unconsious, cold hands, plus either slow capillary refill or weak or fast pulse, give oxygen. Give IV glucose as described under Blood Glucose (left).</p> <p>Then give IV fluids: Amounts IV fluids per hour: 15 ml X _____ kg (child's wt.) = _____ ml</p> <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:15%;"></th> <th style="width:10%;">1st hr</th> <th style="width:10%;">Start</th> <th colspan="4" style="width:40%;">Monitor every 10 minutes</th> <th style="width:10%;">2nd hr</th> <th colspan="4" style="width:40%;">Monitor every 10 minutes</th> </tr> <tr> <th style="text-align: center;">Time</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th style="text-align: center;">*</th> <th></th> <th></th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>Respiratory rate</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td style="text-align: center;">*</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Pulse rate</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td style="text-align: center;">*</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p><i>*If improvements after 1 hour (respiratory and pulse rates are slower), repeat same amount IV fluids for second hour; then alternate ReSoMal and F-75 for up to 10 hours. If no improvement after 1 hour, treat for septic shock (transfuse whole fresh blood, see 'Haemoglobin'), give maintenance IV fluids (4 ml/kg/hour) while waiting for blood.</i></p> <p>SIGNS OF DEHYDRATION:</p> <table style="width:100%;"> <tr> <td style="width:50%; vertical-align: top;"> Watery diarrhoea? Yes No Blood in stool? Yes No Vomiting? Yes No Number of days with diarrhoea: _____ </td> <td style="width:50%; vertical-align: top;"> If diarrhoea, circle signs present: Restless/irritable, lethargic, thirsty Recent sunken eyes, dry mouth/tongue, no tears </td> </tr> </table> <p>If diarrhoea and/or vomiting, give ReSoMal orally (or by NG tube if too ill) every 30 minutes for first 2 hours and monitor **. Amount: 5 ml x _____ kg (child's weight) = _____ ml ReSoMal</p> <p>For up to 10 hours, give ReSoMal and F-75 orally (or by NG tube) in alternate hours and monitor every hour **. Amount: 5-10 ml x _____ kg (child's weight) = _____ to _____ ml ReSoMal every 2 hours</p> <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:15%;">Time</th> <th style="width:10%;">Start:</th> <th></th> </tr> </thead> <tbody> <tr> <td>Respiratory rate* (breaths/minute)</td> <td></td> </tr> <tr> <td>Pulse rate* (beats/minute)</td> <td></td> </tr> <tr> <td>Passed urine (YES/NO)</td> <td></td> </tr> <tr> <td>Number of stools</td> <td></td> </tr> <tr> <td>Number of vomits</td> <td></td> </tr> <tr> <td>Hydration signs (Yes/No)**</td> <td></td> </tr> <tr> <td>Amount ReSoMal taken (ml)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td style="text-align: center;">F-75</td> </tr> </tbody> </table> <p>*Stop ReSoMal if any sign of over-hydration: Fast breathing, increasing pulse and resp. rates, engorging jugular veins, puffing of eyelids. ** Stop ReSoMal if two or more signs of hydration: Passing urine, moist tongue, making saliva, not thirsty.</p>		1 st hr	Start	Monitor every 10 minutes				2 nd hr	Monitor every 10 minutes				Time							*					Respiratory rate							*					Pulse rate							*					Watery diarrhoea? 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VITAMIN A: If eye signs or recent measles, give treatment dose on day 1, 2, and 14. Time first dose: _____	< 6 months	50,000 IU																																																																																																																																																																																		
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MALARIA TEST (Type/Date/Outcome):																																																																																																																																																																																				
HTS Date: ___/___/___ Outcome: NR R Exposed DNA PCR: Positive Negative Not done N/A Date started cotrimoxazole: ___/___/___ Date started ART: ___/___/___																																																																																																																																																																																				

Name: _____ Sex: M F Age: _____ Date of admission: _____ Time: _____ Hospital ID number: _____

DAILY CARE CHART

DAYS IN HOSPITAL	Week 1							Week 2							Week 3						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Date																					
Daily weight (kg)																					
Weight gain (g/kg) <i>Calculate when on RUTF/F100 and breastfed infant</i>																					
Bilateral pitting oedema 0 + ++ +++																					
Diarrhoea (Write number of loose stools)																					
Vomiting (write the frequency)																					
RESOMAL.....mls																					
FEED PLAN: Type of feed																					
# daily feeds																					
Amount to give per feed (ml)(packet)																					
Total amount taken (ml)(packet)																					
NG tube Yes/No																					
Breastfeeding Yes/No																					
ANTIBIOTICS AND OTHER DRUGS	<i>List prescribed antibiotics and other drugs in left column. Allow one row for each daily dose. Draw a box around days/times that each drug should be given. Sign when given.</i>																				
ANTIMALARIAL:																					
VITAMIN A treatment dose on days 1, 2, and 14																					
Albendazole/Mebendazole. Give after 1 week.																					
IRON Give 3 mg/kg/day, 2 x daily, after 2 days starting to gain weight during transition. Do not give when on RUTF.																					
Crush 200 mg ferrous sulphate in 2–2.4 L F-100 or F-100 Diluted. Do not give iron if child is on RUTF.																					
EYE INFECTIONS															<i>After 7–10 days eye drops are no longer needed.</i>						
Tetracycline ointment 3 x daily or Chloramphenicol 1 drop 4 x daily																					
Corneal ulceration: As above, plus Atropine 1 drop 3 x daily																					
Ear, mouth, or throat problems																					
Dermatosis 0 + ++ +++																					
Bathing, 1% potassium permanganate or zinc oxide																					

Name: _____ Sex: M F Age: _____ Date of admission: _____ Time: _____ Hospital ID number: _____

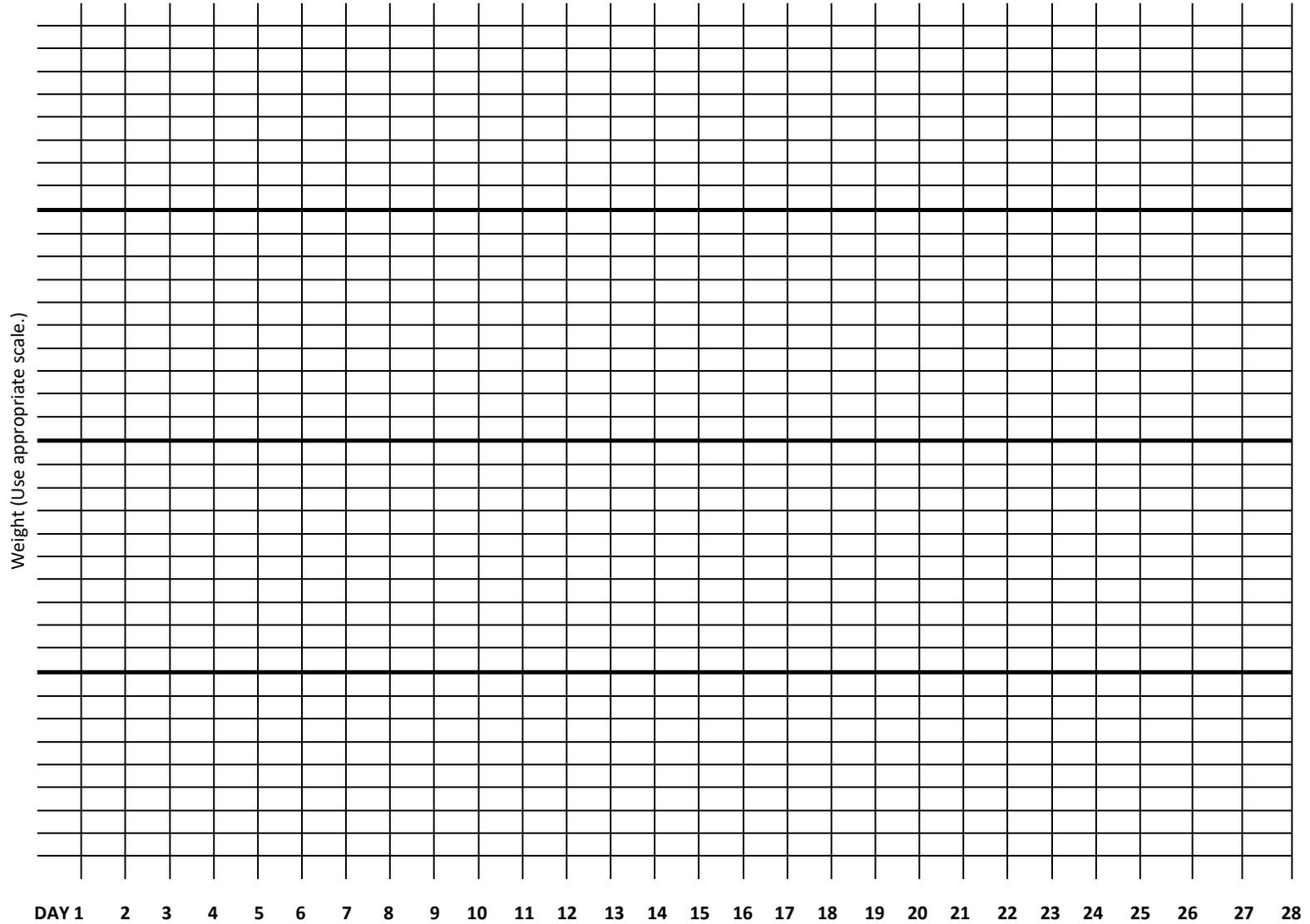
WEIGHT CHART

Weight on **admission:** kg

MUAC on **admission:** mm

Height/length on **admission:** cm

Bilateral pitting oedema
on **admission:** 0 + ++ +++



Name: _____ Sex: M F Age: _____ Date of admission: _____ Time: _____ Hospital ID number: _____

24-HOUR FOOD INTAKE CHART

Complete one chart for every 24-hour period during stabilisation and transition.

Starting weight (kg): _____ Today's weight (kg _____): _____ Oedema: 0 + ++ +++ **DATE:** _____

TYPE OF FEED (circle): F-75 F-100 Infant Formula or F-100-Diluted RUTF

FEEDS	GIVE ____ milk feeds of ____ ml, or ____ ml per day (X)					GIVE ____ RUTF feeds of about ____ packet, or ____ packets per day (Y)		i. Passed loose stools (Yes/No)
	a. Amount of milk offered (ml)	b. Amount of milk left in cup (ml)	c. Amount of milk taken orally (ml) (a – b)	d. Amount of milk taken by NG tube if needed (ml)	e. Estimated amount of milk vomited (ml)	f. Estimated amount of RUTF taken (proportion of packet)	g. Amount of milk offered to complete the RUTF feed (ml) (20 g RUTF or 2 teaspoons = 135 ml F-75 or 100 ml F-100)	
Time								
TOTALS			C.	D.	E.	F.	G.	
24-HOUR INTAKE	Total daily amount of milk taken (H)= (C) + (D) – (E) = ____ ml					Estimated proportion of daily amount of RUTF taken (F/Y): ____ %		
	Estimated proportion of daily amount of milk taken (H/X): ____ %							

Name: _____ Sex: M F Age: _____ Date of admission: _____ Time: _____ Hospital ID number: _____

OUTCOME CHART

COMMENTS

COUNSELLING and PSYCHOSOCIAL SUPPORT TO MOTHER OR CARER

IMMUNISATIONS

Vaccination	At birth	First	Second	Third
BCG*	At birth	—	—	—
OPV	At birth	At 6 weeks	At 10 weeks	At 14 weeks
Penta**	—	At 6 weeks	At 10 weeks	At 14 weeks
PCV		At 6 weeks	At 10 weeks	At 14 weeks
Rotavirus	—	At 6 weeks	At 10 weeks	—
IPV				At 14 weeks
Measles	—	At 9 months	At 15 months	—

FOLLOW-UP OR DISCHARGE INSTRUCTIONS

OUTCOME

DISCHARGE DATE: _____ Name of discharging officer _____	
TRANSFER to Outpatient Care, Name of Site: _____	
OUTCOME	
Date: _____	
Transferred (Transfer to outpatient care to continue treatment)	Weight: _____ kg
Cured (Discharge at full recovery)	MUAC: _____ mm
Early Departed or Defaulted (Absence against medical advice for more than 2 days)	Height: _____ cm
Non-cured (Not reaching end of treatment criteria after 4 months of comprehensive investigation and treatment, medical referral to higher care)	
Medical Transfer (Transferred to another higher level facility for further medical investigations and treatment)	
Died Apparent cause(s) of death: _____	Number of days after admission: <24 hrs 1–3 days 4–7 days > 7 days Time of death: Day Night Did child receive IV fluids? Yes No

Annex B: Summary: Antibiotics for SAM Children

IF:	GIVE:	
NO MEDICAL COMPLICATIONS	Amoxicillin oral (15 mg/kg) every 8 hours for 5 days	
MEDICAL COMPLICATIONS (shock, hypoglycaemia, hypothermia, dermatosis with raw skin/fissures, respiratory or urinary tract infections, or lethargic/sickly appearance)	Gentamicin IV or IM (7.5 mg/kg) once daily for 7 days, plus:	
	<table border="1"> <tr> <td>Benzyl penicillin IV or IM (50,000 IU/kg) every 6 hours for 2 days</td> <td>Followed by: Amoxicillin oral (15 mg/kg) every 8 hours for 5 days</td> </tr> </table>	Benzyl penicillin IV or IM (50,000 IU/kg) every 6 hours for 2 days
Benzyl penicillin IV or IM (50,000 IU/kg) every 6 hours for 2 days	Followed by: Amoxicillin oral (15 mg/kg) every 8 hours for 5 days	
Resistance to amoxicillin and benzyl penicillin, and presence of medical complications	In the case of sepsis or septic shock , give: IV/IM ceftiaxone (children or infants over 1 month of age (100 mg/kg once a day)	
	If suspected staphylococcal infections , add: IV/IM cloxacillin (25–50 mg/kg/dose 4 times a day, depending on the severity of the infection). If out of stock, give oral flucloxacillin 25–50 mg/kg every 6 hours	
IF no improvement after 48 hours (second-line antibiotic)	CEFTRIAXONE 100 mg/kg IV or IM once a day for 5 days (infants < 3 kg: 50 mg/kg)	
Specific infection requires an additional antibiotic	Add specific antibiotic as per standard treatment guidelines for Malawi	
Child is HIV-positive or exposed.	Cotrimoxazole oral according to the Malawi Guidelines for Clinical Management of HIV	

Specific Formulations and Body Weight Ranges for Antibiotics for SAM Children in Inpatient Care

ANTIBIOTIC	ROUTE/DOSE/ FREQUENCY/ DURATION	FORMULATION	DOSE ACCORDING TO CHILD'S WEIGHT		
			3 up to 6 kg	6 up to 8 kg	8 up to 10 kg
Amoxicillin	Oral: 15 mg/kg body weight every 8 hours for 5 days	Syrup, 125 mg/5 ml	2.5 ml	5 ml	5 ml
		Syrup, 250 mg/5 ml	1.5 ml	2 ml	2.5 ml
Benzyl penicillin	IV or IM: 50,000 units/kg body weight every 6 hours for 5 days	IV: vial of 600 mg mixed with 9.6 ml sterile water to give 1,000,000 units/10 ml	2 ml	3.5 ml	4.5 ml
		IM: vial of 600 mg mixed with 1.6 ml sterile water to give 1,000,000 units/2 ml	0.4 ml	0.7 ml	0.9 ml

ANTIBIOTIC	ROUTE/DOSE FREQUENCY/ DURATION	FORMULATION	DOSES FOR SPECIFIC BODY WEIGHTS (<i>Use closest weight</i>)									
			3 kg	4 kg	5 kg	6 kg	7 kg	8 kg	9 kg	10 kg	11 kg	12 kg
Gentamicin	IV or IM: 7.5 mg/kg once daily for 7 days	IV/IM: vial containing 20 mg (2 ml at 10 mg/ml), undiluted	2.25 ml	3 ml	3.75 ml	4.5 ml	5.25 ml	6 ml	6.75 ml	7.5 ml	8.25 ml	9 ml
		IV/IM: vial containing 80 mg (2 ml at 40 mg/ml) mixed with 6 ml sterile water to give 80 mg/8 ml	2.25 ml	3 ml	3.75 ml	4.5 ml	5.25 ml	6 ml	6.75 ml	7.5 ml	8.25 ml	9 ml
		IV/IM: vial containing 80 mg (2 ml at 40 mg/ml), undiluted	0.5 ml	0.75 ml	0.9 ml	1.1 ml	1.3 ml	1.5 ml	1.7 ml	1.9 ml	2 ml	2.25 ml

Annex C: Medicine Protocols for Children with SAM in Inpatient Care

Name of Medication	When to Give	Age - Weight	Dosage	Special Instructions
AMOXICILLIN	Children with SAM without medical complications (first-line antibiotic).	All ages	15 mg/kg orally 3 times per day for 5 days (Infants < 3 kg: 15 mg/kg/dose every 12 hours)	Note that majority of children admitted to inpatient care will have medical complications. If amoxicillin is not available, use cotrimoxazole according to IMCI protocol.
BENZYL PENICILLIN <i>and</i> GENTAMICIN	All children with SAM with medical complication. <i>(first line antibiotic)</i>	All ages	Benzyl penicillin 50,000 IU/kg 6 hourly IV/IM for 48 hours then oral amoxicillin 15 mg/kg 8 hourly for 5 days Gentamicin 7.5 mg/kg/dose IV (or IM) once a day for 7 days (including for infants from second week of life onwards).	If child is transferred to from NRU to OTP before drug regimen has been completed, NRU staff should provide instructions for continuing antibiotic treatment at in OTP.
CEFTRIAXONE	IF no improvement with first-line antibiotic after 48 hours. <i>(second line antibiotic)</i>		100 mg/kg IV (or IM) (infants < 3 kg: 50 mg/kg IV (or IM) once a day for 5 days.	Give as a single daily dose.
CLOXACILLIN	IF no improvement with first-line antibiotic after 48 hours and IF suspected staphylococcal infections.		25–50 mg/kg/dose IV (or IM or orally) every 6 hours (infants < 3 kg: 25–50 mg/kg/dose every 8 hours) for 5 days.	Depends on the severity of the infection.
CIPROFLOXACIN	<i>(example of third line antibiotic)</i>		10 mg/kg/dose IV every 8 hours for 5 days, or 15 mg/kg/dose orally every 12 hours for 5 days.	Do only give to infants < 3 kg in case of life saving measure.
ALBENDAZOLE <i>or</i> MEBENDAZOLE	At the start of phase 2 (after 7 days), for presumptive treatment. Immediate, for treatment in case of severe infestation.	≥ 10 kg	Albendazole: 1–2 years:200 mg, once a day for 3 days > 2 years:400 mg, once a day for 3 days Mebendazole: 1–2 years: 100 mg, once a day for 3 days > 2 years: 100 mg, 2 times a day for 3 days	Should be given routinely to all children from 12 months since many malnourished children may be infested with worms.
LA (Contains 120mg Lumefantrinerine /20mg Artemether)	For treatment of malaria. LA should only be prescribed if there is a positive diagnostic test. Do not use quinine. Iron and folic acid should never be provided together with a malaria treatment; malaria is treated first.		5–14, 9kg: 1 tablet 2x/day/3 days 15–24, 9kg: 2 tablets 2x/day/3 days 25–35kg: 3 tablets 2x/day/3 days > 35 kg: 4 tablets 2x/day/3 days	A rapid diagnostic test for malaria should be done on all children admitted to NRU.
10% GLUCOSE 10% SUCROSE (SUGAR WATER*)	To all children for the treatment for hypoglycaemia (low blood glucose, <3 mmol/L) or as preventive dose.	All ages	<u>If not lethargic or unconscious</u> , give 10% glucose or sucrose 50 ml (infants < 6 months 5 ml/kg or 25 ml) orally or by NG tube; <u>If lethargic or unconscious</u> , give sterile 10% glucose 5 ml/kg IV, followed by 10% glucose or sucrose 50 ml (infants < 6 months 25 ml) by NG tube to prevent re-bound hypoglycaemia. If IV fluids will be given for shock, no need to give the NG bolus as glucose is included in the IV fluids.	10% sucrose or sugar water is obtained by dissolving 1 teaspoon of sugar in 3 tablespoons water.
RESOMAL	For oral treatment of dehydration (diarrhoea and recent sunken eyes) without shock given in prescribed amounts. Monitor danger signs every 30 minutes.	All ages	<u>Treatment fluid</u> : 5 ml/kg/30 minutes orally or by NG tube in first 1-2 hours, then alternate hourly 5–10 ml/kg/2 hours with F-75 for 10 hours, or until minimum two signs of hydration appear.	A diagnosis of dehydration needs to be associated with a definite recent history of significant fluid loss; watery diarrhoea (not just soft or mucoid) and frequent (more than 3 stools per day) with a recent onset.

	After rehydration given as maintenance fluid in prescribed amounts after each loose stool.		<i>Maintenance fluid:</i> if wasted give 15–30 ml/kg/loose stool (or < 2 years 50–100 ml, ≥ 2 years 100–200 ml), if oedema 30 ml/loose stool.	It is recommended that low osmolarity ORS is used instead of ReSoMal where cholera or acute watery diarrhoea (AWD) has been diagnosed/
IV FLUID: Half-strength Darrow's with 5% dextrose, or half strength Ringer's lactate with 5% dextrose**	For IV treatment of shock with lethargy or unconsciousness.	All ages	<i>Treatment fluid:</i> 15 ml/kg/hour for first hour, reassess the child, and continue second hour if the child has improved <i>Maintenance fluid:</i> 4 ml/kg/hour If no improvement after first hour of rehydration, assume that the child has septic shock.	Monitor danger signs every 10 minutes. (If no Darrow's or Ringer's, use half-strength saline (0.45% NaCl) with 5% dextrose**) (**Add sterile potassium chloride 20 mmol/L to the solution)
OXYGEN	For treatment of pneumonia, respiratory distress, shock.	All ages	1–2 litres per minute.	
BLOOD TRANSFUSION (and FUROSEMIDE)	For treatment of septic shock after failure to respond after 1 hour rehydration, and of very severe anaemia. Monitor danger signs every 10 minutes.	All ages	10 ml/kg safe fresh whole blood given slowly over 3 hours. Give furosemide just prior to the blood infusion at 1 mg/kg IV. If signs of heart failure, give 7 ml/kg packed blood cells instead and consider giving digoxin.	Depends on the severity of the infection.
TETRACYCLINE EYE OINTMENT or CHLORAMPHENICOL EYE DROPS	For treatment of eye infections. Wash hands before and after application.		1 drop tetracycline every 8 hours, or 1 drop chloramphenicol every 6 hours, until 2 days after condition has resolved.	Wash hands before and after use. Wash eyes before application. Continue for 2 days after disappearance of signs of infection.
ATROPINE 1%	For corneal ulceration, to relieve pain as pupil dilatation stops ciliary muscle spasms.		1 drop every 8 hours (morning, afternoon and before sleep).	May be used to relieve pain as pupil dilatation stops ciliary muscle spasms.
NYSTATIN	For treatment of candidiasis. Use dropper and show mother how to use it.		100,000 units (1 ml) every 6 hours after food for 7 days.	Use dropper and show caregiver how to use it.
BENZYL BENZOATE	For topical treatment of scabies. Avoid eye contact; do not use on broken or secondary infected skin.		Apply over whole body; repeat without bathing on following day; wash off 24 hours later.	Avoid eye contact. Do not use on broken or secondary infected skin
WHITFIELDS	For topical treatment of ringworm, taenia or fungal infections of the skin.		Apply two times a day, until condition has resolved.	Continue treatment until condition has completely resolved.
GENTIAN VIOLET	For topical treatment of minor abrasions or fungal infections of the skin.		Apply once a day, until condition has resolved.	Can be repeated. Continue until condition has resolved
1% POTASSIUM PERMANGANATE	For topical treatment of dermatosis. To make a 1% solution, dissolve a crystal in enough water so that the colour is slightly purple and still transparent.		Daily bathe for 10–15 minutes. Sponge the solution onto affected areas while the child is sitting in a basin.	

