MODULE 3
INITIAL MANAGEMENT

REPUBLIC OF GHANA
MINISTRY OF HEALTH

GHANA HEALTH SERVICE
Your Health • Our Concern

Training Course on Inpatient Management of Severe Acute Malnutrition

(Adapted from the 2002 WHO *Training course on the inpatient management of severe acute malnutrition*)

Children 6–59 Months with SAM and Medical Complications

March 2012

This modified version of the 2002 World Health Organisation's *Training Course on Inpatient Management of Severe Acute Malnutrition (SAM)* is the practical application of the 2010 MOH/GHS *Interim National Guidelines for Community-Based Management of Severe Acute Malnutrition in Ghana.* The training course was modified by the MOH/GHS SAM Support Unit in collaboration with the MOH/GHS Regional SAM Support Teams. USAID/Ghana, FANTA-2 Bridge project, UNICEF/Ghana and WHO/Ghana provided technical and financial support to review and modify the training course. This revised training course is made possible by the generous support of the American people through the support of USAID/Ghana and the Office of Health, Infectious Diseases, and Nutrition, Bureau for Global Health, United States Agency for International Development (USAID), under terms of Cooperative Agreement No. AID-OAA-A-11-00014, through the FANTA-2 Bridge, managed by FHI 360.

Illustrations for modules: Susan Kress

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Acronyms and Abbreviations

AIDS	Acquired Immune Deficiency Syndrome
ACT	Artemisinin-Based Combination Therapy
ART	Antiretroviral Therapy
CCP	Critical Care Pathway
cm	Centimetre(s)
CMAM	Community-Based Management of Acute Malnutrition
CMV	Combined Mineral and Vitamin Mix
dl	Decilitre(s)
ER	Emergency Room
F-75	Formula 75 Therapeutic Milk
F-100	Formula 100 Therapeutic Milk
g	Gram(s)
Hb	Haemoglobin
HIV	Human Immunodeficiency Virus
IM	Intramuscular
IU	International Unit(s)
IV	Intravenous
kcal	Kilocalorie(s)
kg	Kilogram(s)
L	Litre(s)
mg	Milligram(s)
ml	Millilitre(s)
mm	Millimetre(s)
mmol	Millimole(s)
MUAC	Mid-Upper Arm Circumference
NG	Nasogastric
NGT	Nasogastric Tube
ORS	Oral Rehydration Solution
PCV	Packed Cell Volume
PLHIV	People Living with HIV
PMTCT	Prevention of Mother-to-Child Transmission of HIV
ReSoMal	Rehydration Solution for Malnutrition
RUTF	Ready-to-Use Therapeutic Food
SAM	Severe Acute Malnutrition
TB	Tuberculosis
WFH	Weight-for-Height
WHO	World Health Organisation
WHZ	Weight-for-Height Z-Score
µg	Microgram(s)
° C	Degrees Celsius
>	Greater Than
≥	Greater Than or Equal To
<	Less Than
≤	Less Than or Equal To
%	Percent

Introduction

The focus of initial management is to prevent death while stabilising the child who is admitted to Inpatient Care. The first step is to check the child for emergency signs and provide emergency treatment as necessary. Any child presenting to the hospital should be checked for emergency signs as part of standard procedure[1].

In an emergency situation, many procedures must be done very quickly, almost simultaneously. Much practice and experience is needed to perform efficiently in an emergency room (ER) 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 severe acute malnutrition (SAM).

Some of the initial management procedures described in this module may be performed in the ER before a child is admitted to Inpatient Care (SAM ward). It is very important that ER staff know how to treat children with SAM differently. If ER staff do not know how to treat children with SAM, the children with SAM should be moved to the SAM ward immediately. ER staff must be taught to recognise children with SAM and to understand that these children might be seriously ill even without showing signs of infection. A child with SAM should be seen as quickly as possible in the ER. ER staff must understand that they should **not** start a rapid intravenous (IV) flow, but should rather follow procedures as outlined in this module and Chapter Five of the Interim *National Guidelines for CMAM in Ghana*.

After any necessary emergency treatment has been provided, the child should be moved immediately to Inpatient Care. For several days, it is critical to watch for and treat or prevent such life-threatening problems as hypoglycaemia, hypothermia, shock, dehydration, and infection. Only later, after these problems are under control and the child is stabilised, is the child expected to gain weight. This module describes the life-saving tasks that are essential to the initial management of a child with SAM.

[1] Basic emergency treatment is taught in medical schools and will not be taught in this course. For additional information, you may refer to the World Health Organisation (WHO) document *Management of the Child with a Serious Infection or Severe Acute Malnutrition: Guidelines for care at the first-referral level in developing countries* (*WHO/FCH/CAH/00.1*).

Learning Objectives

This module describes and, to the extent feasible, allows you to observe and/or practise the following skills:

- Identifying and managing a child with SAM with medical complications in Inpatient Care:
  - Hypoglycaemia
  - Hypothermia
  - Shock
  - Very severe anaemia
  - Corneal clouding and corneal ulceration
  - Watery diarrhoea and/or vomiting

- Preparing Rehydration Solution for Malnutrition (ReSoMal)

- Selecting appropriate antibiotics and calculating doses

- Testing and treating for malaria, HIV, and tuberculosis (TB)

- Keeping a written record of initial findings and treatments

1. Identify and Manage a Child with SAM and Medical Complications

1.1. Manage Hypoglycaemia

What is Hypoglycaemia?

Hypoglycaemia is a low level of glucose in the blood. In children with SAM, the level considered low is < 3 mmol/L (or < 54 mg/dl). 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 children with SAM 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. Children with SAM 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) is also a sign 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.

Test Blood Glucose Level

If blood was not taken during emergency procedures, take a sample on admission to the SAM ward. 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 can be tested using a glucometre, treated paper strips such as dextrostix, glucostix, or other similar products. If using a paper strip, the end is covered with a blood sample, the paper strips change colour to indicate blood glucose level. Regularly check the expiry date on such products as dextrostix or glucostix. If expired, the readings may not be true.

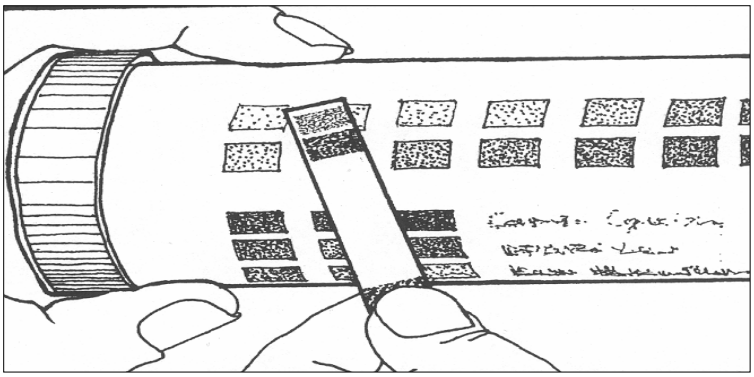
Different test kits may have different instructions. In general, instructions are as follows.

1. Touch the treated paper to the blood sample.

2. Wait an appropriate number of seconds.

3. Wash the blood off the strip with running water.

4. Compare the test paper to a colour scale or read the result in a glucometre (a device for reading a precise glucose level).



Testing blood glucose level using a paper strip

In many cases, the colour scale for the paper strips may not clearly show the level < 3 mmol/L. For example, it may say that a certain colour corresponds to 2–4 mmol/L. If a range is given, assume that the child's blood glucose is the lower reading (that is, in this example, 2 mmol/L).

If using a glucometre, follow the manufacturer's instructions on how to test for blood glucose, an illustration of a glucometre is provided below.

Testing blood glucose level using a glucometre

There may not be enough time to take and test a blood sample right away. If hypoglycaemia is suspected, give treatment immediately without laboratory confirmation. If no glucometre or testing strips are available, or if it is not possible to get enough blood to test, assume that the child has hypoglycaemia.

Prevent Hypoglycaemia and 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 hours, even during the night. Appropriate amounts are given in the **Stabilisation Phase Reference Table for Amounts of F-75 Based on 130 ml/kg/day** in the job aids. 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 Tables in the Job Aid

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 reference 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 will be discussed in detail in ***Module 4, Feeding****.*

Treat Hypoglycaemia

If blood glucose is low or hypoglycaemia is suspected, immediately give the child a 50 ml bolus of 10% glucose or 10% sucrose orally (1 teaspoon sugar to 3 tablespoons of water) or by nasogastric tube (NGT). 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% glucose solution is available, dilute one part to four parts sterile or boiled water to make a 10% solution.

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

If the child is lethargic, unconscious, or convulsing, give 5 ml/kg body weight of sterile 10% glucose by IV, followed by 50 ml of 10% glucose or sucrose by NGT. If the IV dose cannot be given immediately, give the nasogastric (NG) dose first.

Note: *If the child will be given IV fluids for shock, there is no need to follow the 10% IV glucose with an NG bolus, as the child will continue to receive glucose in the IV fluids.*

Start feeding F-75 half an hour after giving glucose 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 reference 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.

Example: Ari weighs 7.4 kg. He has hypoglycaemia and is given a 50 ml bolus of 10% glucose orally shortly after arrival at the hospital. A 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 then 3 mmol/L or higher, he should be given 80 ml of F-75 every 2 hours.

1.2. Manage Hypothermia

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**.

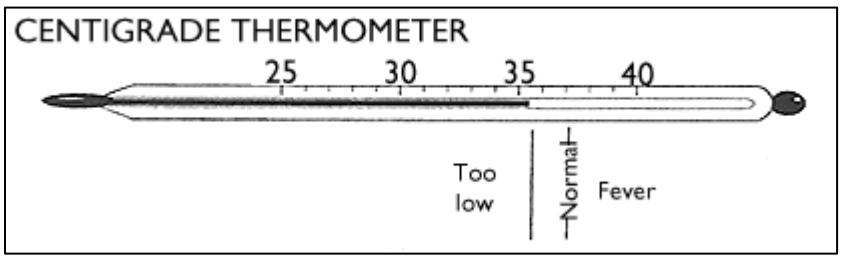
Children with SAM are at greater risk of hypothermia than other children and need to be kept warm. The hypothermic child has not had enough calories to warm the body. If the child is hypothermic, he is probably also hypoglycaemic. Both hypothermia and hypoglycaemia are signs that the child has a serious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

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

Take Temperature

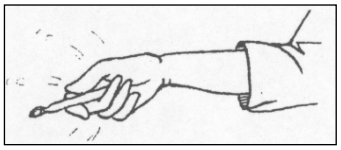
In general, rectal temperatures are preferred because they more accurately reflect core body temperature. One can convert axillary temperatures to rectal temperatures by adding 0.5° C. If axillary temperatures are used for routine monitoring, recheck any patient with an axillary temperature below 35° C by taking a rectal temperature if available.

The following illustration shows a low-reading rectal thermometer with too low, normal, and high (fever) temperatures indicated.

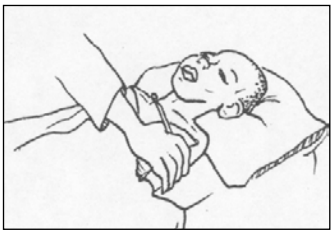


If possible, use a low-reading thermometer. If no low-reading thermometer is available, use a normal thermometer. With a normal thermometer, assume that the child has hypothermia if the mercury does not move.

Steps for Using a Thermometer to Take Axillary Temperatures



1. Shake thermometer down to below 35° C.
2. Place thermometer under armpit.
3. Keep in place for 3 minutes.
4. If below 35° C, take the rectal temperature for a more accurate reading.



Steps for Using a Thermometer to Take Rectal Temperatures

1. Shake thermometer down to below 35° C.
2. Position the child on his side or back with legs lifted.
3. Insert thermometer in rectum so that the bulb goes in about ½ inch.
4. Keep in place for 1 minute.

Warm the Child

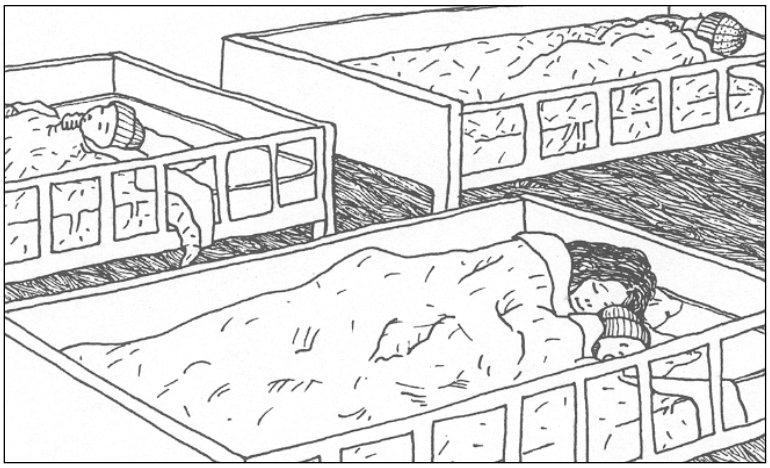
Children with SAM have difficulty controlling their body temperature. As a result, it is important to keep them warm and fed frequently. Keeping them warm also conserves their energy.

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

Maintain Temperature (Prevent Hypothermia)

The following measures are important for all children with SAM.

- Give 2-hourly feed, and start feeds immediately on admission.
- Always give feeds throughout the day and night.
- Cover the child, including his or her head.
- Stop draughts in the room. Move the child away from windows.
- Maintain room temperature of 25–30° C, if possible.
- Keep the child covered at night.
- Warm your hands before touching the child.
- Avoid leaving the child uncovered while being examined, weighed, etc.
- Promptly change wet clothes or bedding.
- Dry the child thoroughly after bathing.
- If it is not possible to warm the room to the temperature recommended above, let the child sleep with mother in an adult bed, covered with a blanket, as shown below.



Actively Re-Warm the Hypothermic Child

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

- Have the mother hold the child with her or 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.

- 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.

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

Example of a Critical Care Pathway

The next page shows the first part of a case record called a Critical Care Pathway or CCP. 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 CCP sections titled **Signs of Severe Acute Malnutrition**, **Temperature**, **Blood Glucose**, and **Feeding**. As the module continues, you will learn about the other sections of this page of the CCP.

A complete, blank CCP is provided in **Annex A** of this module. The CCP will be used in this course as both a job 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 CCP. In the meantime, you may study the example on the next page.

Name: Cara Sex: M (F) Age (months): 18months Date of Admission: 10/12/01 Time: 10:20AM Hospital ID Number: 46

INITIAL MANAGEMENT

Comments on pre-referral and/or emergency treatment already given: Referred by the Health Centre

ADMISSION AS: Old Case (*from Outpatient, Inpatient Care or other*), New case

VISIBLE SIGNS OF SAM Severe wasting? (Yes) No

Bilateral Pitting Oedema? (0) + ++ +++

Dermatosis? (0) + ++ +++ (raw skin, fissures)

Weight (kg): 6.3 MUAC (cm): 10.9

TEMPERATURE: 36 °C (axillary) rectal

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

BLOOD GLUCOSE (mmol/l) 2-4 mmol/L

If < 3 mmol/L and alert, give 50 ml bolus of 10% glucose or sucrose (oral or NGT).

If < 3 mmol/L and lethargic, unconscious, or convulsing, give sterile 10% glucose IV: 5 ml x _____kg (child's wt) = _____ml. *Then give 50 ml bolus by NGT.*

Time glucose given: 10:30 (Oral) NGT IV

HAEMOGLOBIN (Hb) (g/dl): 9 or Packed cell vol (PCV):

Blood type: A+

If Hb < 4 g/dl or PCV < 12%, transfuse 10 ml/kg whole fresh blood (or 5–7 ml/kg packed cells) slowly over 3 hours.

Amount: Time started: Ended:

EYE SIGNS None (Left) Right

Bitot's spots (Pus) Inflammation Corneal clouding Corneal ulceration

*If eye signs, give vitamin A on day 1, 2 and 15. Record on Daily Care page.

**If corneal ulceration, give atropine eye drops immediately. Record on Daily Care page

***If no eye signs, give vitamin A preventive dose on the 4th week or after full recovery from SAM (upon discharge), record on Comments/Outcome page.

Oral dose of vitamin A:	< 6 months	50,000 IU
	6–11 months	100,000 IU
	≥ 12 months	200,000 IU

MEASLES (Yes is circled if the child has measles now or had measles in the past 3 months) Yes (No)

FEEDING *Begin feeding with F-75 as soon as possible*

Amount for 2-hourly feedings: 70 **ml F-75* Time first fed:** 11:00AM

*If hypoglycaemic, feed 17.5 ml F-75 (¼ of the amount above) every half hour for the first 2 hours; continue until blood glucose reaches 3 mmol/L.

**If child was dehydrated, use the new weight after rehydration to determine amount of F-75.

Record all feeds on 24-hour Food Intake Chart.

SIGNS OF SHOCK (None) Lethargic/unconscious Cold hand Slow capillary refill (> 3 seconds) Weak/fast pulse

If lethargic or unconscious, plus cold hand, plus either slow capillary refill or weak/fast pulse, give *oxygen. Give IV glucose as described under Blood Glucose (left).*

Then give IV fluids: Amount IV fluids per hour: 15 ml x _____ kg (child's wt) = _____ml

	Start:	Monitor every 10 minutes					*2nd hr	Monitor every 10 minutes				
Time							*					
Resp. Rate							*					
Pulse rate							*					

**If respiratory & pulse rates are slower after 1 hour, repeat same amount IV fluids for 2nd hour; then alternate ReSoMal and F-75 for up to 10 hours as in right section of chart below. If no improvement on IV fluids, transfuse whole fresh blood. (See Haemoglobin, left.). Give maintenance IV fluids (4 ml/kg/hour) while waiting for blood.*

DIARRHOEA

Watery diarrhoea? Yes (No)
Blood in stool? Yes (No)
Vomiting? Yes (No)

If diarrhoea, circle signs present: Skin pinch goes back slowly
Lethargic Thirsty Restless/irritable
Dry mouth/tongue No tears Sunken eyes

If diarrhoea and/or vomiting, give ReSoMal. Every 30 minutes for first 2 hours, monitor and give:*5 ml x _____ kg (child's wt) = _____ ml ReSoMal

For up to 10 hours, give ReSoMal and F-75 in alternate hours. Monitor every hour. Amount of ReSoMal to offer:*
5 to 10 ml x _____ kg (child's wt) = _____ to _____ ml ReSoMal

Time															
Resp. rate															
Pulse rate															
Passed urine? Y N															
Number stools															
Number vomits															
Hydration signs															
Amount taken (ml)							F-75		F-75		F-75		F-75		F-75

*Give ReSoMal orally or in special cases by NGT

** ***Stop ReSoMal if signs of rehydration appear:*** *Passing urine, moist tongue, making tears, not thirsty.* ***However,*** *if diarrhoea continues, give ReSoMal after each loose stool to replace stool looses and prevent dehydration*

Stop ReSoMal if any sign of over-hydration: *Increase in pulse & resp. rates, jugular veins engorges, increase in oedema, puffy eyelids*

Once the child is rehydrated, reweigh to determine the amount of F-75 to continue feeding. New weight: _____ *kg (record the amount of F-75 feeds to be given on the left hand section of this chart)*

ANTIBIOTICS (All received) Drug/Route	Dose/Frequency/Duration	Time of 1st Dose
Amoxicillin - Oral (125mg/5ml)	5ml Syrup every 8 hours for 5 days	12:30

MALARIA TEST 10/12/01 **Type/Date/Outcome** Negative	**Antimalarial:**	**Dose/Frequency/Duration**	**Time of 1st Dose**
HIV TEST 10/12/01 **Type/Date/Outcome** Non-reactive	**If HIV+, give Cotrimoxazole**		

1.3. Manage a Child with SAM with Shock

What is Shock?

Shock is a dangerous condition with severe weakness, lethargy, or unconsciousness; cold extremities; and fast, weak pulse. It is caused by diarrhoea with severe 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. Thus, IV fluids are given in SAM only if the child meets the following criteria.

A child with SAM is considered to be in shock if he or she:

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

Plus either:

- Has **slow capillary refill** (longer than 3 seconds)

OR

- **Weak or fast pulse**

To check capillary refill:

1. Press the nail of the thumb or big toe for 2 seconds to produce blanching of the nail bed.
2. 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 2 months up to 12 months of age, a fast pulse is 160 beats or more per minute. For a child 12 months to 5 years of age, a fast pulse is 140 beats or more per minute.

Give Oxygen, IV Glucose, and IV Fluids for Shock

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

- Give oxygen (1–2 L flow per minute).
- Give sterile 10% glucose 5 ml/kg by IV (as described in **Section 1.1** under ‘Treating Hypoglycaemia’).
- Give IV fluids as described below.
- Keep the child warm.

Give 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 CCP. Also record the starting time.

2. Infuse IV fluid at 15 (or 10) ml/kg over 1 hour. Use one of the following solutions, listed in order of preference:
   - Half-strength Darrow's solution with 5% glucose
   - Ringer's lactate solution with 5% glucose*
   - Half-normal (0.45%) saline solution with 5% glucose*

   * If either of these is used, add sterile potassium chloride (20 mmol/L) if possible.

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

3. Observe the child and check respiratory and pulse rates every 10 minutes.

4. If the respiratory rate increases by 5 breaths per minute and the pulse rate increases by 25 beats per 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. 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 CCP (excerpt below) as a reminder.

Important note: *The CCP is not a flow chart, thus it does not indicate steps of priority.*

SIGNS OF SHOCK None Lethargic/unconscious Cold hand Slow capillary refill (> 3 seconds) Weak/fast pulse												
***If lethargic or unconscious, plus cold hand, plus either slow capillary refill or weak/fast pulse**, give oxygen. Give IV glucose as described under Blood Glucose (left).* *Then give IV fluids:* Amount IV fluids per hour: 15 ml x ____ kg (child's wt) = _____ml												
	Start:	Monitor every 10 minutes					*2nd hr	Monitor every 10 minutes				
Time							*					
Resp. Rate							*					
Pulse rate							*					
**If respiratory & pulse rates are slower after 1 hour, repeat same amount IV fluids for 2nd hour; then alternate ReSoMal and F-75 for up to 10 hours as in right section of chart below. If no improvement on IV fluids, transfuse whole fresh blood. (See section on Haemoglobin). Give maintenance IV fluids (4 ml/kg/hour) while waiting for blood.*												

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. 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 as these have a smaller volume. (See steps below under 'If Hb < 4 g/dl..., give a blood transfusion' for more details)

1.4. Manage Very Severe Anaemia

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 < 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 later with iron, after the child has stabilised. Do **not** give iron now as it can damage cell membranes and make infections worse.

If it is not possible to test Hb, rely on clinical judgement. For example, judge based on the paleness of the child's palms, gums, lips, and inner eyelids.

If Hb is < 4 g/dl (or Hb is 4–6 g/dl and there are signs of respiratory distress), give a blood transfusion[2].

1. Stop all oral intake and IV fluids during the transfusion.

2. Look for signs of congestive heart failure, such as fast breathing, respiratory distress, rapid pulse, engorgement of the jugular vein, cold hands and feet, and cyanosis of the fingertips and under the tongue.

3. Get the blood ready. If there are no signs of congestive heart failure, be prepared to give 10 ml/kg whole fresh blood over 3 hours. If there are signs of congestive heart failure, be ready to give packed cells (5–7 ml/kg) over 3 hours instead of whole blood.

4. Give a diuretic[3] to make room for the blood. Furosemide (1 mg/kg, given by IV) is the most appropriate choice.

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

[3] Diuretics should never be used to reduce oedema in children with severe 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 CCPs for several children. You will then answer questions about treatment needed. Use your job aids as needed.

Case 1 – Tina

Tina 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. Additional information is provided in the CCP sections below.

VISIBLE SIGNS OF SAM: Severe wasting?				(Yes)	No
Bilateral Pitting Oedema?		0	+	(++)	+++
Dermatosis?	(0)	+	++	+++	(raw skin, fissures)
Weight (kg): 6.3		MUAC (cm): 11.4			

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 (mmol/L) ***If no test, treat for hypoglycaemia.***				3.5
If < 3 mmol/L and alert, give 50 ml bolus of 10% glucose or sucrose (oral or NGT). Yes No *If < 3 mmol/L and lethargic, unconscious or convulsing, give sterile 10% glucose* *IV:* 5 ml x ____ kg (child's weight) = ___ ml. *Then give 50 ml bolus by NGT.*				
Time glucose given:	Oral	NGT	IV	
HAEMOGLOBIN (Hb) (g/dl): 9.0			or Packed Cell Vol (PCV):	
Blood type: B+				
If Hb < 4 g/dl or PCV < 12%, transfuse 10 ml/kg whole fresh blood (or 5–7 ml/kg packed cells) slowly over 3 hours.				
Amount:	Time started:		Ended:	

1a. Should Tina be managed in Inpatient Care? Why or why not?

1b. Is Tina hypothermic?

1c. Is Tina hypoglycaemic?

1d. Does Tina have very severe anaemia?

1e. Tina 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 Tina in shock?

1f. What two things should be done for Tina immediately based on the above findings?

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

Case 2 – Kalpana

Kalpana 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, diarrhoea, vomiting, or eye problems. Additional findings are described in the CCP sections below.

VISIBLE SIGNS OF SAM: Severe wasting?	(Yes) No
Bilateral Pitting Oedema?	(0) + ++ +++
Dermatosis?	(0) + ++ +++ (raw skin, fissures)
Weight (kg): 8.0	MUAC (cm): 10.9

TEMPERATURE: 36° C (axillary) rectal
If axillary < 35° C or rectal < 35.5° C, actively warm child. Check temperature every 30 minutes.

BLOOD GLUCOSE (mmol/L) ***If no test, treat for hypoglycaemia.*** < 3 mmol/l
If < 3 mmol/L and alert, give 50 ml bolus of 10% glucose or sucrose (oral or NGT). Yes No *If < 3 mmol/L and lethargic, unconscious or convulsing, give sterile 10% glucose* *IV:* 5 ml x ____ kg (child's weight) = ___ ml. *Then give 50 ml bolus NGT.* Time glucose given: Oral NGT IV
HAEMOGLOBIN (Hb) (g/dl): 3.9 or **Packed Cell Vol (PCV)**: **Blood type**: B+ If Hb < 4 g/dl or PCV < 12%, transfuse 10 ml/kg whole fresh blood (or 5–7 ml/kg packed cells) slowly over 3 hours. Amount: Time started: Ended:

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

How should it be given?

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

How often and how much should she be fed?

2c. Does Kalpana have very severe anaemia?

If yes, what should be done? Kalpana 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 home 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 palms, gums, lips, and inner eyelids appear normal in colour (not pale). Additional information is given below.

VISIBLE SIGNS OF SAM: Severe wasting?	(Yes)	No			
Bilateral Pitting Oedema?	(0)	+	++	+++	
Dermatosis? 0	(+)	++	+++	(raw skin, fissures)	
Weight (kg): 5.8	MUAC (cm): 11.1				

TEMPERATURE: _____ ° C axillary rectal (assumed < 35.5° C)

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

BLOOD GLUCOSE (mmol/L) ***If no test, treat for hypoglycaemia.*** < 3

If < 3 mmol/L and alert, give 50 ml bolus of 10% glucose or sucrose (oral or NGT). Yes No
If < 3 mmol/L and lethargic, unconscious or convulsing, give sterile 10% glucose
IV: 5 ml x ____ kg (child's weight) = ___ ml. *Then give 50 ml bolus by NGT.*

Time glucose given: Oral NGT IV

HAEMOGLOBIN (Hb) (g/dl): or **Packed Cell Vol (PCV)**:
Blood type:

If Hb < 4 g/dl or PCV < 12%, transfuse 10 ml/kg whole fresh blood (or 5–7 ml/kg packed cells) slowly over 3 hours.

Amount: Time started: Ended:

SIGNS OF SHOCK None (Lethargic/unconscious) (Cold hand) (Slow capillary refill (> 3 seconds)) Weak/fast pulse

If lethargic or unconscious, plus cold hand, plus either slow capillary refill or weak/fast pulse, give oxygen. Give IV glucose as described under Blood Glucose (left).

Then give IV fluids: Amount IV fluids per hour: 15 ml x ____ kg (child's wt) = _____ml

	Start:	Monitor every 10 minutes					*2nd hr	Monitor every 10 minutes				
Time							*					
Resp. Rate							*					
Pulse rate							*					

**If respiratory & pulse rates are slower after 1 hour, repeat same amount IV fluids for 2nd hour; then alternate ReSoMal and F-75 for up to 10 hours as in right section of chart below. If no improvement on IV fluids, transfuse whole fresh blood. (See Haemoglobin, left.). 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% 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.

1.5. Give Emergency Eye Care for Corneal Ulceration

What is Corneal Ulceration?

Corneal ulceration is a break in the surface of the cornea (eye's surface). The eye may be extremely red or bleeding. A child with corneal ulceration may keep the 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.

Examine 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 or her eyes to check them or gently pull down the lower eyelids to check. Wash your hands again after examining the eyes.

Give Vitamin A 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 15.

Child's age	Frequency	Vitamin A oil-based oral dose
< 6 months	Day 1, 2, 15	50,000 IU
6–11 months	Day 1, 2, 15	100,000 IU
≥ 12 months	Day 1, 2, 15	200,000 IU

Oral treatment with vitamin A is preferred. Intramuscular (IM) treatment may be used if available for children who are unconscious and should be changed to oral treatment as soon as possible. For oral administration, an oil-based formulation is preferred. For IM treatment, only water-based formulations are used.

Instil one drop atropine (1%) into the affected eye(s) (3 times a day) to relax the eye and prevent the lens from pushing out. Tetracycline ointment (2 times a day) or chloramphenicol eye drops (4 times a day) and bandaging are also 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**.

All children with SAM without eye signs of vitamin A deficiency or recent measles will receive vitamin A after 4 weeks in treatment or upon discharge. Children with oedema will receive vitamin A after oedema has completely subsided. Treatment of various eye signs is described in **Module 5, Daily Care.**

Note: *If a child with SAM has eye signs and bilateral pitting oedema, vitamin A should be given to the child on Days 1, 2, and 15.*

What is Corneal Clouding?

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 spots[4]. This eye condition can quickly aggravate and evolve into corneal ulceration.

Vitamin A should be administered immediately as described above, however, it is not be necessary to provide atropine if the child has corneal clouding.

1.6. Manage Watery Diarrhoea and/or Vomiting with ReSoMal

What is ReSoMal?

ReSoMal is Rehydration Solution for Malnutrition. It is a modification of the standard or low-osmolarity oral rehydration solution (ORS) recommended by the World Health Organisation (WHO). ReSoMal contains less sodium, more sugar, and more potassium than standard ORS and is intended for children with SAM with diarrhoea, except in the case of profuse liquid diarrhoea (e.g., with cholera). It should be given by mouth or NGT. Do not give standard ORS to children with SAM, except in case of profuse liquid diarrhoea.

ReSoMal is available commercially in some places, but it may also be prepared from standard or low-osmolarity ORS and some additional ingredients.

Contents of ReSoMal as prepared from <u>standard ORS</u>:	
Water	2 L
Ghana-ORS	Two 600 ml packets
Sugar	50 g
Combined mineral and vitamin mix (CMV)	1 level scoop
Contents of ReSoMal as prepared from <u>low-osmolarity ORS</u>:	
Water	1,700 ml
WHO-ORS	One 1 L packet
Sugar	40 g
CMV	1 level scoop

Recognise the Need for ReSoMal

It is difficult to determine the dehydration status of children with SAM, as the usual signs of dehydration (such as lethargy and sunken eyes) may be present in these children all of the time, whether or not they are dehydrated.

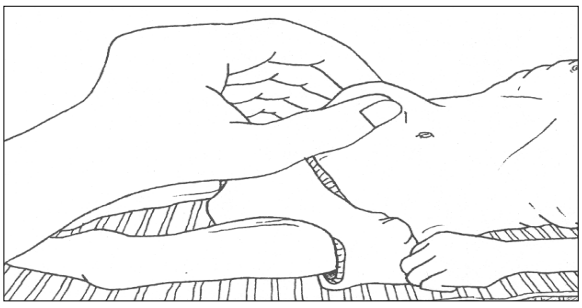
Ask the mother if the child has had watery diarrhoea or vomiting. If the child has watery diarrhoea or vomiting, assume dehydration and give ReSoMal. (Also ask about blood in the stool, as this will affect choice of antibiotics.)

[4] Bitot's spot is a foamy material on the conjunctiva.

Even if a child with SAM has oedema, he or she may be dehydrated. The oedema indicates a loss of control of fluid distribution in the body, rather than too much fluid. If the child has diarrhoea or vomiting, give ReSoMal even if the child has oedema.

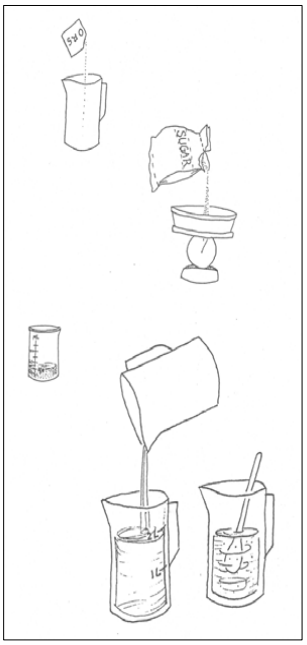
Note the following signs of dehydration so that improvements can be detected later. Even though the signs may be misleading, if they go away after giving ReSoMal, you will know that the ReSoMal has had a good effect.

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 the child's hydration status. Ask the mother if 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	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:*** *The skin pinch may always go back slowly in a wasted child.*) 

2. Prepare ReSoMal

If using commercial ReSoMal, follow the package instructions. If preparing ReSoMal from standard ORS and combined mineral and vitamin mix (CMV), prepare as follows.



1. Wash hands.
2. Empty two 600 ml Ghana-standard ORS packets into a container that holds more than 2 L.
3. Measure and add 50 g 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 (ORS and sugar).
5. Measure and add **2 L** cooled boiled water.
6. Stir until dissolved.
7. Use within 24 hours.

Calculate 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 and the amount of ongoing losses in the stool. F-75 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 via NGT. Monitor the child's condition carefully, and stop when signs of hydration appear (e.g., making tears, moist mouth, passing urine).

SHORT ANSWER EXERCISE

Fill in the blanks in the following case studies.

1. Roberto 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. Yuma, 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. Yuma 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 against the answers beginning on **page 58**.

Tell a facilitator when you are ready for the group exercise on the next page. If you reach this point before the rest of the group is ready, you may continue with individual work on **page 26**.

Exercise B

In this exercise, the group will prepare and taste ReSoMal and 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.

Case 1 – Ramesh

Ramesh has severe wasting and watery diarrhoea and is just starting ReSoMal. He weighs 7.3 kg.

1a. How much ReSoMal should Ramesh be given every 30 minutes for the next 2 hours?

1b. After 2 hours, what is the least amount of ReSoMal that Ramesh should be offered in alternate hours?

1c. What is the greatest amount of ReSoMal that Ramesh should be offered in alternate hours?

Case 2 – Sula

Sula has severe wasting, is vomiting, and has watery diarrhoea. She weighs 11.6 kg.

2a. How much ReSoMal should Sula be given every 30 minutes for the next 2 hours?

2b. After 2 hours, what is the least amount of ReSoMal that Sula should be offered in alternate hours?

2c. What is the greatest amount of ReSoMal that Sula 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.

Give 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 NGT can be used for giving ReSoMal at the same rate if the child is too weak to take enough fluid voluntarily. An NGT 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 the degree of dehydration cannot be determined by clinical signs and too much fluid could cause heart failure, it is very important that fluids are not forced on the child. When fluids are given orally, the child's thirst helps regulate the amount given.

Monitor the Child Who is Taking ReSoMal

Monitor the child's progress every half hour for the first 2 hours, then monitor hourly, i.e., every time the child takes F-75 or ReSoMal.

Signs to Check

- 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 CCP. 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
  - 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 title **"After Rehydration, Offer ReSoMal after Each Loose Stool"**, below.

Signs of Over-Hydration

Stop ReSoMal if any of the following signs appear:

- Increased respiratory and pulse rates (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)

After Rehydration, Offer ReSoMal after Each Loose Stool

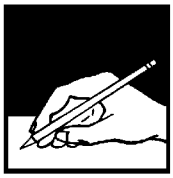
When the child has three or more signs of improving hydration (see above), stop giving ReSoMal routinely in alternate hours. However, watery diarrhoea may continue after the child is rehydrated. If diarrhoea continues, give ReSoMal after each loose stool to replace stool losses and prevent dehydration.

- For children under 2 years of age, give 50–100 ml after each loose stool.
- For children 2 years and older, give 100–200 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.

In Case of Profuse Liquid Diarrhoea

In case of profuse liquid diarrhoea (e.g., cases of cholera), ReSoMal should be replaced by low-osmolarity ORS following the same amounts and frequency as described above for the use of ReSoMal.



Exercise C

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

Case 1 – Marwan

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

VISIBLE SIGNS OF SAM: Severe wasting?	(Yes)	No	
Bilateral Pitting Oedema?	(0)	+	++ +++
Dermatosis? 0	(+)	++	+++ (raw skin, fissures)
Weight (kg): 6.2	MUAC (cm): 10.9		
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) ***If no test, treat for hypoglycaemia.*** < 3 mmol/l			
If < 3 mmol/L and alert, give 50 ml bolus of 10% glucose or sucrose (oral or NGT). Yes No *If < 3 mmol/L and lethargic, unconscious or convulsing, give sterile 10% glucose* *IV:* 5 ml x ____ kg (child's weight) = ___ ml. *Then give 50 ml bolus by NGT.* Time glucose given: Oral NGT IV			
HAEMOGLOBIN (Hb) (g/dl): or Packed Cell Vol (PCV): Blood type: If Hb < 4 g/dl or PCV < 12%, transfuse 10 ml/kg whole fresh blood (or 5–7 ml/kg packed cells) slowly over 3 hours. Amount: Time started: Ended:			
EYE SIGNS None Left (Right) Bitot's spots Pus/Inflammation Corneal clouding (Corneal ulceration) **If eye signs, give vitamin A on day 1, 2 and 15. Record on Daily Care page.* *** If corneal ulceration, give atropine eye drops immediately. Record on Daily Care page.* ****If no eye signs, give Vitamin A preventive dose on the 4th week or after full recovery from SAM (upon discharge), record on Comments/Outcome page.*			
ORAL DOSE OF VITAMIN A	< 6 months	50,000 IU	
	6–11 months	100,000 IU	
	≥ 12 months	200,000 IU	
MEASLES **** Yes No			

**** '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 Marwan?

-
-
-

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

Case 2 – Ram

Note: *For this case, use the first page of a blank CCP, available in your classroom.*

Ram is a 9-month-old boy. He was referred from Outpatient Care after his condition deteriorated. He has had loose stools and vomiting in the last 3 days. There has been no blood in the stool. Ram is severely wasted and has some mild dermatosis. He has no oedema. His weight is 4.4 kg and his mid-upper arm circumference (MUAC) is 10.4 cm.

Ram's axillary temperature is 37.5° 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, Ram cries but he has no tears. The skin pinch goes back slowly. Ram has a dry mouth and drinks eagerly.

2a. Using the above information about Ram, complete as many parts of the CCP as you can.

> ***Note:*** *You will not complete the section of the CCP 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; you will complete it starting in question 2h. You will learn about feeding in* ***Module 4, Feeding****.*

Since Ram has diarrhoea but no signs of shock, he needs ReSoMal. Ram 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. Ram has not passed urine. He has had one loose stool, but no vomiting. There has been no change in hydration signs. Again, Ram takes the full amount of ReSoMal.

2b. In the Diarrhoea section of Ram's CCP, complete the 'Start' (9:00) column and the column for 9:30.

Note: *You will need to abbreviate or write briefly in the row for hydration signs. Since Ram has had no change in hydration signs, write 'same'.*

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

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

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

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

At 11:00, Ram'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. Ram takes the maximum amount of ReSoMal in his range, but he no longer seems thirsty or eager to drink.

2e. Complete the column in the Diarrhoea section of Ram's CCP for 11:00.

At 12:00, Ram'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. Ram now has tears as well as a moist mouth. Ram is weighed again. He now weighs 4.5 kg. Ram is still willing to drink within the recommended range, though he does not drink eagerly.

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

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

2h. What should be given to Ram in the next hour (starting at 12:00)? How much should be given? Record this information in the Feeding section of the CCP.

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

2i. If Ram'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 – Irena

Note: *For this case, use the first page of a blank CCP, available in your classroom. This case will be done as a group.*

Irena is a 25-month-old girl. She arrives at the hospital at 10:00 on March 3 and has not received treatment for SAM before (she is a new case). 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 her MUAC is 10.9 cm.

Irena has axillary 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.

Irena 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 beats per minute).

Although Irena has had steady diarrhoea, her mother says there has been no blood in the stool. When the physician pinches the skin of Irena's abdomen, it stays folded for 2 seconds. Irena 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 have always been like that. She has a dry mouth.

3a. Using the information about Irena, complete as many parts of the CCP 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; you begin filling it out in question 3j.*

3b. Is Irena hypoglycaemic?

Is she hypothermic?

3c. Does Irena need vitamin A?

Does she need it immediately?

3d. Which signs of shock does Irena have?

What amount of sterile 10% glucose should she be given by IV? Enter the amount on the CCP in the Blood Glucose section.

What amount of IV fluids should Irena be given in the first hour? Enter the amount on the CCP in the Shock section.

Irena's IV is started at 10:30. Her respiratory rate is 40 breaths per minute and her pulse rate is 140 beats per minute. The nurses monitor Irena every 10 minutes. See the results of monitoring in the chart on the next page.

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

3e. Enter Irena's starting time and rates on her CCP. Then enter the information from monitoring. What should be done next for Irena?

Irena 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, Irena weighs 6.2 kg.

3f. Finish completing the IV section of Irena's CCP.

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

How much should be given? Enter the range of amounts on the CCP in the second (right-hand) part of the Diarrhoea section.

At 12:30, Irena'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 CCP. The nurse offers Irena the maximum amount of ReSoMal in her range, and Irena eagerly takes it all. Write this amount in the space for 'Amount taken' at the bottom of the 12:30 column.

At 13:30, Irena'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 CCP.

3j. Using Irena's new weight of 6.2 kg, look in the Job Aids on your *F-75 Reference Tables* to find the amount of F-75 to give at 13:30. Record this amount in the Feeding section of the CCP.

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

Twelve hours after her arrival at the hospital, Irena 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. Irena's diarrhoea continues after she is rehydrated. What does she need after each loose stool? How much does she need?

3. Give 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. It is recommended that adaptations are made according to the standard treatment guidelines for Ghana. The important principle is that all children with SAM should be given appropriate antibiotics.

3.1. Select Antibiotics and Prescribe Regimen

Selection of antibiotics depends on the presence or absence of medical complications. Medical complications include septic shock, hypoglycaemia, hypothermia, skin infections or dermatosis (+++ with raw skin/fissures), respiratory or urinary tract infections, and a lethargic, sickly appearance.

As shown on the summary chart on the next page:

- **If there are no medical complications**, give amoxicillin 15–30 mg/kg, orally, 3 times per day (every 8 hours), for 5 days.

- **If medical complications are present**, give gentamicin plus ampicillin, followed by oral amoxicillin.

- **If the context indicates a resistance to amoxicillin and ampicillin** and the child has medical complications (see details of drug use described below):

    - In the case of **sepsis or septic shock**, give:
      IV/IM cefotaxime (for children or infants over 1 month of age: 50 mg/kg every 8–12 hours) + oral/IV ciprofloxacin (5–15 mg/kg twice a day)
    - If **suspected staphylococcal infections**, add:
      IV/IM cloxacillin (12.5–50.0 mg/kg/dose four times a day, depending on the severity of the infection)

- **If a specific infection is identified that requires a specific antibiotic not already being given** or an additional medicine, give the appropriate additional medicine to address that infection. For example, dysentery and pneumonia may require additional antibiotics. Certain skin infections, such as Candidiasis, require specific antibiotics or antifungals. For a more comprehensive list of antibiotics required, see **Annex B** and the job aids **Medicine Protocols and Vaccines for Children under 5 with SAM in Inpatient Care**.

- **If the child is HIV-positive**, give oral cotrimoxazole and link to care in line with the national guidelines for HIV/AIDS.

Summary: Antibiotics for Children with SAM

<table>
<tr><th>IF:</th><th colspan="2">GIVE:</th></tr>
<tr><td>NO MEDICAL COMPLICATIONS</td><td colspan="2">Amoxicillin* oral (15mg/kg) every 8 hours for 5 days</td></tr>
<tr><td rowspan="2">MEDICAL COMPLICATIONS
(shock, hypoglycaemia, hypothermia, dermatosis with raw skin/fissures, respiratory or urinary tract infections, or lethargic/sickly appearance)</td><td colspan="2">Gentamicin** IV or IM (7.5 mg/kg) once daily for 7 days, plus:</td></tr>
<tr><td>Ampicillin IV or IM (50 mg/kg) every 6 hours for 2 days</td><td>Followed by: Amoxicillin* oral (15 mg/kg) every 8 hours for 5 days</td></tr>
<tr><td rowspan="2">Resistance to amoxicillin and ampicillin, and presence of medical complications</td><td colspan="2">In the case of sepsis or septic shock, give: IV/IM cefotaxime (children or infants over 1 month of age (50 mg/kg every 8–12 hours) + oral/IV ciprofloxacin (5–15 mg/kg 2 times per day)</td></tr>
<tr><td colspan="2">If suspected staphylococcal infections, add: IV/IM cloxacillin (12.5–50.0 mg/kg/dose four times a day, depending on the severity of the infection)</td></tr>
<tr><td>Specific infection requires an additional antibiotic</td><td colspan="2">Add specific antibiotic as per standard treatment guidelines for Ghana</td></tr>
<tr><td>Child is HIV-positive or exposed.</td><td colspan="2">Cotrimoxazole oral (25 mg sulfamethoxazole + 5 mg trimethoprim/kg) according to the standard treatment guidelines for Ghana</td></tr>
</table>

* If amoxicillin is not available, give ampicillin, 50 mg/kg orally every 6 hours for 5 days.
** If the child is not passing urine, gentamicin may accumulate in the body and cause deafness. Do not give the second dose until the child is passing urine.

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 **Annex B** and the job aid **Medicine Protocols and Vaccines for Children under 5 with SAM in Inpatient Care**. For each formulation of a drug, the tables have rounded practical doses to use for children of different weights. Refer to **Annex B** as you read the following steps and example.

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 its strength.

4. Look up the formulation on the dose tables, and find the amount to give for the child's weight. For most drugs, the doses are given for weight ranges.

Example of Determining the Dose

Khalil weighs 8.6 kg. He is severely wasted and has a MUAC of 10.7 cm. He has mild oedema. His axillary 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. Khalil has no medical complications, so he should be given amoxicillin. It should be given orally every 8 hours for 5 days.

2. Khalil'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 of amoxicillin syrup and Khalil's weight. The dose is 5 ml. He prescribes 5 ml amoxicillin syrup to be taken orally every 8 hours for 5 days.

3.2. Choose and Use the Best Route of Administration

Sometimes there is a choice of whether to give a drug intravenously or by IM injection. IM injections are very painful for a child with SAM. If an IV line is in and being used to give fluids, 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. 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- 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.

3.3. Prescribe Metronidazole if it is Policy to Do So

Some experienced doctors also routinely give metronidazole (orally, 7.5 mg/kg, every 8 hours for 7 days). The purpose of giving metronidazole is to kill harmful bacteria growing in the upper gut. However, the efficacy of this treatment has not been proven by clinical trials. Possible side effects of metronidazole are anorexia, nausea, and metallic aftertaste.

Exercise D

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

Refer to **Annex B** of this module 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 – Pershant

Pershant weighs 8.0 kg, has a MUAC reading of 10.2 cm, and has oedema of both feet *(marasmic-kwashiokor).* He has no hypoglycaemia, hypothermia, signs of shock, or other medical complications.

1a. What antibiotic does Pershant need? By which route should it be given?

1b. Look at the formulations listed on the dose tables. What formulation is most likely to be available in your hospital?

Note: *Use this formulation to answer the next question.*

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

1d. Summarise the prescription for Pershant in the table below.

Drug	Route	Dose	Frequency	Duration

Case 2 – Ana

Ana weighs 6 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.

Note: *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 in the table 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 is alert and 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 question 2h, what is the appropriate dose for Ana?

2j. Summarise the prescription for the new drug in the table below.

Drug	Route	Dose	Frequency	Duration

Case 3 – Dipti (optional)

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

3a. Dipti has signs of a specific infection (pneumonia) requiring a specific antibiotic. Look in the job aids **Medicine Protocols and Vaccines for Children under 5 with SAM in Inpatient Care** to see which antibiotic is required first, and record it in the table at the top of the next page.

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

3c. Summarise the prescription for Dipti in the table at the top of the next page.

Drug	Route	Dose	Frequency	Duration

After 5 days, Dipti's breathing is normal and there is no chest in-drawing. She is taking F-75 well. She still weighs 7.9 kg.

3d. Which choice of antibiotics should be given next and by which route?

Hint: *Refer to the job aids* ***Medicine Protocols and Vaccines for Children under 5 with SAM in Inpatient Care****.*

3e. Choose one of the above antibiotics. What formulation of this drug is most likely to be available in your hospital?

3f. Given the formulation listed in 3e, what is the appropriate dose for Dipti?

3g. Summarise Dipti's new prescription in the table below.

Drug	Route	Dose	Frequency	Duration

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. This video will show many of the steps described so far in this module.

4. Test and Treat/Manage for Malaria, HIV, and Tuberculosis

4.1. Test and Treat for Malaria

Diagnose malaria and give treatment according to the national protocol. Test for malaria using the Rapid Diagnostic Test Kit or any other available diagnostic tests in the health facility.

In high-prevalence areas, all children with SAM should be systematically screened for malaria. In the absence of screening methods, all children under 5 with SAM with clinical signs of malaria should be treated presumptively.

In low-prevalence areas, if the results are in clinical doubt, the test should be repeated in the week following the initial test. A persistently negative test excludes *p. falciparum* malaria.

Notes:

- *The usual clinical signs and symptoms of malaria might be absent in a child with SAM because he or she might be unable to mount an acute phase inflammatory response as a result of pathophysiological changes in his or her body.*

- *In case of malaria with pneumonia or dysentery, artemisinin-based combination therapy (ACT) can be combined with amoxicillin or ciprofloxacin, but not with cotrimoxazole.*

For more information about malarial treatment, follow the Ghana Standard Treatment Guidelines or the national malaria treatment guidelines.

4.2. Test for and Manage HIV

Although guidelines for the management of SAM are considered appropriate for HIV-infected patients, with the minor adaptations described below, extensive research is currently under way to further adapt protocols for these patients. These include, among other considerations:

- Comparison of recovery rates of HIV-infected and HIV-negative children with SAM treated in Community-Based Management of Acute Malnutrition (CMAM)

- Development of nutrition products specifically designed for HIV-infected children with SAM

- Efficacy of micronutrient supplementation for HIV-infected individuals

- Development of nutrition support for people living with HIV (PLHIV) on antiretroviral therapy (ART)

- Studies on the interaction between ART and nutritional status

- Impact of nutrition support on HIV-infected children

- Harmonization of HIV programmes and CMAM

Until the evidence base is established, it is advised to treat SAM in HIV-infected children with the standard treatment protocol for SAM, combined with a prophylactic treatment (cotrimoxazole). Thus, the dietary management of HIV-infected children with SAM does not differ from dietary treatment of HIV-negative children with SAM. HIV-infected children with SAM are more likely to present with associated infections, and therefore rates of weight gain and recovery may be slower than in HIV-negative children with SAM. Also, the management of SAM in HIV-infected children should take into account the following.

- High prevalence of TB: Always consider a diagnosis of TB[5] in HIV-infected children. The signs are the same as those in HIV-negative children (see **Section 4.3**).

- Cotrimoxazole prophylaxis: Prophylactic doses of cotrimoxazole should be given to children when HIV is suspected, and provision should be indefinite in situations where ART is not yet available. This antibiotic is added to the other routine antibiotics for treatment of SAM.

- ART should be considered for HIV-positive children with SAM where available. The most appropriate schedule for start of ART treatment for HIV-infected children with SAM is not yet established but currently being investigated.

- HIV testing and counselling of children with SAM, and their mothers, is advised in areas with a high prevalence of HIV.

- The treatment option to choose for infants with SAM of HIV-positive mothers has to take into account the national guidelines on the prevention of mother-to-child transmission of HIV (PMTCT).

- Knowing the HIV status of a child has implications for the treatment of SAM, and it may lead to detection of HIV in the accompanying mother, with implications for counselling and treatment.

[5] WHO. 2006. *Guidance for national tuberculosis programmes on the management of tuberculosis in children.*

4.3. Test and Treat for Tuberculosis

The diagnosis of TB in children relies on a thorough assessment of all the evidence derived from a careful history, clinical examination, and relevant investigations. Most children with TB have pulmonary TB. The decision to treat a child should be carefully considered, and once such a decision is made, the child should be treated with a full course of therapy.
TB in children with SAM is often missed or over-diagnosed. The presence of three or more of the following key features should strongly suggest a diagnosis of TB in children.

1. Careful history:
    - Contact with others infected with TB
    - Chronic symptoms suggestive of TB, e.g., prolonged fever (> 2 weeks), chronic cough (non-remitting for 2–3 weeks), weight loss, or failure to thrive (i.e., if SAM does not respond to treatment)

2. Clinical examination:
    - Physical signs highly suggestive of extrapulmonary TB, e.g., gibbus (especially of recent onset) or non-painful enlarged cervical lymphadenopathy with fistula formation
    - Physical signs requiring investigation to exclude extrapulmonary TB, e.g., meningitis not responding to antibiotic treatment or distended abdomen with ascitis

3. A positive tuberculin skin test (Mantoux method), i.e., reading after 48 hours with ≥ 5 mm diameter of induration in high-risk children (HIV-infected and/or with SAM) and ≥ 10 mm in all other children

4. Chest X-ray suggestive of TB, e.g., persistent opacification in the lung together with enlarged hilar or subcarinal lymph glands

For TB treatment, consult the national treatment protocol for TB in children.

5. Record Initial Findings and Treatments and Communicate to Staff

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

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

The Critical Care Pathway (CCP) 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 CCP, available in your classroom. Use this module and your reference tables or job aids as needed.

1. Use the information below to complete the first page of a CCP for a child named Rayna**.** 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.)

   Rayna is a 13-month-old girl. She is admitted on October 3 at 9:00 a.m. She is an old case, referred from Outpatient Care. She is severely wasted and has mild oedema (+), but has no dermatosis. She weighs 6.3 kg and her MUAC is 10.6 cm.

   Rayna's axillary 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.

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

2. When you have finished with the CCP, 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.

Annex A. Critical Care Pathway

This Annex contains all pages of a blank CCP. The CCP will be used as a tool throughout this course. Copies of the CCP should be available in your classroom.

Name: _____ Sex: **M F** Age (months): _____ Date of Admission: _____ Time: _____ Hospital ID Number: _____

INITIAL MANAGEMENT

Comments on pre-referral and/or emergency treatment already given:

ADMISSION AS: Old Case (*from Outpatient, Inpatient Care or other*), New case

VISIBLE SIGNS OF SAM Severe wasting? Yes No

Bilateral Pitting Oedema? 0 + ++ +++

Dermatosis? 0 + ++ +++ (raw skin, fissures)

Weight (kg): MUAC (cm):

TEMPERATURE: °C axillary rectal

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

BLOOD GLUCOSE (mmol/l)

If < 3 mmol/L and alert, give 50 ml bolus of 10% glucose or sucrose (oral or NGT).

If < 3 mmol/L and lethargic, unconscious, or convulsing, give sterile 10% glucose IV: 5 ml x _____kg (child's wt) = _____ml. *Then give 50 ml bolus by NGT.*

Time glucose given: Oral NGT IV

HAEMOGLOBIN (Hb) (g/dl): or Packed cell vol (PCV):

Blood type:

If Hb < 4 g/dl or PCV < 12%, transfuse 10 ml/kg whole fresh blood (or 5–7 ml/kg packed cells) slowly over 3 hours.

Amount: Time started: Ended:

EYE SIGNS None Left Right

Bitot's spots Pus/Inflammation Corneal clouding Corneal ulceration

*If eye signs, give vitamin A on day 1, 2 and 15. Record on Daily Care page.

**If corneal ulceration, give atropine eye drops immediately. Record on Daily Care page

***If no eye signs, give vitamin A preventive dose on the 4th week or after full recovery from SAM (upon discharge), record on Comments/Outcome page.

Oral dose of vitamin A:	< 6 months	50,000 IU
	6–11 months	100,000 IU
	≥ 12 months	200,000 IU

MEASLES (Yes is circled if the child has measles now or had measles in the past 3 months) Yes No

FEEDING *Begin feeding with F-75 as soon as possible*

Amount for 2-hourly feedings: _____ ml F-75* Time first fed: _____

**If hypoglycaemic, feed _____ ml F-75* (¼ of the amount above) every half hour for the first 2 hours; continue until blood glucose reaches 3 mmol/L.*

***If child was dehydrated, use the new weight after rehydration to determine amount of F-75.*

Record all feeds on 24-hour Food Intake Chart.

SIGNS OF SHOCK None Lethargic/unconscious Cold hand Slow capillary refill (> 3 seconds) Weak/fast pulse

If lethargic or unconscious, plus cold hand, plus either slow capillary refill or weak/fast pulse, give *oxygen. Give IV glucose as described under Blood Glucose (left).*

Then give IV fluids: Amount IV fluids per hour: 15 ml x _____ kg (child's wt) = _____ml

	Start:	Monitor every 10 minutes					*2nd hr	Monitor every 10 minutes				
Time							*					
Resp. Rate							*					
Pulse rate							*					

**If respiratory & pulse rates are slower after 1 hour, repeat same amount IV fluids for 2nd hour; then alternate ReSoMal and F-75 for up to 10 hours as in right section of chart below. If no improvement on IV fluids, transfuse whole fresh blood. (See Haemoglobin, left.). Give maintenance IV fluids (4 ml/kg/hour) while waiting for blood.*

DIARRHOEA

Watery diarrhoea? Yes No

Blood in stool? Yes No

Vomiting? Yes No

If diarrhoea, circle signs present: Skin pinch goes back slowly

Lethargic Thirsty Restless/irritable

Dry mouth/tongue No tears Sunken eyes

If diarrhoea and/or vomiting, give ReSoMal. Every 30 minutes for first 2 hours, monitor and give:* 5 ml x _____ kg (child's wt) = _____ ml ReSoMal

For up to 10 hours, give ReSoMal and F-75 in alternate hours. Monitor every hour. Amount of ReSoMal to offer:*

5 to 10 ml x _____ kg (child's wt) = _____ to _____ ml ReSoMal

Time															
Resp. rate															
Pulse rate															
Passed urine? Y N															
Number stools															
Number vomits															
Hydration signs															
Amount taken (ml)							F-75		F-75		F-75		F-75		F-75

*Give ReSoMal orally or in special cases by NGT

** ***Stop ReSoMal if signs of rehydration appear****: Passing urine, moist tongue, making tears, not thirsty.* ***However,*** *if diarrhoea continues, give ReSoMal after each loose stool to replace stool looses and prevent dehydration*

Stop ReSoMal if any sign of over-hydration: *Increase in pulse & resp. rates, jugular veins engorges, increase in oedema, puffy eyelids*

Once the child is rehydrated, reweigh to determine the amount of F-75 to continue feeding. New weight: _____ ***kg*** *(record the amount of F-75 feeds to be given on the left hand section of this chart)*

ANTIBIOTICS (All received) Drug/Route	**Dose/Frequency/Duration**	**Time of 1st Dose**

MALARIA TEST Type/Date/Outcome	**Antimalarial: Dose/Frequency/Duration**	**Time of 1st Dose**
HIV TEST Type/Date/Outcome	**If HIV+, give Cotrimoxazole**	

Name: _____ Sex: **M F** Age (months): _____ Date of Admission: _____ Time: _____ Hospital ID Number: _____

DAILY CARE

	Week 1							Week 2							Week 3						
DAYS IN HOSPITAL	**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)	*Calculate daily when on RUTF or F-100*																				
Bilateral pitting oedema 0 + ++ +++																					
Diarrhoea (D) or Vomit (V): O D V																					
FEED PLAN: Type feed																					
# daily feeds																					
Volume to give per feed																					
Total volume taken (ml)																					
NG Tube Y N																					
Breastfeeding Y N																					
Appetite test with RUTF ***F failed P passed***																					
ANTIBIOTICS	*List prescribed antibiotics in left column. Allow one row for each daily dose. Draw a box around days/times that each drug should be given. Initial when given.*																				
ANTIMALARIAL (note type of drug)																					
FOLIC ACID (5 mg single dose upon admission)		*Give a single dose upon admission*																			
VITAMIN A			*Give day 1, 2, and 15 if child admitted with eye sign or recent measles. Else, give routinely for prevention, single dose on week 4 or upon discharge unless evidence of dose in past one month*																		
ANTIHELMINTHIC *Drug for worms* only give to children > 24 months unless the younger child has worm infestation																					
IRON (if not on RUTF) Give 3mg/kg/day, 2 x daily Give Iron after Malaria treatment	*Begin iron after 2 days on F-100. Do not give when on RUTF.*																				
FOR EYE PROBLEMS											*After 7–10 days, when eye drops are no longer needed, shade boxes for eye drops.*										
Tetracycline eye ointment: 2x daily or **Chloramphenicol eye drops:** 1 drop 4 x daily																					
Corneal Ulceration, As above, plus 1% atropine eye drops: 1 drop 3 x daily																					
Dermatosis 0 + ++ +++																					
Bloody Stool (Yes or No)																					
Ear problems																					
Mouth or Throat problems																					
Bathing, 1% permanganate																					
OTHER																					

MONITORING RECORD

Monitor respiratory rate, pulse rate, and temperature 4-hourly until after transition to RUTF or F-100 and patient is stable. Then monitoring may be less frequent (e.g., twice daily).

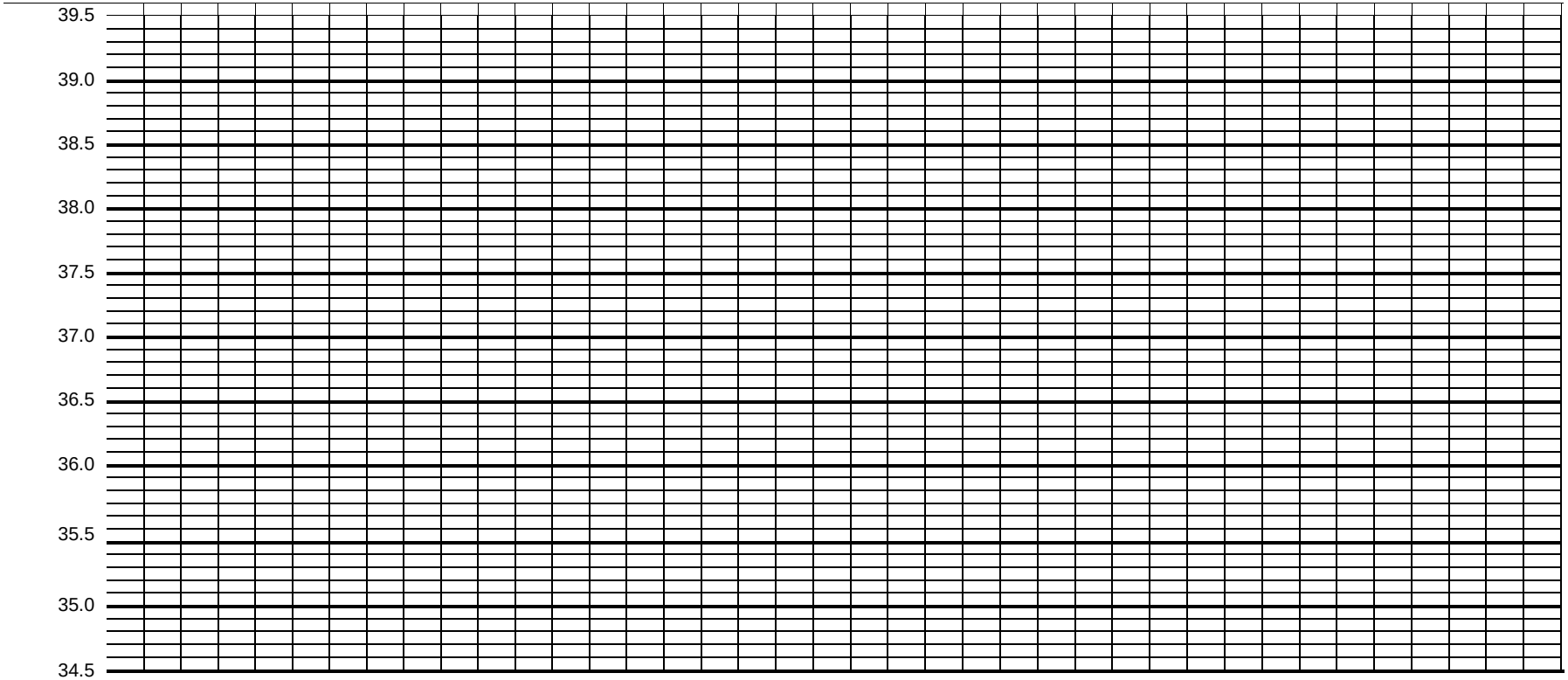
RESPIRATORY RATE

Breaths/ minute

PULSE RATE

Beats/ minute

TEMPERATURE



Danger Signs: Watch for increasing pulse and respirations, fast or difficult breathing, sudden increase or decrease in temperature, rectal temperature below 35.5°C, and other changes in condition. See Danger Signs and normal ranges of pulse and respiration rates listed in the Inpatient Care Job Aids.

WEIGHT CHART

Weight on admission: _____ kg

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

Desired weight if full recovery in inpatient care (Target weight), 15% weight gain of admission weight or weight free of oedema:

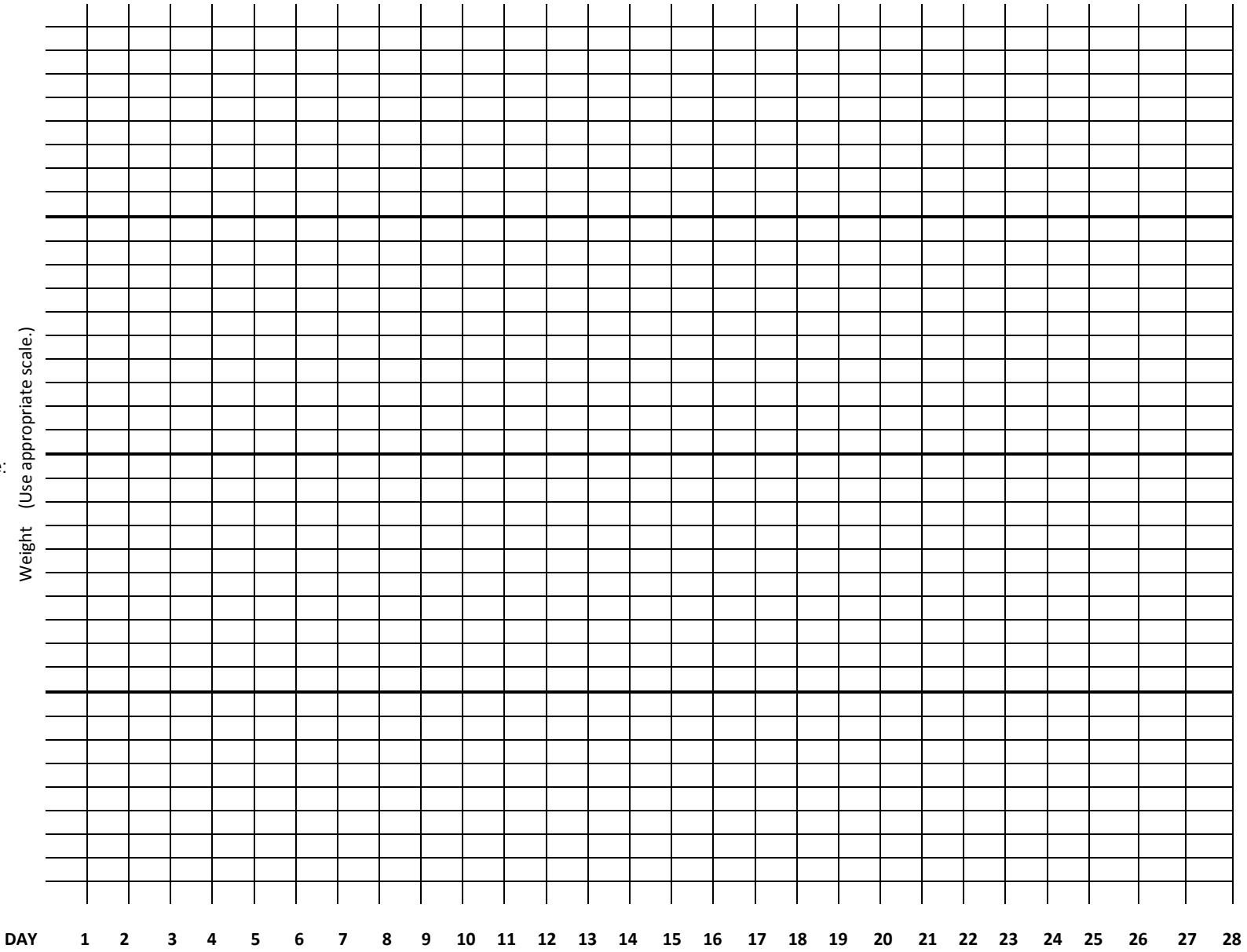
_____ kg

Weight at referral to outpatient care:

_____ kg

Weight at discharge if treatment until full recovery in inpatient care:

_____ kg



COMMENTS/OUTCOME

COMMENTS

COUNSELLING GIVEN TO PARENTS/CAREGIVERS

IMMUNISATIONS

Immunisation card/Child Health Record? Yes No

Circle immunisations already given. Initial and date by any given in hospital.

Immunisation	At Birth	First	Second	Third
BCG	At birth	__	__	__
Polio	At birth	6 weeks	10 weeks	14 weeks
PENTA 1, 2, 3	__	6 weeks	10 weeks	14 weeks
Measles	6–9 months (if SAM)	9 months	—	—
Yellow Fever	__	9 months	__	__
Rotavirus *and* Pneumococcal	—	6 weeks	10 weeks	14 weeks

SPECIAL DISCHARGE AND FOLLOW-UP INSTRUCTIONS

PATIENT OUTCOME

	DATE	CIRCUMSTANCES/COMMENTS
Referral to Outpatient Care		Site:
In case of treatment until full recovery in Inpatient Care and/or discharge, Circle Outcome.		
Discharge based on 15% weight gain ***Cured***		Discharge weight equal or above 15% weight gain: Y N
Early Departure (against advice) ***Defaulter***		Weight on discharge_____
Non-recovered		MUAC on discharge _____
Death		Number of days after admission (circle): < 1 1–3 4–7 > 7 Approximate time of death: Day Night
		Apparent cause(s): Had child received IV fluids? Yes No

Annex B. Medicine Protocols and Vaccines for Children under 5 with SAM in Inpatient Care

1. Routine Medicine Protocols and Vaccines for Children under 5 with SAM in Inpatient Care

Name of Medication	When to Give	Age	Prescription	Dose
AMOXICILLIN	On admission if **no** medical complication	6–59 months	Amoxicillin 15mg/kg	3 times per day, for 5 days
ALBENDAZOLE or MEBENDAZOLE	After 1 week, for presumptive treatment for ONLY children > 24 months Immediate, for treatment in case of severe infestation	> 24 months	> 2 years: Albendazole 400 mg Mebendazole 600 mg	Albendazole: > 2 years: 400 mg single dose Mebendazole: > 2 years: 100 mg, 2 times per day, for 3 days
VITAMIN A	On admission **if eye signs** of vitamin A deficiency	All ages	< 6 months: 50,000 IU 6–11 months: 100,000 IU ≥ 12 months: 200,000 IU	1 dose on admission, day 2, and day 15
	On week 4 or discharge (and oedema free) **if no eye signs** of vitamin A deficiency	6–59 months	6–11 months: 100,000 IU ≥ 12 months: 200,000 IU	Delayed single dose

Folic acid and iron:

- **5 mg of folic acid in 1 single dose** is given on admission.
- **3 mg/kg/day of iron (ferrous sulphate) is given after 2 days on F-100**, when gaining weight.
- Iron and folic acid should never be provided together with a malaria treatment. Malaria is treated first.
- The child on an RUTF diet receives neither folic acid nor iron, as the daily dose of RUTF contains sufficient iron (10 mg/100 g or 500 kcal) and folic acid (210 µg/100 g or 500 kcal).

Zinc:

- Zinc is not given in case of diarrhoea as the daily doses of F-75, F-100, and RUTF contains sufficient zinc (daily dose provides 30–45 mg of elemental zinc).

Antimalarial drugs:

- Refer to the national guidelines for first-, second-, and third-line treatment and for when to give or not give presumptive malaria treatment.

Vaccination:

- Give measles vaccine upon admission if the child is over 6 months of age and has not yet received the measles vaccine.
- Update all vaccines.

2. Summary: Antibiotics for Children with SAM in Inpatient Care

<table>
<tr><th>IF:</th><th colspan="2">GIVE:</th></tr>
<tr><td>NO MEDICAL COMPLICATIONS</td><td colspan="2">Amoxicillin* oral (15 mg/kg) every 8 hours for 5 days</td></tr>
<tr><td rowspan="2">MEDICAL COMPLICATIONS
(shock, hypoglycaemia, hypothermia, dermatosis with raw skin/fissures, respiratory or urinary tract infections, or lethargic/sickly appearance)</td><td colspan="2">Gentamicin** IV or IM (7.5 mg/kg) once daily for 7 days, plus:</td></tr>
<tr><td>Ampicillin IV or IM (50 mg/kg) every 6 hours for 2 days</td><td>Followed by: Amoxicillin* oral (15 mg/kg) every 8 hours for 5 days</td></tr>
<tr><td rowspan="2">Resistance to amoxicillin and ampicillin, and presence of medical complications</td><td colspan="2">In the case of sepsis or septic shock, give: IV/IM cefotaxime (children or infants over 1 month of age (50 mg/kg every 8–12 hours) + oral/IV ciprofloxacin (5–15 mg/kg 2 times per day)</td></tr>
<tr><td colspan="2">If suspected staphylococcal infections, add: IV/IM cloxacillin (12.5–50.0 mg/kg/dose four times a day, depending on the severity of the infection)</td></tr>
<tr><td>Specific infection requires an additional antibiotic</td><td colspan="2">Add specific antibiotic as per standard treatment guidelines for Ghana</td></tr>
<tr><td>Child is HIV-positive or exposed.</td><td colspan="2">Cotrimoxazole oral (25 mg sulfamethoxazole + 5 mg trimethoprim/kg) according to the standard treatment guidelines for Ghana</td></tr>
</table>

* If amoxicillin is not available, give ampicillin, 50 mg/kg orally every 6 hours for 5 days.
** If the child is not passing urine, gentamicin may accumulate in the body and cause deafness. Do not give the second dose until the child is passing urine.

3. 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
Ampicillin	Oral: 50 mg/kg body weight every 6 hours for 5 days	Tablet, 250 mg	1 tablet	1½ tablet	2 tablets
	IV/IM: 50 mg/kg body weight every 6 hours for 2 days	Vial of 500 mg mixed with 2.1 ml sterile water to give 500 mg/2.5 ml	1 ml	1.75 ml	2.25 ml
Metronidazole	Oral/IV: 7.5 mg/kg body weight every 8 hours for 7 days	Suspension, 200 mg/5 ml	1 ml	1.25 ml	1.5 ml
Benzylpenicillin	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 *(Use closest weight)*									
			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

4. Other Medicine Protocols for Children under 5 with SAM in Inpatient Care*

Name of Medication	When to Give	Prescription	Special Instructions
AMOXICILLIN-CLAVULANIC ACID	**IF** SAM with medical complication (severe infection) (first-line antibiotic)	15–30 mg/kg, orally, 2 times per day, for 5–10 days	Give in combination with gentamicin
GENTAMICIN		7.5 mg/kg, IV or IM, 1 time per day, for 5–10 days	Give in combination with amoxicillin-clavulanic acid
CHLORAMPHENICOL	**IF** no improvement with first-line antibiotic within 48 hours (second-line antibiotic)	25 mg/kg, IV or IM, 3 times per day, for 5–10 days (4 times per day if meningitis is suspected)	Add to first-line treatment Do not give to a child < 2 months
CEFTRIAXONE (Third generation cephalosporin)	**IF** no improvement with second-line antibiotic after 48 hours (third-line antibiotic)	100 mg/kg, IV or IM, 1 time per day, for 5–10 days	Give as a single daily dose
CEFOTAXIME	In case of sepsis or septic shock	50mg/kg, IV or IM 3 to 2 times per day, for 5–10 days	Do not give infants < 1 month of age
CIPROFLOXACIN	In case of sepsis or septic shock	5–15mg/kg, oral or IV 2 times per day, for 5–10 days	
CLOXACILLIN	For suspected staphylococcal infection	12.5–50.0 mg/kg, oral, IV or IM 4 times a day, for 5–10 days	Depends on the severity of the infection
TETRACYCLINE EYE OINTMENT *or* CHLORAMPHENICOL EYE DROPS	For treatment of eye infection	Apply 2 times per day 1 drop, 4 times per day	Wash hands before and after use; wash eyes before application; continue for 2 days after disappearance of signs of infection
1% ATROPINE EYE DROPS	As part of treatment of corneal clouding and corneal ulceration	1 drop, 3 times per day: morning, afternoon, and at night before sleep	May be used to relieve pain as pupil dilatation stops ciliary muscle spasms
NYSTATIN (Oral suspension)	For treatment of candidiasis	100,000 IU (1 ml) 4 times per day after food, for 7 days	Use dropper and show caregiver how to use it
PARACETAMOL	For treatment of fever over 38.5° C	10 mg/kg oral 3 times a day, for 3 days	Give upon admission to all children with high fever
BENZYL BENZOATE (12.5%)	For treatment of scabies	Apply over whole body; repeat without bathing on following day; wash off 24 hours later; repeat for 2 consecutive days	Avoid eye contact; do not use on broken or secondary infected skin
WHITFIELDS	For treatment of ringworm, taenia, or fungal infections of the skin	Apply 2 times per day	Continue treatment until condition has completely resolved
GENTIAN VIOLET	For treatment of minor abrasions or fungal infections of the skin	Apply on lesion	Can be repeated; continue until condition has resolved

* For medicine protocols for treating other infections, such as TB and HIV, refer to the Ghana Standard Treatment Guidelines.

Answers to Short Answer Exercises

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The answers to the questions 1 and 2 are written in the blanks below.

1. Roberto 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. Yuma, 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. Yuma 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