SEVERE ACUTE MALNUTRITION TREATMENT & PREVENTION IN SA CONTEXT

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Background

- WHO Ten Steps were piloted in rural hospitals of the Eastern Cape, South Africa in 1998 with the support of experts, Prof Ann Ashworth, Prof Thandi Pouane and Prof David Sanders (1).
  - The pilots reflected a halving of deaths in children with severe acute malnutrition.

- According to SA Saving Children Report (2005), over 60% of children who died in South African hospitals were underweight and more than half of these were severely malnourished (2).

- Management of Severe Malnutrition became one of the critical intervention to reduce child mortality in SA.

Background

- According to the 2008 *Lancet Series* on Maternal and Child Undernutrition, severe acute malnutrition (SAM) was recommended as one of the most important contributing causes of childhood mortality (3).

- Subsequent studies, suggested for new commodities, such as ready-to use therapeutic foods, that could be used in the community setting (4).

- By 2009, South Africa was the only country in the ESARO region that had not extended the treatment of severe acute malnutrition to outpatient

Process

- From 2009 till 2012, South Africa embarked on extensive consultations with experts, clinicians, implementers and all relevant stakeholders and partners.
  - 4 provinces namely, Eastern Cape, North West, Limpopo and Kwa-Zulu Natal were already implementing the WHO Ten steps in some hospitals with paediatric wards
  - Health care workers (nurses, dieticians and doctors working in paediatric wards) were trained
- In 2012, the South African inpatient protocols to managing children with SAM in the SA context (with deviations from the WHO guidelines) were approved and rolled out to all the 9 provinces.
- The Essential drug list (2014), included these deviated guidelines.
- In 2015, a draft Integrated management acute Malnutrition (IMAM) guideline were finalised and piloted by some provinces.

SEVERE ACUTE MALNUTRITION
EMERGENCY TREATMENT IN SOUTH AFRICA

Complicated cases of Severe Acute Malnutrition have a very high risk of dying during first 48 hours of admission. Early recognition of emergency signs and early treatment will improve likelihood of survival in hospital.

CONDITION	IMMEDIATE ACTION
Treat shock Shock is suspected in these children if the child is lethargic or unconscious, and cold hands **Plus either**: Weak fast pulse **or** Slow capillary refill (longer than 3 seconds) **Monitor closely:** children in shock need frequent monitoring of vital signs (pulse rate and volume, respiratory rate, urine output, glucose, etc)	**If child is in shock:** 1. Give oxygen. Treat and prevent hypoglycaemia and hypothermia. 2. Give IV 0.9% Normal Saline bolus fluid at 10ml/kg over 10minutes. Monitor response. 3. **If there are signs of improvement** (e.g. slower pulse and respirations) repeat bolus 10ml/kg over 10 minutes, until max 40ml/kg in 1 hour. Each time, check response to previous bolus before giving further fluid. Then switch to oral rehydration if further fluid is needed. **If there are no signs of improvement** assume child has ***septic shock***: ✓ Admit to ICU for CVP line. Start inotropic support. ✓ Start broad-spectrum antibiotics (Ceftriaxone). Treat and prevent hypoglycaemia/hypothermia. ✓ Admit the child to high care bed for monitoring. Discuss further case management with your referral hospital. 4. Only transfer the child to ward once signs of shock have resolved.
Treat very severe anaemia Severe anaemia is Hb<4g/dL	**If very severe anaemia** (or Hb 4-6g/dl AND respiratory distress)**:** 1. Give packed cells 10ml/kg body weight slowly over 4 hours. If signs of heart failure, give 5-7ml/kg packed cells. 2. Give furosemide 1mg/kg IV at the start and end of the transfusion. **NB Keep a close eye for signs of fluid overload: further tachycardia, gallop rhythm, breathing even faster, puffy eyelids, enlarging liver size**
Treat hypoglycaemia Hypoglycaemia is a blood glucose <3mmol/L Assume hypoglycaemia if no dextrostix available	Test blood glucose level 3 hourly, you can stop testing when it is normal and stable for 24 hours provided the child is not severely ill[1]. ▪ If the blood glucose <3 mmol/L in asymptomatic child, give orally or by NG tube: ○ immediate feed of a "stabilizing feed (F75)", **or** ○ 50ml bolus of 10% dextrose, **or** ○ sugar solution 5 ml/kg ○ Re-Check the Blood Glucose after 30 min, if normal continue normal feeds, monitor blood glucose to see it remains above 3 mmol/L. ▪ If symptomatic or unresponsive hypoglycaemia give dextrose 10%[2], IV, 2 ml/kg over 2-3 minutes[3]. **Re-Check the Blood Glucose after 30 min, if normal, continue feeds, monitor blood glucose to see it remains above 3 mmol/L.**
Treat hypothermia Hypothermia is axillary/underarm temperature <35^{0}C.	Take temperature at outpatients/casualty and on admission in the ward. (Ensure thermometer is well shaken down). **If the temperature is below 36.5^{0}C**: 1. Begin feeding straightaway (or start rehydration if diarrhoea with dehydration). 2. Active re-warming: Put the child on the mother's bare chest (skin-to-skin contact) and cover them. Cover the child's head. Or clothe the child, apply a warmed blanket and place a heater or lamp nearby. 3. Feed 2-3hourly (8-12 feeds in 24 hours). **Monitor during re-warming** • Take temperature every two hours: stop active re-warming when temperature rises above 36.5^{0}CTake temperature every 30 minutes if heater is used because the child may become overheated.
Emergency Eye Care Corneal Ulceration is a sign of severe Vitamin A deficiency.	**If corneal ulceration:** 1. Give Vitamin A immediately (<6 months 50,000IU, 6-11 months 100,000 IU, 12-59 months 200,000IU) and **repeat** same dose the following day. **Record dose given in prescription chart and RTHB.** 2. Instil one drop atropine (1%) into affected eye to relax the eye and prevent the lens from pushing out. *Note: All children with clinical signs of vitamin A deficiency and children with measles should receive vitamin A on days 1, 2 and 14.*

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[1] If severely ill continue 3 hrly blood glucose testing
[2] Mix 0.5ml/kg 50% Dextrose with 2 ml/kg of water for injection in a syringe – give 2ml/kg of the resulting 10% dextrose solution/ alternatively give 2ml/kg neonatal maintenance solution which also contains 10% dextrose.
[3] Previously 5 ml/kg – recent APLS suggests 2ml/kg.

PROTOCOL FOR THE IN-PATIENT MANAGEMENT OF CHILDREN WITH SEVERE ACUTE MALNUTRITION IN SOUTH AFRICA

*"Severely malnourished children are **different** from other children; so they need **different treatment**"*

CONDITION	PREVENTION	WARNING SIGNS	IMMEDIATE ACTION
1.Hypoglycaemia *(Low blood sugar)* Hypoglycaemia is a blood glucose <3mmol/L	For all children:- 1. Feed immediately "stabilizing feed" /F75 every 3 hours (8 feeds), day and night. Start straightaway i.e. on arrival at hospital and within 30 minutes after admission. (Use feeding chart to find amount to give). 2. Encourage mothers to stay with very ill children to watch for any deterioration, help feed and keep child warm.	1. Low temperature (hypothermia) noted on routine check. 2. Child feels cold. 3. Child becomes drowsy or lethargic. 4. Signs of Shock 5. If blood sugar is low, monitor blood sugar every 30 minutes to 60 minutes and intervene accordingly.	Perform Dextrostix test in outpatients/casualty and on admission on all patients. **If conscious and blood sugar is below 3 mmol/L:-** 1. If hypoglycaemic, feed 2hourly (12 feeds in 24 hours). Use feeding chart to find amount to give. Start straightaway. Afterwards, feed 3-4hours. 2. Give 50 ml of 10% glucose (to **prepare mix** 10ml 50% dextrose with 40ml sterile water) or sugar solution (1 rounded teaspoon sugar in 3 tablespoons of plain water) **orally or if child refuses, via nasogastric tube (NG tube)**. If 10% glucose is not available, give sugar solution or F75 rather than wait for glucose. Test again 30 minutes after treatment. If blood sugar is still low, repeat **oral** 50ml 10% glucose or sugar solution. Consider putting up a short IV line. **If unconscious,** give dextrose **IV** (2ml/kg of sterile 10% glucose: prepare **1ml/kg 50% dextrose mixed with 4ml/kg sterile water**), followed by **oral** 50ml of 10% glucose or **oral** sugar solution or **via NG tube**. **Monitor response to treatment.** 3. Monitor blood sugar 3-hourly until stable especially in first 48hours. If blood sugar is persistently low, review feed and look for infections.
2. Hypothermia *(Low temperature)* Hypothermia is Axillary/underarm temperature <35^{o}C	For all children:- 1. Feed straightaway and then every 2-3 hours, day and night. 2. Keep warm. Cover with a blanket. Let mother sleep with child to keep child warm. 3. Keep room warm, no draughts. 4. Keep bedding/clothes dry. Dry carefully after bathing (do not bathe if very ill). 5. Avoid exposure during examinations, bathing.	1. Cold extremities 2.Lethargic 3. Poor appetite NOTE: Hypothermia in malnourished children often indicates co-existing hypoglycaemia and serious infection.	Take temperature at outpatients/casualty and on admission. (Ensure thermometer is well shaken down). **If the temperature is below 36.5^{o}C**: 1. Begin feeding straightaway (or start rehydration if diarrhoea with dehydration). 2. Active re-warming: Put the child on the mother's bare chest (skin- to -skin contact) and cover the child. Cover the child's head, clothe the child, apply a warmed blanket and place a heater or lamp nearby. 3. Feed 2-3hourly (8-12 feeds in 24 hours). **4. Check temperature 3-4hourly.Monitor during re-warming** • Take temperature every two hours: stop active re-warming when temperature rises above 36.5^{o}C • Take temperature every 30 minutes if heater is used because the child may become overheated.
3. Some or Severe Dehydration (without Shock) *(Too little fluid in the body)*	1. When a child has watery diarrhoea, give 10ml/kg Oral Rehydration Solution (ORS) after each loose stool to replace stool losses to prevent dehydration. 2. Treat some or severe dehydration with ORS to prevent severe dehydration or shock	Profuse watery diarrhoea, sunken eyes, slow skin pinch, absent tears, dry mouth, very thirsty, reduced urine output.	**DO NOT GIVE IV FLUIDS EXCEPT IN SHOCK** (see Emergency Treatment Wall Chart for treating shock) **If there is some or severe dehydration:** Give ORS, oral or by NG tube, 20ml/kg every hour for 4 hours (i.e. 5 mL/kg every 15min for 4hours) using frequent small sips. Show the caregiver how to give ORS with a cup and spoon If child vomits wait 10 minutes and then continue more slowly. Stop ORS when there are 3 or more hydration signs, or signs of overhydration. **Monitor during rehydration for signs of overhydration:** • increasing oedema and puffy eyelids • increasing pulse and respiratory rate Check for signs at least hourly. Stop if pulse increases by 25 beats/minute and respiratory rate by 5 breaths/minute. Encourage caregiver to continue feeding the child, especially if breast-feeding. **Review at least hourly** general condition, capillary filling time, level of consciousness, skin turgor, sunken eyes, respiratory rate, abdomen, if passing urine and number/quality of stools – If shock redevelops, treat for shock (see Emergency Wall Chart). If dehydration is improving – continue for up to 10 hours If there is no dehydration go to prevention 10ml/kg ORS orally after each loose stool If dehydration is not improving consider IV fluids with great care.
4. Electrolyte imbalance *(Too little potassium and magnesium, and too much sodium)*	1. Use ORS 60mmol sodium/L and F75 formula as these are low in sodium. 2. Do not add salt to food. **3. Do not treat oedema with diuretics** **Give extra potassium and magnesium (either as CMV in feeds or as a supplement)**	Oedema develops or worsens, poor appetite and apathy	1. If the child is on Stabilizing feed **with added** minerals and vitamins (CMV) they will receive the necessary Potassium, Magnesium, Copper and Zinc within their feeds daily, **or** 2. **Give daily**: extra potassium (4mmol/kg/day body weight) and magnesium (0.4-0.6mmol/kg/day). **For potassium**, give Oral *Mist Pot Chloride*(MPC) solution: MPC 1ml/kg 8 hourly (1ml=1mmol K+), **AND Trace element mix** (contains MgSO4 280mg/ml, ZnSO4 36mg/ml, CuSO4 0.1mg/ml,) daily orally, **or magnesium individually**, give a single IM injection of 50% magnesium sulphate (0.3ml/kg body weight) to a maximum of 2ml. or 1ml of 2% MgSO4 daily mixed with food.
5. Infections	1. Good nursing care 2. Reduce overcrowding if possible (separate room or ward for malnourished children)	NOTE: The usual signs of infection, such as fever, are often absent so **assume all** severely malnourished	**Starting on the first day, give antibiotics to all children.** 1. **If the child is severely ill** (apathetic, lethargic) or has complications (hypoglycaemia, hypothermia, raw skin/fissures, meningitis, respiratory tract or urinary tract infection) give IV/IM **Ceftriaxone 100mg/kg/day** for 7days 2. **If the child has medical complications** but not seriously ill, give IV/IM **Ampicillin**: 50mg/kg IM/IV 6-hourly for 7 days AND **Gentamicin**:

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INTEGRATED MANAGEMENT OF CHILDREN WITH ACUTE MALNUTRITION IN SOUTH AFRICA

OPERATIONAL GUIDELINES

WHO Guidelines for Routine Management children with SAM

Prevent and treat

- ● Hypoglycaemia
- ● Hypothermia
- ● Dehydration
- ● Electrolyte imbalance
- ● Infection

Micronutrient deficiencies Provide special feeds for

- ● Initial stabilisation
- ● Catch-up growth

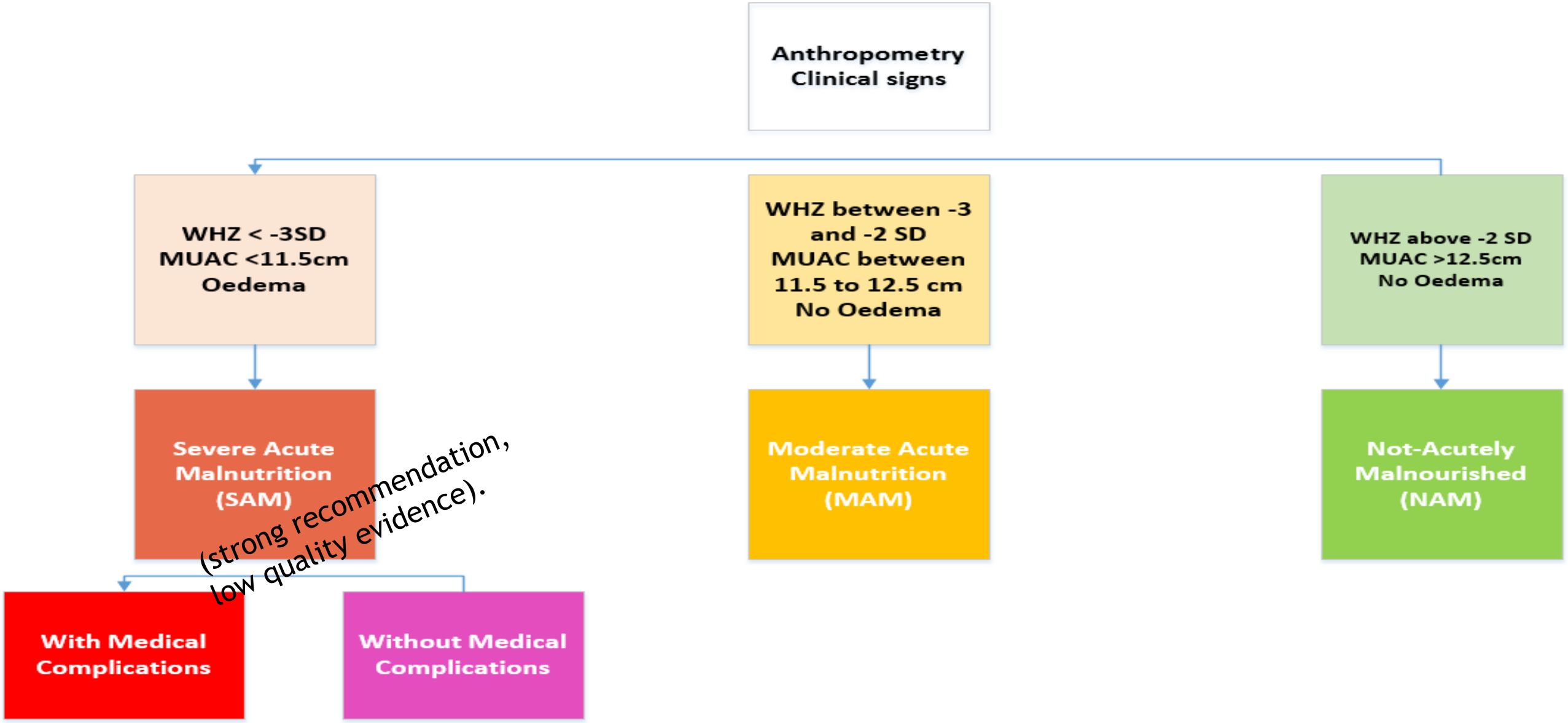
- ● Provide loving care and stimulation
- ● Prepare for follow-up after discharge

Inpatient Management Regime

The inpatient management regime in South Africa is approached in 3 phases, as follows:

- Emergency
- Stabilization and
- Rehabilitation

Classification of Acute Malnutrition



Emergency

- Shock
  - IV fluids only given to children with shock (lot of effort for this practice to change)
  - Use of 0.9 normal saline instead of Darrows solution with 5% dextrose or Ringer's lactate with 5% dextrose **(conditional recommendation, very low evidence).**
  - If there is no improvement within first hour, assume child is in septic shock, get the doctor involved.
  - Children admitted to ICU if there are no signs of improvement of shock, for CVP line and initiated with inotropic support.
- Hypoglycaemia – below 3mmol/L
  - If there is no dextrostix, assume hypoglycaemic.
- Hypothermia – Re-warming Action starts at 36.5C
- Anaemia- If very severe anaemia (or Hb 4-6g/dl AND respiratory distress).
- Eye care treatment – therapeutic vitamin A and atropine.

Stabilisation

- Prevent & Treat Hypoglycaemia and Hypothermia

  Practice changes

  - Due to space challenges, not all mothers were admitted with their children except for those who are exclusively BF but later extended to children with SAM.
  - SAM children to skip cue and F75 provided at Casualty
  - If there is no dextrostix, child assumed to be hypoglycaemic.
  - Active re-warming from 36.5, assumed hypothermic.

- Prevent & Treat Dehydration
  - The slow hydration of 5-10ml/kg/hour up to 12 hours has not been adopted in SA instead it is 5ml/kg/hour every 15minutes for 4 hours **(strong recommendation, low evidence).**
  - SOROL (60mmol/L) is used instead of ReSomal (45mmol/L) for oral or nasogastric tube rehydration **(strong recommendation, low evidence).**

Stabilisation

- Treat & Prevent Electrolyte Imbalance
  - **Use SOROL (60mmol/L) instead of RESOMAL (45mmol/L) and F75 formulas these are low in sodium.**
  - Ready-to use Stabilizing feed (F75) is available in SA.
  - Combination for electrolytes and minerals (CMV) is available in SA.
  - Individual and trace element mix no longer prepared by hospital pharmacy.

- Treat & Prevent Infection
  - Structured into Severely ill (apathetic, lethargic), medical complications, no medical complications
  - Ceftriaxone vs Chloramphenicol used for the severely ill

Stabilisation

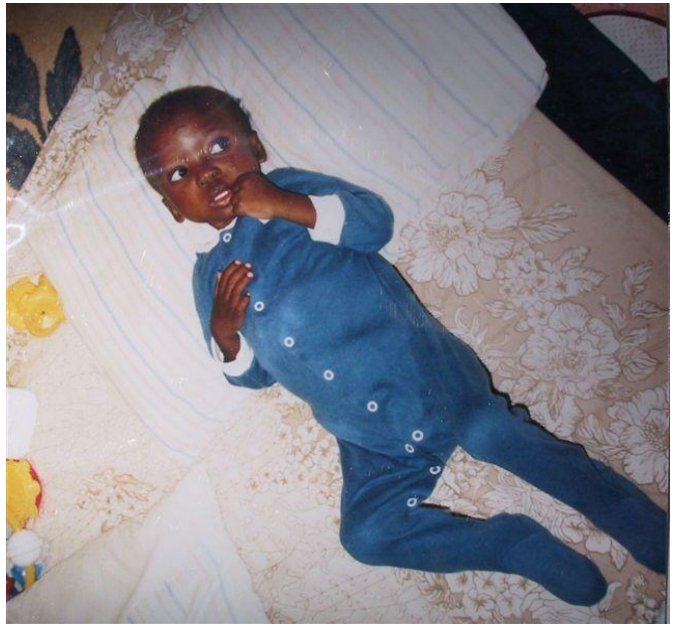
- Treat & Prevent Micronutrient Deficiencies
  - Vitamin A is given on day 1 to all children with SAM
  - Folic acid 2.5mg daily orally (5mg on day 1). (Folic acid is in CMV, if CMV is used in feeds then give only the 5mg dose of day 1)
  - If the child is on ready-to-use Stabilizing feed or Stabilizing Feed with added minerals and vitamins (CMV) they will receive the necessary Potassium, Magnesium, Copper and Zinc within their feeds, and
  - Multivitamin syrup 5 ml daily orally (Multivitamins are in CMV, so if CMV is used in feeds then omit the syrup
- Stabilisation Feeding
  - Energy: 100kcal/kg/day and Protein: 0.9g /kg/day. The fluid requirement is 130ml/kg/day.
  - Ready-to-use F75
  - Complex for minerals and vitamins (CMV) is available in SA to add on feed.

Rehabilisation

- Rehabilitation Feeding
  - Energy: 150-220Kcal/kg/day and Protein: 4-6 g/kg/day).
  - Ready to use F100 available
- Loving care, Play & Stimulation
  - Play rooms are there – challenge of shortage of nursing staff
  - There are occupational therapists and physiotherapists now currently involved in the management and not solely the responsibility of the professional nurse.
- Prepare for discharge
  - RUTF is available in SA for outpatient management of SAM.
  - TB & HIV are investigated thoroughly prior discharge.
  - No children with SAM are discharged to outpatient if they still have some oedema.
  - Entered in malnutrition register for follow-up
  - Children with SAM are put on child support grant if not already on it

Transformation
Limpopo HIV Success Story

Before



6 months later

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THANK YOU

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