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 are crucial for survival and recovery 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 10 minutes. Monitor response.
3. If there are signs of improvement (e.g. slower pulse and respiration) repeat bolus of 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 is no 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. Begin feeding straightaway (or start rehydration if diarrhoea with dehydration).
  2. Give furosemide 1mg/kg IV at the start and end of the transfusion.
  3. Keep a close eye for signs of fluid overload: further tachycardia, gallop rhythm, breathing even faster, puffy eyelids, enlarging liver size, cold hands.

- If severely ill continue 3 hrly blood glucose testing:
  - Stop active re-warming when temperature rises above 36.5°C.
  - Cloth the child, apply a warmed blanket and place a heater or lamp nearby.
  - Feed 2ml/kg over 2-3 minutes³.

**Treat hypoglycaemia**

Hypoglycaemia is a blood glucose <3mmol/L.

- **Assume hypoglycaemia if no dextrostix available**

Test blood glucose level every 30 minutes; if normal and stable for 24 hours provide the child is not severely ill.

- 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 minutes³.

**Treat hypothermia**

Hyperthermia is axillary/underarm temperature <35°C.

- **Assume hypothermia if no thermometer is well shaken down**.

If the temperature is below 36.5°C:
1. Active warming: Straighten the child, apply a warmed blanket and place a heater or lamp nearby.
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. Clothe the child, apply a warmed blanket and place a heater or lamp nearby.
3. Feed 2-3 hourly (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°C.
- Take 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 suspicion:
  1. Give Vitamin A immediately (6 months 50,000IU, 6-11 months 100,000 IU, 12-59 months 200,000IU).
  2. Instil one drop atropine (1%) into affected eye to relax the eye and prevent the lens from pushing out.
  3. 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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² If severely ill continue 3 hrly blood glucose testing
³ 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.

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Health
Department: 
Republic of South Africa
PHASE 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"

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>PREVENTION</th>
<th>WARNING SIGNS</th>
<th>IMMEDIATE ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypoglycaemia (Low blood sugar)</td>
<td>For all children: 1. Feed immediately “sabotaging feed” (F75 every 3 hours (8 feeds), day and night straightaway i.e. on arrival at hospital and within 30 minutes after admission.</td>
<td>Low blood sugar (hypoglycaemia) noted on routine check.</td>
<td>Perform Dextrostix test in outpatients/casualty and on admission on all patients.</td>
</tr>
<tr>
<td>Hypoglycaemia is a glucose blood level &lt;3mmol/L</td>
<td>2. Child feels cold. 3. Child becomes drowsy or lethargic. 4. Signs of Shock 5. If blood sugar is low, monitor blood sugar every 15 minutes to 60 minutes and intervene accordingly.</td>
<td></td>
<td>If conscious and blood sugar is below 3 mmol/L:</td>
</tr>
<tr>
<td>Hypoglycaemia</td>
<td>1. If hypoglycaemic, feed/hourly (12 feeds in 24 hours). Use feeding charts to find amount to give.</td>
<td></td>
<td>1. If hypoglycaemic, feed 2 hourly (12 feeds in 24 hours). Use feeding charts to find amount to give. Start... 4-hours.</td>
</tr>
<tr>
<td></td>
<td>2. If unconscious, give dextrose IV (2ml/kg of sterile 10% glucose) prepare 10ml/50% glucose or oral sugar solution or via NG tube. Monitor response to treatment.</td>
<td></td>
<td>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 tablespoon water), orally or if child refuses, via nasogastric tube (NG tube). If 10% glucose is not available, give sugar solution or F75 wait for glucose mother. Test again 30 minutes after treatment. If blood sugar is still low, repeat oral 50 ml 10% glucose or sugar solution. Consider putting up a short IV line.</td>
</tr>
<tr>
<td>Hypertermia</td>
<td>For all children: 1. Feed immediately (separate room or separate from other children; so they need special room and care) 2. Monitor during rehydration for signs of overhydration: If child vomits wait 10 minutes and then continue more slowly. 3. Check temperature 3–4 hourly. Monitor during rehydration for signs of overhydration: If child vomits wait 10 minutes and then continue more slowly.</td>
<td></td>
<td>If there is no dehydration go to prevention 10ml/kg ORS orally after admission. (Ensure thermometer is well shaken down).</td>
</tr>
<tr>
<td>(Low temperature)</td>
<td>5. Avoid exposure during existing hypothermia and serious infection.</td>
<td></td>
<td>If the child is severely ill, give IV/IM Ampicillin: 50mg/kg IM/IV 6-hourly for 7 days AND Gentamicin: 7.5mg/kg IM/IV once daily for 7 days.</td>
</tr>
<tr>
<td>Hypothermia is an Axillary/rectal temperature &lt;35°C</td>
<td>1. When a child has watery diarrhoea, give 10ml/kg Oral Rehydration Solution (ORS) after each small stool to replace stool losses to prevent dehydration.</td>
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<tr>
<td></td>
<td>2. Take temperature at outpatients/casually and on admission. (Ensure thermometer is well shaken down). Show the caregiver how to give ORS with a cup and spoon.</td>
<td></td>
<td>If order to treatment:</td>
</tr>
<tr>
<td>Some or Severe Dehydration (Cold feet, dry skin)</td>
<td>Profuse watery diarrhoea or neonate: slow skin pinch, absent tears, dry mouth, very thirsty, reduced urine output.</td>
<td></td>
<td>1. Begin feeding straightaway (or start rehydration if diarrhoea with dehydration). Let mother sleep with child to keep child warm.</td>
</tr>
<tr>
<td>(Too little fluid in the body)</td>
<td>1. Cold extremities 2. Low blood sugar (hypoglycaemia) 3. Poor appetite.</td>
<td></td>
<td>2. Active re-warming: Put the child on the mother’s bare chest (skin-to-skin) and cover the child with a blanket. If hypoglycaemic, apply a warmed blanket and place a heater or lamp nearby.</td>
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<tr>
<td>Electrolyte imbalance (Too little potassium and magnesium, and too much sodium)</td>
<td>NOTE: Hypoglycaemia in malnourished children often indicates existing hypoglycaemia and serious infection.</td>
<td></td>
<td>3. Check temperature 3–4 hourly. Monitor during re-warming: If after two hours: stop active re-warming when temperature rises above 36.5°C.</td>
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<td></td>
<td>3. Ceftriaxone 100mg/kg/day for 7 days.</td>
<td></td>
<td>4. Take temperature every 30 minutes if heater is used because the child may become overheated.</td>
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<td></td>
<td>DO NOT GIVE IV FLUIDS EXCEPT IN SHOCK (see Emergency Treatment Wall Chart for treating shock)</td>
</tr>
<tr>
<td></td>
<td>5. Avoid exposure during existing hypoglycaemia and serious infection.</td>
<td></td>
<td>If there is some or severe dehydration go to prevention 10ml/kg ORS orally after each small stool to replace stool losses to prevent dehydration:</td>
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<td></td>
<td>6. Monitor during rehydration for signs of overhydration:</td>
<td></td>
<td>If the child developes, treat for shock (see Emergency Wall Chart).</td>
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<td></td>
<td>• 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.</td>
<td></td>
<td>If dehydration is improving – continue for up to 10 hours.</td>
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<td></td>
<td>7. For potassium: give 1ml/kg/day in the first 48 hours. Consider giving 1ml/kg/day in subsequent 48 hours plus 1ml/kg/day in third 48 hours.</td>
<td></td>
<td>If there is no dehydration go to prevention 10ml/kg ORS orally after each small stool to replace stool losses to prevent dehydration:</td>
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<tr>
<td></td>
<td>8. For magnesium: give 1ml/kg/day in the first 48 hours plus 1ml/kg/day in subsequent 48 hours plus 1ml/kg/day in third 48 hours.</td>
<td></td>
<td>If there is no dehydration go to prevention 10ml/kg ORS orally after each small stool to replace stool losses to prevent dehydration:</td>
</tr>
<tr>
<td>Infections</td>
<td>Oedema develops or a sudden decrease in fluid intake or appetite and apathy</td>
<td></td>
<td>If the child develops, give vitamins and food supplements.</td>
</tr>
<tr>
<td></td>
<td>If the child is on Stabilizing feed with added vitamins and essential amino acids (casein, 0.3g/kg, F75 total fat, 5g/kg, magnesium, calcium, and zinc within their feeds daily.</td>
<td></td>
<td>If child develops, give vitamins and food supplements.</td>
</tr>
<tr>
<td></td>
<td>1. Use ORS 60mg/ml sod – 30mg/L potassium/L and F75 total fat, 5g/kg, magnesium, calcium, and zinc within their feeds daily.</td>
<td></td>
<td>If child develops, give vitamins and food supplements.</td>
</tr>
<tr>
<td></td>
<td>2. Do not add salt to food.</td>
<td></td>
<td>If child develops, give vitamins and food supplements.</td>
</tr>
<tr>
<td></td>
<td>3. Do not eat oedema with diuretics</td>
<td></td>
<td>If child develops, give vitamins and food supplements.</td>
</tr>
<tr>
<td></td>
<td>Give sod, pot, magnesium, calcium, and magnesium (either as CMV in feeds or sodium/potassium, mag and zinc in feeds)</td>
<td></td>
<td>If child develops, give vitamins and food supplements.</td>
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<td>1. If the child is on Stabilizing feed with added vitamins and essential amino acids (casein, 0.3g/kg, F75 total fat, 5g/kg, magnesium, calcium, and zinc within their feeds daily.</td>
<td></td>
<td>If child develops, give vitamins and food supplements.</td>
</tr>
<tr>
<td></td>
<td>2. Give daily:</td>
<td></td>
<td>If child develops, give vitamins and food supplements.</td>
</tr>
<tr>
<td></td>
<td>• magnesium (4mg/kg/day body weight) and magnesium (0.4-0.6mmol/kg/day). For potassium, give Oral Malt Pot/Creamed Milk solution (1ml/kg 8 hourly for up to 10 days).</td>
<td></td>
<td>If child develops, give vitamins and food supplements.</td>
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<tr>
<td></td>
<td>Trace element mix (contains MgSO4 280mg/ml, ZnSO4 36mg/ml, CuSO4 30mg/ml, and MnSO4 6mg/ml). This can be given up to 10 days.</td>
<td></td>
<td>If child develops, give vitamins and food supplements.</td>
</tr>
<tr>
<td></td>
<td>• 1ml/kg of 50% magnesium sulphate (0.2ml/kg body weight) added to 2ml of 2% MgSO4 drops in a mix of food.</td>
<td></td>
<td>If child develops, give vitamins and food supplements.</td>
</tr>
<tr>
<td></td>
<td>5. Infections</td>
<td></td>
<td>1. If the child is severely ill (apathetic, lethargic) or has complications (sepsis, severe malnutrition, meningitis, respiratory tract or urinary tract infection) give IV/IM Ceftriaxone 100mg/kg/day for 7 days.</td>
</tr>
<tr>
<td></td>
<td>1. Good nursing care</td>
<td></td>
<td>2. If the child has medical complications but not seriously ill, give IV/IM Ceftriaxone 100mg/kg/day for 7 days.</td>
</tr>
<tr>
<td></td>
<td>2. Reduce overcrowding if possible (separate room or ward for malnourished children)</td>
<td></td>
<td>1. If the child is severely ill (apathetic, lethargic) or has complications (sepsis, severe malnutrition, meningitis, respiratory tract or urinary tract infection) give IV/IM Ceftriaxone 100mg/kg/day for 7 days.</td>
</tr>
<tr>
<td></td>
<td>NOTE: The usual signs of infection, such as increased temperature and scanty or often absent so culture and sensitivity are all severely ill children.</td>
<td></td>
<td>2. If the child has medical complications but not seriously ill, give IV/IM Ceftriaxone 100mg/kg/day for 7 days.</td>
</tr>
</tbody>
</table>
WHO Guidelines for Routine Management of 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

Anthropometry
Clinical signs

WHZ < -3SD
MUAC <11.5cm
Oedema

Severe Acute Malnutrition
(SAM)

WHZ between -3 and -2 SD
MUAC between 11.5 to 12.5 cm
No Oedema

Moderate Acute Malnutrition
(MAM)

WHZ above -2 SD
MUAC >12.5cm
No Oedema

Not-Acutely Malnourished
(NAM)

With Medical Complications

Without Medical Complications

(strong recommendation, low quality evidence).
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 inotrop 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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