

Editorial

Severe Acute Malnutrition (SAM) in Pediatrics

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OVERVIEW OF MANAGEMENT OF SEVERE ACUTE MALNUTRITION

Severe Acute Malnutrition (SAM) is one of the most critical public health concerns in world, particularly in developing countries like India.¹ Malnutrition includes both overnutrition and undernutrition; however, this article focuses exclusively on undernutrition, specifically SAM, which contributes significantly to childhood morbidity and mortality.² According to the World Health Organization (WHO), SAM can be diagnosed using the following four criteria:

1. **Weight-for-height/lenth ratio less than-3 SD** (standard deviation), calculated using WHO growth charts.
or
2. **Severe visible wasting**, characterized by a cachexic appearance.
or
3. **Mid-upper arm circumference (MUAC) below 11.5 cm**, measured using the shakir tape at the mid-upper arm.
or
4. **Bilateral pitting edema**, assessed by pressing a point 5 cm above the ankle for few seconds (approximate 10).

Types of SAM

SAM is primarily classified into two categories:

- **Marasmus:** Characterized by severe visible wasting, loss of subcutaneous fat, and muscle mass. The child typically

appears emaciated, with an old-man or monkey-like face. They are usually alert and have a good appetite.

- **Kwashiorkor:** Characterized by edema, hypoalbuminemia, skin changes (hyperpigmentation, “crazy pavement” dermatosis), and a lethargic appearance. The child’s face may appear plump due to fluid retention, which can give a misleading impression of good health.

Clinical Features of SAM⁴

A comprehensive examination of SAM patients reveals multiple systemic changes:

1. **General Appearance:** Severe wasting, baggy pants appearance, or edema in kwashiorkor.
2. **Hair and Skin Changes:** Sparse, thin, fragile hair with “flag sign” (bands of hypopigmentation). Hyperpigmentation, especially around knuckles, and skin lesions may be present.
3. **Hepatic Manifestations:** Hepatomegaly is common, particularly in kwashiorkor, due to fatty liver infiltration.
4. **Immunological Impairment:** Increased susceptibility to infections due to compromised immunity.

MANAGEMENT OF SAM

The management of SAM follows a structured and gradual approach to prevent metabolic complications and ensure a successful recovery. The WHO has outlined



a comprehensive **10-step protocol**, which includes three key phases: stabilization, rehabilitation, and follow-up.^{4,5}

1. Treat Hypoglycemia

Hypoglycemia is a common and dangerous condition in children with SAM. Blood glucose levels should be monitored regularly to detect low sugar levels early. Small, frequent meals rich in carbohydrates should be given to maintain stable blood glucose levels and prevent further complications.⁵

2. Manage Hypothermia

Children with SAM are prone to hypothermia due to a lack of adequate body fat and energy reserves. Keeping the child warm by ensuring proper clothing, warm blankets, and skin-to-skin contact is essential. Exposure to cold environments should be minimized to maintain normal body temperature.⁵

3. Correct Dehydration

Assessing dehydration in SAM patients can be challenging as traditional signs, such as sunken eyes and skin pinch, may not be reliable. Rehydration should be carefully managed using ReSoMal (Rehydration Solution for Malnutrition) instead of standard Oral Rehydration Salts (ORS), as it helps prevent sodium overload, which could worsen the child's condition.⁵

4. Correct Electrolyte Imbalance

Electrolyte imbalances, particularly deficiencies in potassium, magnesium, and calcium, are common in SAM. These deficiencies should be corrected with appropriate supplementation to restore normal physiological functions. Sodium intake should be restricted to avoid complications such as fluid overload.⁵

5. Treat Infections

SAM weakens the immune system, making children highly susceptible to infections. Since typical signs of infection may be absent, empirical broad-spectrum antibiotics should be administered as a precautionary measure. Screening for underlying infections such as tuberculosis, HIV, and chronic diarrhea is essential for comprehensive treatment.⁵

6. Supplement Micronutrients

Children with SAM suffer from multiple micronutrient deficiencies. All essential

vitamins and minerals should be supplemented except iron, which is introduced only after stabilization to prevent free radical formation and bacterial proliferation. Vitamin A is administered at admission, on day 1, and on day 14 to support immune function and vision health.⁵

7. Cautious Feeding Initiation

To prevent refeeding syndrome, initial feeding should be done cautiously. The F-75 therapeutic diet, which provides 75 kcal per 100 ml with low protein and sodium content, is given every two hours. As the child's condition stabilizes, the feeding interval is gradually extended to four hours.⁵

8. Promote Catch-Up Growth

Once the child has stabilized, the transition to the F-100 diet begins, which provides 100 kcal per 100 ml with higher protein content. The goal is to increase calorie intake to approximately 150 kcal/kg/day to promote rapid weight gain and restore normal growth patterns.⁵

9. Sensory Stimulation and Emotional Support

Beyond physical recovery, cognitive and emotional development should be supported. Providing sensory stimulation through play, interaction, and environmental enrichment enhances neurological development. Emotional support from caregivers is crucial for the child's overall well-being and recovery.⁵

10. Prepare for Discharge and Follow-Up

Before discharge, the child must meet specific criteria, including regained appetite, achieving a weight gain of at least 5 g/kg/day, and being up-to-date on immunizations. Caregiver education on home-based nutrition, hygiene, and continued feeding practices is essential to prevent relapse. Scheduled follow-up visits help monitor the child's progress, ensuring continued growth and reducing the risk of malnutrition recurrence.

By following this structured protocol, the management of SAM ensures a holistic recovery, preventing complications and reducing mortality among malnourished children. The combination of medical treatment, nutritional rehabilitation, and long-term support plays a critical role in restoring health and preventing future episodes of severe malnutrition.

HOME-BASED MANAGEMENT WITH READY-TO-USE THERAPEUTIC FOOD (RUTF)

For areas lacking hospital facilities, RUTF provides an effective alternative for **home based treatment**.² RUTF is an energy dense paste rich in essential nutrients and requires no refrigeration. It helps transition children from facility based care to home based management once they regain appetite and stability.¹

CONCLUSION

SAM remains a major global health challenge, requiring early identification and systematic management. The WHO's 10-step protocol provides a structured approach, emphasizing gradual stabilization, nutritional rehabilitation, and long-term monitoring. The role of Nutrition Rehabilitation Centers (NRC) and **RUTF** is crucial in reducing mortality and ensuring sustained recovery. A multidisciplinary approach, including medical, nutritional, and psychosocial support, is essential for effective management and prevention of SAM.

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