Addressing Malnutrition through Practice – The experience at Christian Medical College, Vellore.

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Definitions

Stunting is ↓ height for age

Underweight is ↓ weight for age

Wasting is ↓ weight for for height.
Wasting

- Wasting indicates a recent and severe process of weight loss and is often associated with acute starvation or severe disease.
- Under normal circumstances, wasting prevalence is 5% or less.
- In India, wasting is of the order of 15%.
Weight-for-age distribution: children under 3 in India compared to the global reference population.

Ref: http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/SOUTHASIAEXT/0,,

Source: Calculated from NFHS data
Note: Prevalence of severe, moderate and mild underweight are given in parentheses.
Burden of disease:

- NFHS-2 (1998-1999), 47% of children under three years of age were underweight
- NFHS-3 (2005-2006), 46% under three years of age being underweight; reduction of 1%.
- NFHS-III (2005-2006). Every second child under six years of age is underweight
- 61 million stunted children in India =51% of all Indian children under the age of five years
Stunting

The strongest predictor of severe stunting at 12 months of age is LBW.

The continuum of malnutrition:

- The diminutive growth attributed to malnutrition during pregnancy and first two years of birth have long term consequences, with the child never attaining its full potential.

- Add to this the burden of micronutrient deficiency: in particular Iron deficiency, 84% of < 24 months age

- A child with moderate PEM can go down rapidly into severe PEM, with just one illness.

- Focus should therefore be on all grades, at a national level.
Causes of malnutrition

- Women's status
- The bulky Indian diet; very child unfriendly.
- Absence of weaning foods.
- Maternal Literacy
- Inadequate access to health care
- Cycle of malnutrition: Maternal malnutrition $\rightarrow$ LBW $\rightarrow$ girl child $\rightarrow$ maternal malnutrition
- Feeding practices: breast feeding for too long without supplementing solids; b) solid foods not introduced until nearly a year of age c) no meat in the diet
Why is it so critical to treat malnutrition?

- In the tests chosen, the performances of the survivors of PEM was significantly poorer than that of the controls. There was no improvement in the performance when thirteen survivors were reassessed at 10 years of age.
- There was a significant difference in scholastic performance between the survivors of PEM and the normal controls.

Why have mortality rates for severe malnutrition remained so high?

- Low mortality from PEM is certainly attainable. Of 67 data sets examined, 15% had mortality levels < 10%, the lowest being 3.3%.

- The guidelines for treatment of malnutrition differ in their clarity, foundation on current knowledge, and instructions for treatment.

- A definitive set of practical guidelines is lacking. Since rectified.

- There is an urgent need for clear, accessible and authoritative information that is prescriptive rather than descriptive.

Uncomplicated SAM: amenable for home therapy

A child with SAM above the age of 6 months who is:

- (i) alert
- (ii) with preserved appetite
- (iii) clinically assessed to be well (absence of general danger signs or severe acute illness/anaemia and
- (iv) living in a conducive home environment
Current standard of care:

- Standard of care in CMC for treatment of malnutrition has been High calorie cereal milk. *(HCCM)*

- Recipe: 100 ml undiluted milk.
  - 15 G flour of mother’s choice or availability in home.
  - 5 ml cooking oil of mother’s choice
  - 2 teaspoons of sugar.
  - Cooked like payasam.

- 100 ml HCCM = 187 calories.
- Provision of at least 300 extra calories per day in addition to the food from the family pot. (= HCCM made with < 200 ml of milk).
Other interventions:

- Promotion of exclusive breast feeding upto 6 months of age.
- Teaching mothers who may be unable to do so, ie, twins, working mothers: how to supplement safely and effectively, with full strength cow’s milk.
- Iron supplementation following IMNCI guidelines: 20 mg elemental iron for 100 days/year.
Domiciliary care:

- In the 1990s, we had a domiciliary care for PEM therapy.
- Mothers found it impossible to stay the required one month.
- One week is sufficient to teach the mother.
- This is to be followed up by outpatient visits.
- Readmit for a week if child faltering.
What is so special about the WHO RUTF?

- It is the most child friendly food that I have used.
- Very few children dislike the taste. At best, one has to reduce the amount of sugar.
- It has animal protein, vegetable protein and good amount of calories.
- The micronutrient supplementation is a bonus.
Preparation of the food locally.

- **Ingredients** (for 100g of RUTF):
  - Milk powder: 30g
  - Gingili oil: 15g
  - Multivitamin: 1.6g
  - Sugar: 28g
  - Roasted ground peanuts: 25g
  - Multivitamin: The multivitamin tablets prepared by CMCH pharmacy were powdered and used for the preparation.
- For small quantities, a mechanical mixer was used.
- For larger quantities, the ingredients were powdered in a mill and the oil added later.
- The final product was hand packed to 250g air tight plastic bags.
Micronutrients and their importance:

- The Global Micronutrient Initiative calls for action on Vitamin A, iodine, iron, zinc and folate.
- Vitamin A- twice yearly Vit A 6 to 60 months
- Salt fortification with iodine
- IMNCI – 20 mg iron (at bedtime) 100 days a calendar year, 6 -60 months.
- When in contact with health care system, multivitamin and trace element supplementation, esp to at risk group, PEM, LBW, after an illness.
The precise formulation of the micronutrients in the RUTF is not critical.

What is critical is that more people prepare and use this tool in a country where energy dense child friendly foods are a dire need.
Practically speaking: for ease of remembrance:

- Interns (and later the mothers) taught to make the RUTF use a ratio of
  - 200 G milk powder, unsweetened, if available
  - 200 G roasted peanuts (ground later)
  - 200 G sugar
  - 100 ml cooking oil.
  - 2 tabs multivitamin
Preliminary study to check acceptance: with mothers.

It is very obvious in figure 4 that majority (88.1%) of the mothers expressed high level of acceptance whereas 11.9% showed moderate level of acceptance.
Objectives of the Study

- **Primary Objective:**
  
  To assess the improvement in anthropometric parameters in malnourished children receiving locally made Ready-to-Use Therapeutic Food (RUTF) for three months, and compare it with those who receive the current standard of care alone.

- **Secondary Objective**
  
  To compare the effect of the Ready-to-Use Therapeutic Food supplementation on the blood levels of Iron, Zinc and Vitamin B 12 after three months.
Methods

- Participants were from 16 of 17 pre-schools run by CHAD hospital, located in rural and peri-urban areas around CHAD.

- Scientific and ethical clearance

- Screening: total of 334 children in 16 pre-schools; Information sheets

- Recruitment – following administration of informed consent
Methods: Subjects

- 118 children recruited; randomised into 2 arms using a computer-generated sequence.
  - Intervention A: received RUTF 5 working days a week.
  - Intervention B: mothers taught preparation of a fortified milk-based supplement (HCCM) to be given every day

- Block randomisation – blocks of 10.

- Out of 118 children, there were
  - 55 boys, of whom
    - 29 were in Intervention A (RUTF) and 26 in Intervention B (HCCM)
  - 63 girls, of whom there were
    - 32 in Intervention A (RUTF) and 31 in Intervention B (HCCM)
Results and Discussion

7 children in RUTF arm (of 46; 15.2%) attained normal weight for height.

1 of 42 (2.4 %; p =0.039) in the HCCM arm

- A Significantly higher weight gain occurred in the RUTF group in the first month of intervention. (p=0.020) after which, weight gain equalled the weight gain in the HCCM arm.

- Serum Albumin, a marker of PEM, has significantly increased in both groups.
  - Intervention A, p=0.045
  - Intervention B, p=0.027
Results and Discussion

- Significant increase in vitamin B-12 concentration in the **RUTF group**. (p=0.036)

- Significant improvement in red cell indices in both groups.

- Significant decrease in plasma Zinc in **both groups**. Zinc is a negative acute phase reactant and is complex.
  - (A: p=0.00; B: p=0.00)
Recommendations on the Use of RUTF

- Locally made RUTF - an ideal tool and well-accepted.

- The involvement of pre-school teachers in delivery.

- Local production of the supplement.

- Cost Rs32.50 for 250 G when made in small scale. Cost seems high but when considered as therapeutic tool, may be cost-effective.

- More expensive to produce than the cereal-fortified milk; costs may be lowered by
  - its production in bulk and
  - by the involvement of self-help groups in manufacturing.
Summary of management of PEM:

- Even Grade I is to be acknowledged and addressed.
- Promote exclusive breast feeding until 6 months.
- Keep low birth weight babies under fortnightly follow up until good weight achieved.
- Out-patient therapy = advice 2x100 ml HCCM a day (=350 Cal or so) for ALL grades of malnutrition.
- Give iron supplements 100 days/year; 20 mg at bedtime.
- Look for causes of PEM in Grade III.
- Admit Grade IV for one week.
- RUTF for first few weeks; HCCM to be given alongside.
- Grade IV PEM usually start anti-tuberculous therapy.
Is stunting a problem?

- Since it is not dramatic in its presentation, stunting is not focused upon.

- Anecdotally, it is my observation that stunting could be a marker of food insecurity in families.
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Peanuts !! Thank you.