

Can Nutrition Rehabilitation Centers Address Severe Malnutrition in India?

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Madhya Pradesh has made remarkable progress in facility based management of severe acute malnutrition, and has developed a model that is being replicated in many states. India has uniquely high prevalence of both stunting and wasting, implying that both severe acute malnutrition and severe chronic malnutrition co-exist. This study sought to explore design issues of nutritional rehabilitation centers in order to inform its effectiveness in settings where the prevalence of chronic poverty and malnutrition is high. Our analysis attributes the limited success (marked by poor cure rates and high non-responder rates) to high prevalence of chronic malnutrition, particularly in nutritional rehabilitation centers located in peripheral areas. There is a failure to recognize severe chronic malnutrition as an epidemiological entity and gear wide-ranging programmatic and social interventions.

Keywords: Management, Nutrition, Protein energy malnutrition, Rehabilitation.

There are all-round efforts to tackle childhood undernutrition in India [1]. An estimated 8.1 million under-five children in India are affected, and 0.6 million deaths and 24.6 million DALYs (Disability Adjusted Life Years) are attributed to severe acute malnutrition [2,3]. The Nutritional Rehabilitation Center (NRC) was designed several decades back in Africa for clinical management of severe malnutrition. While there are community (both in emergency and non-emergency settings) and facility-based options for management of SAM, the latter has emerged as a state-promoted and dominant model in India.

CONTEXT

NRCs were first launched as an innovative scheme, *Bal Shakti Yojana*, under the National Rural Health Mission (NRHM) in Madhya Pradesh (MP). Since its inception, 36,538 SAM children out of the targeted 39,840 have been treated through the 258 NRCs set up throughout the state [4]. Following the example of Madhya Pradesh, many states have set up similar network of NRCs.

Bergeron and Castleman [5] used inter-country data to classify countries by their prevalence of each condition expressed in tercile (low, medium, and high) and showed that wasting and stunting generally coexist within populations. India has uniquely high prevalence of both stunting and wasting, implying that both SAM and severe chronic malnutrition (SCM) co-exist. Severe chronic malnutrition (SCM) in children is characterized by stunted growth and defined as child's height-for-age < -3

z-score of the median, according to WHO growth standards [6]. While the median under-five case-fatality rate for untreated SAM ranges from 30-50%, children with SCM are considered to have a potentially less serious but continual form of malnutrition.

Prasad, *et al.* [7] pointed to the inadequacies in the criteria for identification, admission, referral and discharge in NRCs; the lack of clarity in management of sick *versus* hungry children. Our earlier work, based on anthropometric survey data of 1,879 children (aged 6 months to 3 years) had pointed to the limited usefulness of measuring mid-upper-arm-circumference (MUAC) as a screening tool used by frontline health workers to identify SAM [8]. This was hypothesized to be on account of high levels of chronic undernutrition/stunting in these communities in contrast to the epidemiologic profile of acute undernutrition in African child population.

PROBLEM STATEMENT

What really have been the outcome and the experience of the NRC model? The NRC model was designed to treat children with SAM; epidemiologic profiling suggests higher prevalence of SCM among children in societies with chronic poverty in India. This report is an exploration to deconstruct whether the intervention (NRC) is suited to address the epidemiologic profile and priorities in settings where the prevalence of chronic poverty and SCM are known to be high. Outcome indicators of the program have thus been used as a lens to deconstruct the programmatic approach.

STUDY SETTINGS AND METHODOLOGICAL APPROACH

In a spatial analysis of distribution of rural poverty, the proportion of those who were very poor was noted to be largest in South Western MP, Southern Uttar Pradesh, Southern Orissa, Inland Central Maharashtra, Southern Bihar, Northern Bihar and Central Uttar Pradesh. These seven regions had 26% to 42% of their population in severe poverty and had a squared poverty gap (takes into account not only the distance separating the poor from the poverty line, the poverty gap, but also the inequality among the poor) ranging from 5 to 9.7; this near-contiguous cluster of districts has been termed the 'poverty square of India' [9,10]. Eastern districts of MP have been identified as suffering from 'high levels of deprivation' (Balaghat, in our case) and some of the districts bordering Maharashtra (Khandwa, in our case – that borders Melghat in Maharashtra also marked by high prevalence of undernutrition and starvation deaths) [11]. Both these districts belonged to the fourth quintile – this pattern holds both for human development indices as well as the Achievements of Babies and Children (ABC) index computed by the authors. The NFHS-3 recorded that 40% of children (under age 3 years) were stunted in MP and 33% wasted, indicating a high prevalence of SAM among children with SCM [2].

Six NRCs were studied in Khandwa and Balaghat Districts, MP; one NRC each at District Hospital level and two NRCs each at peripheral (CHC/PHC) levels. Interviews were held with various categories of care-providers and institutional data analyzed. Patient data was collected for a period of 6-7 months preceding the period of survey; facility and observational checklists represent single cross sectional data. Assessments of the facilities were made through structured check lists, drawn up in accordance with the operational manuals. We stratified patient data from the two levels of NRCs (1,000 at the peripheral NRCs and 746 at the District hospital level). E-interviews of key experts at national and state levels were conducted following the guidelines of Mann and Stewart [12].

KEY FINDINGS

Anthropometric data from the earlier baseline surveys among populations served by the peripheral NRCs of both districts were as follows: (i) wasting 29% and stunting 64.9% in Khandwa and (ii) wasting 26.7% and stunting 52.1% in Balaghat. This corresponded well with National Institute of Nutrition survey data in these districts and conformed to the typology of Bergeron and Castleman [5].

Infrastructure at the facilities was assessed as per the NRHM Operational Manual for infrastructural

parameters: building, available rooms, kitchens, play areas, toilets, counseling area, staff position, clinical equipment, kitchen equipment and pharmacy supplies. Items on observational checklists included hand washing, general hygiene, laundry, waste disposal, feed preparation and weighing [13]. Knowledge levels of admission, monitoring and discharge criteria were also assessed. They were found to be adequate and functional at both district and peripheral NRCs; differences in treatment outcomes would thus be independent of facility-level factors.

We summarize key findings from our analysis of treatment data from NRCs in these two districts as follows.

1. Two kinds of registers were observed; one which had columns to record weight gains for 14 days and the other for 21 days. Children were typically admitted for 14 days and discharged (on the 14th day) irrespective of their attaining/not attaining target weights; this accounted for about 90% of admissions. In very few cases of inadequate weight gain they stayed for few days more. Default typically occurred during the first week with a range of stay of about 4-7 days (about 10% of admissions).
2. Triage criteria for facility/hospital admission: pitting edema, failure of appetite test and complicating medical illness was about 10-15% [14,15].
3. The critical parameters defined by the program manual were: (i) recovery rate (number of children discharged for recovery/total number of exits); (ii) cure rate (number of children who have reached the discharge criteria [15% of weight gain]/total number of exits; and (iii) defaulter rate (number of true defaulter in the program/ total number of exits) [16].
4. A far higher proportion of children are getting 'cured' [attaining target weight; i.e. 15% of the weight at admission] at district hospital level NRCs than the peripheral NRCs.
 - (a) With relatively few children being referred from the peripheral to the district hospital level NRCs, most of the admissions at district hospitals are from areas closer to the district town.
 - (b) Referrals from district hospital to medical colleges are far more than referrals from peripheral NRCs to the district level.
 - (c) The cure rates, as per the state program guidelines (which include a follow up period of eight weeks, during which the child is only on home-based, and not therapeutic foods) are nearly double at the district hospital level NRCs

- (52.3%) compared to the peripheral ones (37.1%).
- (d) The average weight gain of those cured is 11.2 g/kg/day at the best performing district hospital level NRC and is somewhat lower, 9.6 g/kg/day, at the best performing peripheral NRC.
5. The proportion of non-responders is at least twice or more in peripheral NRCs
 - (a) Non-responder rates at peripheral NRCs were two-and-half times at district-level NRCs (average of 13.7% at district level; 34.9% in peripheral NRCs)
 - (b) There is no follow-up of the non-responders, at either level, despite the operational manual having an algorithm for it.
 6. There were hardly any deaths at peripheral NRCs, at least in part due to complicated cases being referred to higher-level institutions. There were no deaths recorded at peripheral level NRCs, and also deaths at district hospital level NRCs were not more than 1-2% of all admissions.
 7. The program guidelines for detecting secondary failure, not gaining >5 g/kg/day weight for three successive days after feeding freely on catch-up diet is not being followed and reported [16]. Computing from raw data at the best performing district hospital level NRC, we obtained secondary failure rate of up to 15%.
 8. WHO-UNICEF Joint Statement recommends 15% weight gain as discharge criterion for all infants and children admitted to therapeutic feeding programs; but when weight-for-height is used as an admission criterion (which is the case in our study), "it is advisable to continue to discharge children at weight-for-height $> -1SD$ " [15]. Several of our experts opined that $-2SD$ is a reasonable target to aim at and achieve, and that is the position of the IAP Consensus Statement [14].
 - (a) Applying the $-2SD$ criteria, cure was nearly 90% at the district hospital level NRCs, and about 50% at $-1SD$.
 - (b) At peripheral NRCs the cure rates for $-2SD$ and $-1SD$ were 64.4% and 6.7%, respectively.

EMERGING CONCERNS

The reference manual for NRCs in MP benchmark 'acceptable' recovery rate and defaulter rate at $>75\%$ and $<15\%$, respectively; $<50\%$ and $>25\%$ are considered to be 'alarming'. Recovery rates in our district hospital level NRCs reached acceptable levels whereas the peripheral

NRCs (where large numbers are being treated) were in the alarming category. Despite an overall low cure rate, average weight gain of those cured was above the acceptable range of ≥ 8 g/kg/d. Defaulter rates were in the alarming category with most NRCs recording $>25\%$ [16].

A review of the rate of weight gain in 170 patients in Ethiopia found it to be much lower than International minimum standards [17]. In another prospective cohort study conducted in a squatter settlement of Karachi, out of the total of 24 children included in the study, 45.8% reached $-1SD$ at the end of 3 months while 41.6% took 4 months [18]; 91.6% were at the median weight-for-height by the end of 5 months [19]. Similar overlaps have been reported from Bangladesh, Pakistan and Kenya [20].

We have reviewed patient data of a fairly large sample. Applying the International criteria for cure at $-1SD$, not more than 50% of children admitted at district hospital level would be able to achieve it, while only 6.7% would do so at the peripheral levels. This is a significant pointer to the high prevalence of SCM in these child populations, particularly in peripheral locales, and argues in favor of community level rehabilitation. It is pertinent to recall here that only about 15% of those admitted fulfill criteria for facility based rehabilitation.

Restricted public health approach towards SAM management in societies with high levels of chronic undernutrition has been questioned earlier. It has been argued that a large proportion of children with SAM require additional management for SCM [20]. Co-existing wasting and stunting is the consequence of inadequate and sustained poor dietary intake [21]. WHO considered SCM to be the consequence of long-term nutritional deficiency due to poverty, poor housing, inadequate water and sanitation, unemployment and illiteracy [6].

The NRC model (in MP as in other states) is focused on managing 'SAM'; contrary to 'SAM outcomes', mortality is very low (despite 'alarming' low recovery rates in peripheral NRCs) and little complicating medical illnesses. We interpret this apparent paradox on account of high prevalence of predominantly SCM, particularly in populations served by peripheral NRCs. This is further strengthened by very low rates of pitting edema and failed appetite test as admission criteria (markers of SAM). An adverse fallout of less sick children is the minimal engagement of doctors who perceive NRCs as yet another 'feeding program'. Further, low weight gains (in the two/three weeks of hospital stay) do not lead to visible and perceptible changes in children leading to parents questioning the efficacy of the intervention [22]. Taneja, *et al.* [23] reviewed data of 100 admitted children in NRCs in MP and found that a high proportion of the

children (>40%) continued to remain in the high risk category at the time of discharge and concluded that it would require approximately 15.5 years to treat all SAM children of the state.

The labeling of all severe undernutrition as SAM has led to an exceedingly clinical response with sharp standard operating procedures as designed, implemented and sustained by humanitarian and development organizations as well as by government health services [5]. In contrast, programs aimed at correcting SCM (the dominant entity) require well-rounded multi-sectoral approaches that promote adoption of practices to improve the quality of local diets, improving child feeding practices, and reducing exposure to illnesses and also wider issues such as sustaining livelihood of mothers as well as addressing her time issues through crèche and day care models [24-26]. Put differently, while SAM management typically requires a vertical approach (exemplified in the NRC model), SCM mitigation calls for sustained horizontal strategies including support from frontline health workers as well as community mobilization and putting mothers' issues center stage [5]. SAM has the opportunity of being treated or reversed through swift medicalized treatment; the approach to SCM cannot nurture similar goals; indeed, it requires multi-pronged action towards prevention with little scope for 'cure'. MP is in the process of piloting community-based management models; the results of these experiments shall be keenly awaited. The caveat: with chronically malnourished children (non-responders) gaining little weight even with two weeks of therapeutic diet (at NRCs), it would take sustained therapeutic feeding through community level interventions to achieve target weights.

CONCLUSIONS

The NRC has emerged as a quasi-vertical model with emphasis on identifying and referring undernourished children from villages to institutions (health workers reported to the investigators, pressures from the highest quarters of the administration). There is a failure to recognize SCM as an epidemiological entity and gear wide-ranging programmatic and social interventions. The need for convergent actions towards better health and correcting chronic undernutrition cannot be over-emphasized and involves sectoral as well as cross-cutting action. In order to carve out a roadmap, the Planning Commission considered two models: (i) "Whole of Government" (WoG) – inter-sectoral coordination for policy and program development at national and state levels; and (ii) "Whole of Society" (WoS) – rendition of trans-sectoral harmonization at the point of

implementation for convergence in true spirit through involvement of all key stakeholders [29].

We recognize the sincere efforts of well-meaning health personnel in reaching out to children under difficult circumstances. The alarming(ly) low cure rates and high non-responder rates in these districts of the poverty square are pathognomonic of a basic flaw in the approach itself and not a marker of poor implementation. This is a wake-up call to our own selves for a re-think lest it be a slow peaceful journey to nowhere!

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