

Review of simplified approaches for the provision of care to children with acute malnutrition

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ABSTRACT

Acute childhood malnutrition is a major public health issue, affecting millions of children worldwide, particularly in low- and middle-income countries. This phenomenon leads to increased risks of mortality and co-morbidities, as well as long-term cognitive impairment for survivors. Despite significant progress in reducing childhood wasting, a third of severely malnourished children do not receive timely treatment. To combat this problem, various management strategies have emerged, including simplified approaches such as the use of mid-upper arm circumference (MUAC) to detect malnutrition, management by community health workers, and the integration of treatments for moderate acute malnutrition (MAM) and severe acute malnutrition (SAM). Initiatives such as the Family MUAC approach and optimizing the management of acute malnutrition (OptiMA) aim to train families, community workers and community volunteers to identify signs of malnutrition at an early stage. New WHO protocols call for enriched nutrition and the use of standardized treatments to improve management. The OptiMA approach, tested in Burkina Faso, combines these methods to offer a more effective and less costly treatment. These so-called simplified approaches need to be continually evaluated and adjusted to local contexts to maximize their impact and minimize the risk of relapse.

1. Introduction

Malnutrition in all its forms is a challenge facing the world. It is a public health problem, hence its inclusion in the recent Sustainable Development Goals (SDGs) [1]. There are 4 main types of undernutrition: wasting, stunting, underweight and vitamin and mineral deficiencies [2]. Acute malnutrition or wasting is currently defined as a low weight/height ratio, low average arm circumference and/or the presence of bilateral oedema. It may be moderate or severe, depending on the extent of wasting [3].

Acute malnutrition in children is a major public health issue. Worldwide, in 2022, around 45 million children under the age of five were acutely malnourished, including at least 13.6 million with severe acute malnutrition (SAM). These children are at risk of increased mortality and associated co-morbidities, and long-term intellectual and cognitive impairment in survivors [4]. The World Health Organization (WHO) estimates that undernutrition plays a role in around 45% of deaths in children under the age of 5, and that these deaths occur mainly in low- and middle-income countries [2].

Progress in reducing the burden of childhood wasting has been significant over the past two decades, with a reduction in the number of children with severe wasting and an increase in the number of children receiving treatment. However, only 1/3 of children with severe wasting receive timely treatment [5]. Children under 5 suffering from wasting run a higher risk of death than their healthy, well-nourished peers. This risk is particularly high in children with severe wasting [6]. The commitment of national governments to child nutrition in over 70 countries has led to the adoption of national protocols for treating wasting, based on existing WHO recommendations. However, in many contexts, the implementation of national guidelines for the treatment of childhood wasting is hampered by limited resources and capacity, hampering efforts to reach all children in need [6].

The United Nations Children's Fund (UNICEF) and WHO define SAM according to one of three independent criteria: the presence of nutritional oedema, a z-score (weight-for-height in-dice (WHZ)) of less than -3, based on WHO growth charts, or a WHZ of less than 115 mm. To define moderate acute malnutrition (MAM), many programs use a WHZ between below -2 and above -3, or mid-upper arm circumference (MUAC) below 125 mm and above or equal to 115mm [3]. In line with WHO guidelines, children suffering from severe acute malnutrition with medical complications are treated with specialized therapeutic milk (F-75 and F-100), and those with no medical complications (outpatient care) are treated with ready-to-use therapeutic foods (RUTF), as well as systematic treatment with dewormers, antibiotics and vitamin A as appropriate.

2. Challenges and prospects for the detection and management of malnutrition

Prior to 2023, there were no WHO guidelines for the management of moderate acute malnutrition, except in emergency situations. Children suffering from moderate wasting are treated with RUTF in many settings [6]. New WHO guidelines published in 2023 recommend a nutrient-rich diet for malnourished children. Specially formulated foods, lipid-based nutritional supplements and, where these are not available, blended foods fortified with added sugar, oil and/or milk and accompanied by advice are strongly recommended for the management of MAM cases. The same guideline recommends the additional provision of food at home for MAM and their families in emergency settings. [7].

In practice, given the difficulties of measuring WHZs frequently or on a large scale in a community, screening programs tend to use MUAC measurement and oedema testing. Programs then use a threshold of MUAC <125 mm for global acute malnutrition and the presence of oedema for severe malnutrition in children aged 6-59 months [3,8]. These latter approaches would be simpler and easier to use in the field and would increase coverage.

The term simplified approaches refer to several modifications to existing national and global protocols for the treatment of acute malnutrition in children. These simplifications are designed to improve efficiency, quality, coverage and reduce costs in the management of acutely malnourished children [9]. Several approaches have been researched and implemented in several countries. The most common include: (1) Family MUAC; (2) Treatment of acute malnutrition managed by community health workers; (3) Reduced frequency of follow-up visits; (4) Inclusion in the program based on MUAC measurement and/or presence of nutritional oedema only; (5) Broadening of criteria; (6) Use of a single treatment product and (7) Dose reduction.

3. The family MUAC approach

The family MUAC approach involves training mothers, guardians or carers to identify signs of malnutrition in their children, using MUAC. It is a method with an emerging and solid evidence base, very promising in terms of extending screening methodologies to hard-to-reach areas and enabling early management of malnourished children [10]. This approach was first used by ALIMA in 2012 in Niger, with very promising results [11, 12]. It enables early detection of more malnourished children than the standard approach [13]. This approach was also adopted during the covid-19 health crisis to ensure continuity of screening and treatment of acute malnutrition in the community, while limiting the risk of contamination [14].

4. The community health workers (CHW) approach to treating acute malnutrition

The CHW-led approach to treating acute malnutrition involves empowering CHWs to treat children suffering from wasting without medical complications within the community. This model, implemented by Action Contre la Faim (ACF) in Mali, showed high cure rates, with 94.2% of cases cured [15]. CHWs are initially trained and retrained at 6 months in integrated community case management (iCCM) and in the protocol for the management of acute malnutrition (PCMA) using MUAC, WHZ and oedema for admission to nutritional treatment. Passive screening is then reinforced by quarterly active screening. In Mali, the approach has shown that CHWs can correctly screen 96.8% and 78.4% of children with MUAC and oedema respectively. The approach integrates the prescription and distribution of antibiotics; hygiene kit and water treatment; vitamin A supplementation and vermifuges. Complicated SAMs are referred to referral health centers or district hospitals [16, 17]. Since 2007, community-based management of acute malnutrition has become the standard of care for SAM. Trained CHWs, and volunteers can then identify SAM children by means of a MUAC of less than 115 mm and/or nutritional oedema of the feet. Once a SAM child has been identified in the community, he or she needs to be consulted by health personnel with the necessary skills, who determine whether the child should be treated in the community by regular visits to the health center, or whether hospitalization is necessary [18, 19].

5. Reduced frequency of follow-up visits for malnourished children

The reduced frequency of follow-up visits approach consists in reducing the frequency of follow-up visits to children suffering from acute malnutrition under treatment, from weekly to fortnightly or monthly visits. This approach had been tested by Médecins Sans Frontières (MSF) in Niger in 2014 and reported by Isanaka, S., et al., (2017). The approach covered uncomplicated SAM children with a good appetite, living within a radius of more than 15 km from the health facility. Children aged 6-59 months admitted to the program were supplied with RUTF for 4 weeks and the quantity depended on admission weight. These children then visited the health centers every week for 4 weeks for physical examinations and anthropometric assessments, but no additional RUTF or instruction was given during these visits. RUTF is distributed on a monthly basis. This approach has shown satisfactory results in a small sample (115 mother-child pairs) for treatment response and the use of RUTFs in the ambulatory treatment of SAM [20].

6. The MUAC measurement and/or oedema-only approach

The MUAC and/or oedema-only approach relies solely on MUAC and/or oedema as the sole admission and discharge criteria for the management programme. WHO and UNICEF recommend the use of a MUAC of less than 115 mm, the presence of bilateral oedema or a WHZ of less than -3 as independent criteria for the diagnosis and admission of SAM children aged between 6 and 59 months into the management program [21]. According to Myatt M. et al, (2006), the use of MUAC for the diagnosis of SAM is a simple, acceptable, rapid, sensitive, specific and inexpensive indicator that can be measured by community volunteers and field screening teams. The authors state that MUAC, in addition to the presence of bilateral oedema, is the most suitable indicator for screening and detecting cases of malnutrition in the community [22]. A study carried out in Nigeria between 2010 and 2013 by Chitekwe, S., et al., (2018) had confirmed that the MUAC can be used as an admission and discharge criterion in community-based malnutrition management (CMAM) programs with a MUAC < 115 mm for admission and a MUAC \geq 125 mm at discharge [23]. However, since this work, this admission criterion with MUAC in CMAM programs has evolved from MUAC < 115 mm to MUAC < 125 mm [7] (WHO, 2023). Other studies have shown that, compared with WHZ, MUAC <115 mm identifies more children suffering from severe acute malnutrition and at high risk of mortality if left untreated [24]. MSF's project in North Sudan has shown that using MUAC as an exit criterion eliminates the effect of shorter treatment in the most severely malnourished children compared with the least severely malnourished [25]. MUAC \geq 125 mm is a safe discharge criterion and is associated with low levels of SAM relapse (1.9%) and mortality (1.3%), with long treatment durations observed only in the most severe SAM [26, 27].

7. Broadening admission and discharge criteria

The broadening of admission and discharge criteria in an acute malnutrition management program consists in raising the MUAC thresholds to include all children whose MUAC is below 125mm. While severe acute malnutrition is usually treated systematically, children suffering from moderate acute malnutrition do not always have the opportunity to receive treatment. By extending the criteria, the brachial circumference (MUAC) thresholds can be raised to include all children with a MUAC of less than 125 mm, so that children suffering from acute malnutrition across the spectrum who are at greater risk can receive treatment [9]. Work by Burrell A. et al, (2017) has shown that MUAC \geq 125 mm has potential as an exit criterion, predicting treatment outcomes with similar capacity to WHZ and leading to the same average length of stay. The rate of weight gain is lower in those achieving a MUAC \geq 125 mm at discharge [27]. It is a safe discharge criterion and associated with low levels of SAM relapse (1.9%) and mortality (1.3%) with long treatment durations observed only in the most severe SAM [26, 25]. The MUAC is used to assess wasting in girls and boys based on a single threshold. According to Thurstans S et al, (2022), boys could potentially have a predisposition to a thinner MUAC, due to their slightly larger stature [28]. The use of a single MUAC threshold can lead to an overestimation of wasting in girls and an underestimation of wasting in boys [29]. Work by Rasmussen et al (2012) had already shown that MUAC classified more girls and young children as moderately malnourished than MUAC z-score, but that sensitivity varied according to time period, sex and age groups. Overall, however, there was no difference in the performance of MUAC and z-score as predictors of mortality [30].

8. The single treatment product approach for MAM and SAM children

The use of a single treatment product is an approach that consists in treating acute malnutrition without medical complications in children with a single product. The availability of standard foods for the management of acute malnutrition is a challenge that is compounded by several other challenges in the sub-Saharan context [31]. Therapeutic foods, such as RUTFs and F-75 and F-100 milks, have been designed for nutritional and metabolic stabilization and rehabilitation, and their use is aimed at meeting anticipated caloric needs and proteins adapted to the stage of treatment [8]. The transition between MAM and SAM treatment programs is disjointed for mother/child pairs, and children are at risk of dropping out of treatment programs prematurely. In addition, children discharged from the SAM program are eligible for and transferred to the MAM program, but the latter is not always functional or available. An integrated management program for global acute malnutrition (GAM) using the same anthropometric criteria and diet could offer particular advantages in certain contexts. Combining MAM and SAM treatment using the same product as RUTF achieves similar cure rates [32]. According to Maust A et al, (2015), children benefiting from integrated management recover faster, with greater MUAC gain and higher WHZ at the end of treatment with lower cost. This approach calls for the importation of a single food product reducing logistical complexity, the use of lipid nutrient supplements and the exclusion of supplementary vitamin A, iron and folate capsules in acute malnutrition care facilitates care delivery [33].

9. The RUTF dose reduction approach

The dose-reduction approach involves reducing the number of sachets of RUTF per child over the course of treatment. Initially, uncomplicated SAM children receive the standard dose of RUTF (175-200 kcal/kg/day) including medical treatment for two weeks. The standard dose of RUTF depends on body weight until the child reaches a weight/height z-score ≥ -3 and a mid-arm circumference ≥ 115 mm, then a fixed amount of RUTF per day regardless of the child's weight until discharge from the program. The low-dose RUTF protocol (92g or 500kcal/day), combined with specific measures to ensure good quality of service and support for beneficiaries, is successful in treating uncomplicated SAM in certain contexts [34]. Work by Kangas ST et al, (2019) in Burkina Faso has shown that reducing the dose of RUTF administered to children with SAM after two weeks of treatment does not reduce overall weight (g/kg/day) or the rate of mid-hip circumference (MBG) gain, nor does it impair recovery or lengthen the duration of treatment in children. However, the authors point out that this approach has a slight but significant negative effect on linear growth, particularly among the youngest children [35]. The clinical trial by Cazes C. et al, (2023) carried out on 482 food-insecure children in the Democratic Republic of Congo (DRC) showed that SAM children with no medical complications, treated with a re-duplicated dose of RUTF when the child's MUAC and weight increased, had a recovery rate (cured-son) like those treated according to the standard protocol, with 96% and 98% cure rates respectively [36]. In contrast to the work of Kangas ST et al, (2019) [35], the work of Cazes C. et al, (2023) showed similar height gain in both groups between inclusion and 6 months' follow-up [36].

10. Optimizing the management of acute malnutrition (OptiMA)

Since 2014, the humanitarian community has highlighted the limitations of the standard protocol for the management of children suffering from acute malnutrition in Africa. The implementation of family MUAC training in Mali began through community health workers in the community and community relays or volunteers in the communities in 2017 [37]. ALIMA, in partnership with the « Institut national de la santé et de la recherche médicale » (INSERM), University of Bordeaux, « Institut de recherche pour le développement » (IRD) in France and the PAC-CI programme, has developed an innovative approach. The OptiMA approach is based on the use of a single anthropometric measurement as an admission and discharge criterion, a single treatment and the training of families in the early detection of malnutrition. OptiMA thus excludes the therapeutic compartmentalization that exists between care programs for children suffering from moderate and severe acute malnutrition, by integrating all acutely malnourished children into a single program [38]. This is an approach that trains mothers to use MUAC for screening, and targets treatment on children with MUAC < 125 mm or edema with a therapeutic feed at a progressively reduced dose. By 2017, the approach had been tested on a district scale in Burkina Faso with an overall recovery rate above SPHERE standards (86.3%) [39]. OptiMA guarantees a treatment whose safety is evaluated for children with uncomplicated SAM with a progressively reduced dose of RUTF as their MUAC and weight increase, leading to significant savings in RUTF in a context of high food insecurity [37].

11. Study limitations

Our study presents interesting findings but was not a systematic review and therefore has methodological limitations linked to the absence of a more rigorous and transparent approach to study selection, analysis and synthesis. The family MUAC approach, while effective, depends on the ability of families to be properly trained, which may be difficult to guarantee in some regions. In addition, there is a gap in more critical assessments of the challenges encountered in implementation, such as community reluctance or logistical challenges. We have also mentioned the limited resources in low-income countries, but without sufficient discussion of specific solutions to the problems of funding and resource supply. Managing acute malnutrition requires sustainable funding and efficient logistics, which are often insufficient in developing countries. A more detailed analysis of the sustainability and optimization of available resources could bring added value. Although our article mentions projects such as those run by ALIMA or ACF and MSF, it does not provide detailed examples case studies or real-life evaluations of the results of these approaches. Some concrete examples of the effectiveness and challenges encountered in specific contexts would have enriched the analysis. Finally, our article focuses primarily the nutritional and medical aspects of acute malnutrition but does not without discussing the psychosocial impacts of malnutrition, both on children's and their families. The stigmatization, stress and long-term consequences for malnourished children could be an important area to explore to be explored for a more comprehensive care of malnourished children.

12. Conclusion

The management of acute malnutrition has evolved in recent years, with new WHO approaches, and recommendations aimed at improving the effectiveness of interventions while reducing costs and increasing coverage. The challenges of screening for and managing malnutrition are manifold, not least because of the practical difficulties of measuring indicators such as WHZ in communities. However, simplified approaches, such as the use of MUAC and oedema detection, continue to demonstrate their effectiveness in the field, particularly in emergency and access-challenged contexts. Recent innovations, such as the family MUAC approach and the involvement of community health workers, have improved early detection and management of malnourished children, even in remote areas. In addition, strategies such as integrating the treatment of moderate and severe acute malnutrition into a single program, using a single therapeutic product and reducing doses of RUTF, are showing promising results in terms of effectiveness and sustainability. Prospects for the future include the need for a more integrated and systematic approach, combining both simplified screening criteria and adapted treatments, while promoting active community participation. This review also highlights recent WHO guidelines published in 2023, highlighting the need for a nutrient-enriched diet for malnourished children, an approach that represents an important step forward in the fight against malnutrition. Simplified approaches are relevant because they aim to extend access to care in often difficult contexts. Several approaches, such as the extension of treatment programs or the integration of care for moderate and severe acute malnutrition, meet the needs of particular contexts, particularly in sub-Saharan Africa. This flexibility is essential if care is to be adapted to local realities. The OptiMA approach, for example, with its use of a single measure for screening and treatment, and the integration of all malnourished children into a single program, represents a step towards more integrated and less fragmented care. Strengthening local capacities is essential to ensure maximum coverage and optimal management of acute malnutrition. However, these approaches need to be continually evaluated and adjusted to local contexts to maximize their impact and minimize the risk of relapse.

Conflicts of Interest: The author declares no conflict of interest.

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