Acute Malnutrition in Latin America: The Challenge of Ending Avoidable Deaths

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ABSTRACT

In Latin America and the Caribbean, malnutrition still represents a health concern expressed mainly as stunting and micronutrient deficiencies, lessening the attention given to acute malnutrition (moderate and severe); however, the latter has a high fatality rate. Ending these avoidable deaths represents a major health and ethical challenge in the region. Acute malnutrition plus infections (mainly diarrhea and pneumonia) determine an important fraction of the fatality rate due to malnutrition in most regions, especially those with higher poverty and social instability. Application of the World Health Organization guidelines for the treatment of children with acute severe malnutrition reduces the fatality rate significantly. Among the many possibilities for treatment, systems based on day care centers and at home should be promoted. Training in the application of the World Health Organization guidelines should be incorporated into the curricula of health-related professions in countries where malnutrition is prevalent. JPGN 47:S10–S14, 2008.

Key Words: Malnutrition—Poverty—Breast-feeding—Education.

Malnutrition represents a huge burden on health costs around the world, especially in some areas of Asia and Africa (1). In Latin America and the Caribbean, it still represents a health concern expressed mainly as stunting (2) and micronutrient deficiencies, lessening the attention given to acute malnutrition (moderate and severe); however, the latter has a high fatality rate (3). Ending these avoidable deaths represents a major health and ethical challenge in the region. In this review we define the characteristics of the problem, update the situation in Latin America, discuss how definitions affect the known prevalence of malnutrition, the main factors that influence risk of death, and the different strategies available to treat malnourished children. Special emphasis is given to the importance of improving case management to reduce the fatality rate by applying the World Health Organization (WHO) guidelines for treating acute severe malnutrition.

DEFINITIONS AND EPIDEMIOLOGY

How we define malnutrition modifies the prevalence we calculate. In 1956 Gómez (4) defined the criteria for measuring malnutrition based on anthropometric indicators representative of nutritional status, the population to be used as reference, and cutoffs to establish the limits of normal nutrition. Weight/age has been the most frequently used indicator; it adequately predicts mortality but it overlooks stunting, especially for those who are underweight for age but are of normal weight or overweight for height (5). In Latin America, stunting (including children with low birth weight) represents most cases of malnutrition; therefore, this issue becomes relevant (6).

Height/age is a more demanding indicator (it requires adequate weight/age and weight/height); rather than an indicator for nutritional assessment case by case, it is adequate for assessing changes in countries that develop and improve their socioeconomic conditions, but it is not adequate to assess short-term actions. When used for clinical assessment it is helpful to also measure velocity of growth. Finally, weight/height is considered the best indicator to measure acute malnutrition, even in children with short stature. Unfortunately, although there is little discussion about it, final decisions will always depend on local facilities and capacities, and rather frequently in Latin America height cannot be measured. When facilities are scarce, a mid-upper arm circumference <110 mm has been validated as an indicator of wasting in children 6 months to 5 years old (7).

Comparisons are made against a reference population. Until recently, this referred to statistical normalcy,
derived from data obtained from a study of children who were predominantly fed with bottled formula, from families of middle to high socioeconomic status in a rural community in Ohio. These data served as the basis for the 1979 National Center for Health Statistics charts and later for the former WHO standards. The problem of sample quality originating from this group of children was corrected in the new WHO standards, which were built on the basis of children whose characteristics were representative of biological normalcy (single birth, healthy infants without relevant morbidities during the follow-up, socioeconomic characteristics that would not constrain development and growth, adequate sanitary conditions, exclusive breast-feeding for 4 to 6 months, adequate complementary foods after weaning, nonsmoking mothers). Application of the new charts results in lower rates of undernutrition (except during the first 6 months of life) and higher rates of overweight and obesity than when the WHO references of growth were applied, but much as length is somewhat greater, stunting increased (8). These new standards represent a relevant improvement. For the first time a chart describes physiological growth of healthy infants, based on actual data. The most important finding in the new assessment is that it demonstrates that growth during the first year is similar in all children independently of their ethnic background.

In south Saharan Africa, underweight in children increased in the period 1990 to 1995, in Central America there was no improvement, and in South America there has been significant progress in recent decades. UNICEF data gathered from children younger than 6 years old show that in Haiti, Guatemala, and Honduras, the prevalence of weight/age below −2 SD is greater than 15%; in Ecuador and El Salvador, it is about 11%. The prevalence of severe malnutrition in children (weight/age below −3 SD) is between 1.7% and 8.1% in Haiti, Guatemala, Honduras, Ecuador, and Bolivia (9). Although severe malnutrition has a lower prevalence in all countries, edematous forms can still be detected in hospital settings in Latin America (10). A study by Seal and Kerac (11), including children from birth to 5 years of age, showed that in Kenya, Algeria, and Bangladesh, the rates of acute severe malnutrition (weight/height) increased from 0.8%, 2.2%, and 0.5% to 2.1%, 3.8%, and 2.1%, respectively.

FACTORS INFLUENCING MALNUTRITION

The prevalence of malnutrition in different locations is the product of the interaction of several factors. It is well described that poverty is a main determinant of acute malnutrition; although it is true that the logical way to deal with the problem is to improve poverty, it is possible to reduce malnutrition without significant improvement of poor-quality conditions. This is the case in Latin America and the Caribbean, where poverty has remained stable and yet the prevalence of malnutrition has decreased significantly in relation to the figures observed in 1970 (12). In areas of Brazil, malnutrition continues to be high among children younger than 6 years old (13), despite the significant economic growth observed in the country. By contrast, malnutrition rates in Central America have increased—a phenomenon often associated with social emergencies and civil war (14,15).

Breast-feeding is a potent factor in preventing malnutrition and the mortality associated with it (16). An analysis of 12 countries in Latin America and the Caribbean showed that breast-feeding has improved between 1970 and 1990, despite the nutritional, epidemiological, and demographic transition that is taking place in the region. It has been postulated that massive, well-planned, and well-executed national breast-feeding policies and promotion programs may be responsible for this trend, one of the few positive nutrition-related outcomes that can be described during the past 3 decades (17). Malnutrition rates often increase in the weaning period because breast milk becomes insufficient to meet infant needs and at the same time the infant’s diet incorporates low-energy foods that are low in macronutrients and micronutrients. Successful measures to improve this situation include improving feeding during the weaning period, promoting foods with added starch or oil to increase energy density, fortification of staples with micronutrients, and consumption of food microbiologically safe and healthy (18).

Interventions aimed at formally educating mothers have proved to be efficient in lowering the prevalence of malnutrition, showing that maternal education is one of the most relevant influential factors. The study by Smith and Haddad (19) assessed several factors that may explain the different progress observed during the periods 1970 and 1995, including national food supply, women’s status, women’s education, and health environment. Improvement of maternal education was responsible for 43% of the reduction of malnutrition and improvement in food quality for 26%. In Latin America and the Caribbean, women’s education explained 69% of the improvement. In Peru a study of families living in conditions of periurban poverty, in which access to food was not a limiting factor, demonstrated that an education program on nutrition significantly decreased by 11 points the prevalence of stunting in young children (20). In this region, between 1990 and 2015, de Onis et al (21) have estimated that there will be an overall reduction of undernutrition from 8.7% to 3.4%; this reduction will not be homogeneous, being 28% in the Caribbean, 46.8% in Central America, and 34.3% in South America.

RISK OF DEATH IN MALNUTRITION

The relation between malnutrition in general and mortality is well known. The cause of death may be
acute (diarrheal or respiratory) infection, and the contribution of underlying malnutrition is often distorted when it is not registered as a diagnosis by itself. The studies by Puffer and Serrano (22) in the United States and Pelletier et al (23) in Africa and Asia concluded that more than half of all infant deaths are determined by malnutrition. Infection strongly influences this mortality, and at the same time, malnutrition compromises host immune function, increasing case fatality and disease susceptibility (24). The relative risk of death from infection correlates with the severity of malnutrition, with relative risk 8.7 (CI 95% 5.5–13.7) for severe malnutrition, 4.2 (CI 95% 3.1–5.5) for moderate malnutrition, and 2.0 (CI 95% 1.7–2.4) for mild malnutrition (25). Further assessment of this relation shows that different infections may contribute more heavily in deaths associated with malnutrition: 61% of children dying of acute severe malnutrition have diarrhea, 52% pneumonia, 57% malaria, and 45% measles. In Latin America, 38% of the mortality observed in children younger than 5 years old occurs in cases of diarrhea and pneumonia.

There are obvious public health implications in terms of preventing death. Although the risk of death is higher among severely malnourished children, patients with diarrhea and pneumonia are also more likely to die if they are mildly or moderately malnourished. Aside from cost-effective analyses for treatments of malnutrition, the ethical commitment must be to avoid the death of severely malnourished children, because these deaths are preventable.

TREATMENT OF MALNUTRITION

Treatment of malnutrition can be performed in different ways. In accordance with the goals of this review, we focus the discussion on acute severe malnutrition. Traditionally, treatment has been in hospitals because these children become severely ill when infected. Only in the past few decades has it become clear that mortality rates among children hospitalized with severe acute malnutrition were high and that they had not changed in the period 1950 to 1990 (26). In 1999 WHO updated their former guidelines and established clear steps for treatment according to the basic principles of physiology (27). These guidelines recognize 2 phases: acute measures for stabilization (small, frequent feeds day and night; hydration with low-sodium fluids; provision of potassium, magnesium, and micronutrients; and systematic administration of antibiotics) and then nutritional rehabilitation. The treatment of acute severe malnutrition according to the WHO guidelines includes 10 steps (Fig. 1); the guideline has proved successful when all of the steps are followed but often fails when some of them are disregarded. The evidence supporting each step is not similarly robust, but high rates of success have indeed been demonstrated where the guidelines have been applied, with case-fatality rates of 30% to 45% decreasing to <5% (Fig. 2) (28).

The application of these WHO guidelines has minimal physical and instrumental requirements; however, there are several characteristics of the human resources conducting treatment that should be fulfilled. The health team must be trained and motivated. An example of the importance of these factors is shown in the study reported in a South African hospital in which, coinciding with the arrival of newly qualified doctors with no specific training in the management of severe malnutrition, the case fatality rate increased from 18% to 38% (29). Training specific groups in some areas that become reference centers for children with acute malnutrition optimizes treatment outcomes.

**FIG. 1.** Decrease in mortality rate due to acute malnutrition after application of WHO guidelines, based on Jackson et al (28).
the results because these groups can rapidly gain experience that in turn will improve their performance (30). A relevant factor for success is periodic audits to allow discussion among the team members and learning from critical situations. This on-site education not only serves to make the staff feel confident about what they do but also contributes to the orientation and training of the younger personnel. In Latin America several countries have nationwide health services with different degrees of coverage; this is a privileged condition in comparison with areas where health care depends on nonprofessional individuals who, after short periods of training, must take responsibility for the health care in their communities. In this context, it appears unacceptable that treatment of malnutrition is not included in most curricula of health-related professions in Latin American countries. Improvement of the situation demands that academic and political groups recognize the importance of malnutrition in clinical practice, establishing wards or special areas where treatment is provided correctly, securing adequate supplies and specific training of the staff.

The treatment of children with acute severe and moderate malnutrition has been historically conducted in hospitals because acute infections decompensate the child and trigger admission to hospital. Today, hospital treatment is accepted only for cases with complications and should be as short as possible. Several other possibilities of treatment have been reported, and when deciding which should be used, one must consider the given circumstances of the patient and the family. In Chile more than 30 years ago, CONIN (Nutrition Recovery Centers for inpatients) appeared to be an alternative to hospital treatment for severely malnourished children, acting in an integrated way with the National Health Service. These centers were a response to the sociodemographic characteristics of the poorest groups in Chilean society. Treatment included pediatric and nutritional care and psychomotor stimulation. Mothers participated in their children’s recovery, and at the same time, efforts were made to improve the socioeconomic situation of the family and the conditions existing at home (31). Although these centers were successful and are considered an important factor that contributed to a drastic reduction in the fatality rate of acute malnutrition in the country, today they are thought to be an expensive alternative that imposed serious conflicts on families’ daily dynamics. At present, day care centers and home treatment represent the best accepted form to deal with malnutrition. They are most effective, a family can be reached without seriously disturbing the mother’s duties at home, and monitoring the child can be conducted at home by the center staff. Interestingly, Khanum et al (32) reported a comparative study in children who received treatment at hospitals, in day care centers, or at home. The respective costs to reach 80% weight/height were $156, $59, and $29 per treated child, respectively. The days required to reach the target were lowest in the hospital (18 days), 23 days at the day care center, and 35 days at home. Although nutritional recovery was longer at home, mothers preferred this type of treatment. The following summarizes the factors that should be considered when one is deciding where a child should be treated:

- Presence of complications
- Collaborative mother
- Mother available at home
- Supporting family
- Access to health centers
- Sanitary conditions
- Prevalence and severity of malnutrition in the area
- Presence of complementary feeding program in the area

Ready-to-use foods represent a recent interesting alternative for the treatment of children with acute severe malnutrition who have conserved appetite and no medical complications. They are suitable for home feeding in the rehabilitation phase because they are rich in energy, electrolytes, minerals, and vitamins; they have a nice flavor; and their low water content hinders the growth of pathogens (33). Finally, regardless of the alternative treatment chosen, community empowerment is crucial to reach success and have sustainable nutritional interventions (34).

In summary, acute malnutrition plus infections (mainly diarrhea and pneumonia) determine an important fraction of the fatality rate due to malnutrition in most regions, especially those with higher poverty and social instability. Application of the WHO guidelines for the treatment of children with acute severe malnutrition reduces the fatality rate significantly. Among the many possibilities for treatment, systems based on day care centers and at home should be promoted. Training on the...
application of WHO guidelines should be incorporated into the curricula of health-related professions in countries where malnutrition is prevalent.

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