

Dale NM, Myatt M, Prudhon C, Briend A. **Using mid-upper arm circumference to end treatment of severe acute malnutrition leads to higher weight gains in most malnourished children.** PLoS ONE 8: e55404. doi:10.1371/journal.pone.0055404, 2013. (This article can be accessed at: www.plosone.org).

Introduction

Moderate and severe forms of acute malnutrition increase the odds of child mortality by approximately two- to nine-fold, respectively; and these conditions cause more than one million preventable deaths of young children each year (Black, 2008). In 1999, the World Health Organization (WHO) prepared guidelines for the diagnosis and systematic treatment of severely malnourished children; and in 2009, WHO and UNICEF published revised diagnostic criteria for severe acute malnutrition (SAM). According to the updated diagnostic standards, children are considered to have SAM if they have a weight-for-height Z-score < -3 , a mid-upper arm circumference (MUAC) < 115 mm, and/or bi-pedal edema. The WHO/UNICEF document also stated that children could be discharged from treatment after achieving a 15-20% increase over initial body weight.

The rationale for this approach using percent weight gain as the benchmark for discharge from treatment rather than a particular weight-for-height was to eliminate the need for repeated height measurements during treatment, and to avoid the situation in which some children could have been enrolled in treatment based on low MUAC, even though they had weight-for-height in the adequate range. However, experience has now shown that using percent weight gain as the indicator for discharge from treatment results in an unfortunate state of affairs whereby the children who are most malnourished (i.e., those with lowest initial weights) require less weight gain to be eligible for discharge, so they receive a shorter duration of treatment than those children who weigh more initially and are less malnourished. To rectify this situation, clinicians working in an emergency nutrition program in North Sudan have begun using MUAC to evaluate children for both admission and discharge. The paper included in this month's edition of NNA examines whether the use of MUAC to determine children's suitability for discontinuation of treatment eliminates this now recognized undesirable effect observed when percent weight gain is used as the discharge criterion following treatment for SAM.

Methods

The study took place during the second half of 2010 in Gedaref, North Sudan. The investigators examined data from 1022 children 6-59 months of age who were admitted to an outpatient treatment program for uncomplicated SAM, based on the presence of MUAC < 115 mm, satisfactory appetite and absence of severe medical complications, such as severe anemia, shock, sepsis, severe dehydration, anorexia, or severe edema, requiring inpatient therapy. The children were reexamined every two weeks until recovery, which was defined as MUAC > 125 mm on two occasions and evidence of either weight maintenance or weight gain.

Results and Conclusions

Data from 269 children were excluded from analysis because of missing information ($n = 219$), continuation in the program for < 14 days ($n = 33$), or failure to recover ($n=17$), leaving a total of 753

children who were studied. Of these children, 82% were cured, 15% defaulted from treatment, 2% were referred to the district hospital for specialized medical care, and 1% died. The median duration of treatment was 60 days. Children with lower MUAC at the beginning of treatment had longer periods of treatment than those with higher MUAC. All children combined had a 21% weight gain. Children with lower initial MUAC had a higher percent weight gain than those with higher initial MUAC. The vast majority of children in all MUAC categories gained more than 15% of their initial weight, which is the lower limit of percent weight gain recommended by WHO.

Program and Policy Implications

The authors concluded that using MUAC as the criterion for discharge from treatment obviated the problem described above when discharge was based on percent weight gain. In other words, by using MUAC for deciding on both admission and discharge, the most severely undernourished children received longer treatment and had the highest percent weight gain, which is consistent with the results observed when weight-for-height is used to classify children for treatment.

NNA Editor's Comments **

These results suggest that MUAC can be used to classify children for both admission to and discharge from nutritional treatment for SAM in situations where it is not feasible to use weight-for-height. The advantages of using MUAC are that less measuring equipment is required and MUAC is more predictive of mortality risk than weight-for-height (Briend, 2012), possibly because the recommended MUAC cutoff tends to identify a greater number of younger children than the standard cutoff for weight for-height. The authors further state that MUAC is simpler to measure, although other investigators report greater measurement error with MUAC than with weight or length (Ayele, 2012), so adequate training is essential for obtaining accurate MUAC measurements.

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