Diagnostic performance of visible severe wasting for identifying severe acute malnutrition in children admitted to hospital in Kenya.

Mogeni P, Twahir H, Bandika V, Mwalekwa L, Thitiri J, Ngari M, Toromo C, Maitland K, Berkley J. Bull World Health Organ 2011; 89:900-6. (This article can be accessed at: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3260901/pdf/BLT.11.091280.pdf)

Mid-upper arm circumference and weight-for-height to identify high-risk malnourished under-five children.

Briend A, Maire B, Fontaine O, Garenne M. Mat Child Nutr 8:130-133, 2012. (This article can be accessed at: http://onlinelibrary.wiley.com/doi/10.1111/j.1740-8709.2011.00340.x/full)

Introduction

The World Health Organization (WHO) and UNICEF recommend the following criteria for diagnosing severe acute malnutrition (SAM) in infants and young children 6-59 months of age: mid-upper arm circumference (MUAC) <11.5 cm, weight-for-height Z-score (WHZ) <-3 according to the WHO 2006 growth standard, or the presence of bipedal edema (1, 2). However, in lower-income countries, the technical expertise and material resources needed to conduct anthropometric assessments are often limited, so nutritional assessments are not always completed systematically for all children. In many cases, the diagnosis of SAM may be based only on the presence of clinically observed severe wasting, although the accuracy of this approach for detecting SAM has not been carefully evaluated. Moreover, the ability of different anthropometric and clinical indicators to identify those malnourished children who are at greatest risk of dying is uncertain.

One of the articles reviewed in this month's edition of NNA assessed the diagnostic value of clinically defined "visible severe wasting" for diagnosing SAM in relation to the aforementioned MUAC and WHZ criteria among hospitalized Kenyan children, and compared the ability of these three indicators to predict mortality during the hospitalization. The second study examined the ability of just MUAC or just WHZ, or the combination of both indicators, to identify Senegalese children residing in rural communities who died during the subsequent six months of surveillance (3).

Methods

The study from Kenya was conducted among 11,166 children 6-60 months of age admitted to one of two public hospitals (one urban, one rural) from 2007 to 2010. Trained clinicians in both hospitals first diagnosed SAM according to their clinical impressions of severe wasting, which was defined as visible muscle wasting, especially in the gluteal region, and prominence of bony structures, particularly over the thorax, resulting from the loss of subcutaneous fat. Subsequently, at the urban hospital, MUAC was measured by the same clinician; and, at the rural hospital, a trained research assistant independently measured weight, height and MUAC. Using the MUAC and WHZ criteria as references, the authors estimated the sensitivity and specificity of visible severe wasting for the diagnosis of SAM. They also

examined the sensitivity and specificity of visible severe wasting and anthropometrically defined SAM in predicting inpatient death. Finally, they compared demographic and clinical characteristics of children with anthropometrically defined SAM who were or were not also diagnosed by the clinicians as demonstrating visible severe wasting.

The study from Senegal was based on a reanalysis of data originally collected in 1983-84 from 5751 children 6-59 months of age. The children were visited every six months for anthropometric assessments, and all subsequent deaths were recorded by a demographic surveillance system. The authors assessed the ability of standard MUAC and WHZ cutoffs and combinations of the two indices to identify children who died during the 6-month period following each round of anthropometric assessments.

Results and Conclusions

When the results from both hospitals in the Kenya study were combined, the presence of visible severe wasting recorded by a clinician correctly identified only 54% of cases of SAM diagnosed according to MUAC < 11.5 cm, and 45% of those with WHZ < -3, indicating low sensitivity of the clinical observations. 96% of children who did not have SAM according to anthropometric criteria were correctly identified as not being visibly severely wasted, indicating high specificity of the clinical observations. The anthropometric cutoffs also had a slightly higher sensitivity for predicting inpatient death (MUAC: Sens. = 48% and Spec. = 90%, WHZ: Sens. = 53% and Spec. = 86%) compared with visible severe wasting (Sens. = 41% and Spec. = 91%). A combination criterion of either a MUAC < 11.5 cm or a WHZ < -3 increased the sensitivity, but reduced the specificity, for detecting inpatient deaths (Sens. = 60%, Spec. = 83%), compared with either indicator individually. Severely wasted children (diagnosed anthropometrically) who were also correctly identified by visible severe wasting tended to be older, more severely wasted, more likely to have kwashiorkor and more likely to die than those who were not also thought to be visibly wasted.

The study in Senegal found that a MUAC cutoff of <11.5 cm had a sensitivity ~10% for identifying children who died during the following six months, and a WHZ cutoff <-3 had a sensitivity ~4%; both measurements had high specificity (98-99%). Using the combination of either MUAC < 11.5 cm or WHZ < -3 increased the sensitivity slightly to identify high-risk children, but decreased specificity. The authors concluded that there was no advantage for programs to use of both MUAC and WHZ to identify children at high risk of dying compared with using only MUAC.

Policy and Program Implications

Assessment of visible severe wasting by trained clinicians failed to detect approximately half of the hospitalized children with anthropometrically defined severe wasting. Thus, anthropometric assessment is essential for correctly diagnosing SAM, and all children presenting to a clinical center for any services should be screened for acute malnutrition using the combination of anthropometry and examination for edema. Failure to perform routine anthropometric screening during clinic visits and following hospital admission may mean that severely malnourished children do not receive the immediate specialized care they require, which includes standardized antimicrobials, fluids, electrolytes, micronutrients and therapeutic feeding (3), placing these children at a higher risk of death. Mwalekwa et al concluded that measuring both WHZ and MUAC does not improve the identification of severely malnourished children at high risk of dying, compared with MUAC alone, which is consistent with the results reported by Briend et al. in community-based studies. Because the measurement of MUAC was

slightly more sensitive than WHZ for identifying children with an elevated risk of dying, and measurement of MUAC is inexpensive, quick and relatively simple, both studies recommend using MUAC in settings where it is not possible to perform complete anthropometry, including both WHZ and MUAC.

NNA Editors' comments*

A joint statement issued by the WHO and UNICEF in 2009 (1), reports limited overlap in cases of SAM diagnosed by either WHZ or MUAC, with only ~40% of cases selected by both criteria. Similar findings were recently reported for diagnosis of moderate acute malnutrition (MAM) in Mali, where MUAC tended to over-diagnose MAM among infants and under-diagnose MAM among older children compared with WHZ (4). Because younger infants have a higher risk of dying in general, the greater sensitivity of MUAC for predicting death may simply be due to the fact that it categorizes more of the younger children as MAM or SAM than WHZ does. It would be interesting to repeat the analyses by Briend et al after age stratification to determine whether there would be any independent advantage of WHZ for identifying high risk older children, in which case measurement of WHZ might still be recommended for children above a certain age. In the meantime, the joint WHO-UNICEF statement recommending the use of both anthropometric indicators as independent diagnostic criteria is reasonable, unless health workers find it impossible to complete both sets of measurements. In the latter case, MUAC should probably be used preferentially.

Although it is generally believed that MUAC measurements are simple to perform, we have often observed improper measurement techniques in the field, including failure to measure at the midpoint of the upper arm, and application of the tape either too loosely or too tightly. Attention to these details during training of health personnel and frequent supportive supervision are essential for ensuring accurate measurements.

* These comments have been added by the editorial team and are not part of the cited publications.

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