

Pediatric Malnutrition Guidelines: Understanding and Applying the Recommendations

Written by Dennis Bittner

In a session intended to explain recently published guidelines on malnutrition in children, 3 experts in pediatric nutrition described the impact of malnutrition on child health, providing advice on identifying pediatric malnutrition and implementing the new guidelines in clinical practice.

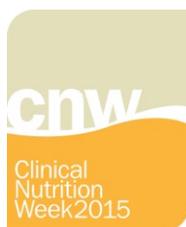
PREVALENCE AND IMPLICATION OF PEDIATRIC MALNUTRITION

Mark R. Corkins, MD, University of Tennessee Health Science Center, Memphis, Tennessee, USA, provided data on the prevalence of pediatric malnutrition. Dr Corkins said that while studies report that anywhere from 6% to 51% of children assessed are malnourished, the condition is likely underdiagnosed. Part of this problem has arisen from various definitions used for malnutrition, making valid comparisons between populations difficult. It is hoped that the publication of new definitions for pediatric malnutrition will improve the situation.

Dr Corkins showed data from 1-day surveys conducted at Boston Children's Hospital, first in September 1976, where acute malnutrition was observed in 35% of pediatric patients and chronic malnutrition was seen in 47% [Merritt RJ et al. *Am J Clin Nutr.* 1979]. In 1992, 16 years later, acute malnutrition had decreased to 24.5% and chronic malnutrition had dropped to 27.3% [Hendricks KM et al. *Arch Pediatr Adolesc Med.* 1995]. At a tertiary care children's hospital in Germany, a survey of pediatric patients in 2003 found that 24.1% were malnourished [Pawellek I et al. *Clin Nutr.* 2008]. At Hospital for Sick Children in Toronto, results of a study published in 2007 of 175 children admitted for scheduled surgery found that 51% of them were judged to be malnourished [Secker DJ, Jeejeebhoy KN. *Am J Clin Nutr.* 2007]. Dr Corkins probed these data, describing the methods each group used to derive values for malnutrition incidence. In 1976, Boston Children's Hospital used weight for height (WH) to assess acute malnutrition and height for age (HA) for chronic malnutrition. By 1992, the hospital was still using these measures, but now expressing these as statistically superior z scores, WHz and HAz, respectively. The assessment of the German inpatients used the percentage of the median WH, while values for the Toronto preoperative patients used the Subjective Global Nutritional Assessment, a method based on qualitative measures. A 2008 review found 5 different definitions for acute malnutrition used worldwide, with classification systems varying by country [Joosten KFM, Hulst JM. *Curr Opin Pediatr.* 2008]. Of these, 63% used chart percentiles, 6% used the percentage of the median, and 18% used z scores (ie, standard deviations).

Dr Corkins also shared 2013 data from malnutrition assessments of 1746 pediatric outpatients aged 2 to 18 years performed at the emergency services department of the University of Oklahoma Children's Hospital [Wyrick S et al. *Pediatr Emer Care.* 2013]. Using a malnutrition criterion of body mass index (BMI) below the fifth percentile, 8.2% of patients were judged to be malnourished. One-sixth of the patients were admitted; of these, 3 times as many (24.5%) were assessed as malnourished ($P = .02$) as the nonadmitted group. Regarding current practice, Dr Corkins showed data presented as a poster at Clinical Nutrition Week 2014 that included Healthcare Cost and Utilization Project data from 2010. Of the 4.3% of hospitalized children diagnosed with malnutrition, their length of stay was 4.4 times longer (16.7 days vs 3.8 days; $P < .001$) and their hospital costs were 5 times higher (\$28 292 vs \$5485; $P < .001$) than nonmalnourished patients. Dr Corkins summarized his talk by reminding the audience that malnutrition is common in the pediatric age group and that malnutrition is clearly associated with a disease state or other health anomalies.

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USING THE GUIDELINES TO IDENTIFY PEDIATRIC MALNUTRITION

Sandra Bouma, MS, RDN, CSP, C.S. Mott Children's Hospital, University of Michigan, Ann Arbor, Michigan, USA, told the audience that the goal of the new guidelines is to provide a uniform definition for early detection of children at risk for malnutrition and facilitate better comparisons of data between different studies and centers. Uniform screening tools and consensus thresholds for intervention enable collection of meaningful data and help in analyzing the impact of malnutrition on outcomes. A paradigm shift toward etiology-related definitions has occurred [Mehta NM. *JPEN J Parenter Enteral Nutr.* 2013]. Pediatric malnutrition is considered as an imbalance between nutrient requirements and intake, which results in cumulative deficits in energy, protein, or micronutrients that may negatively affect growth, development, and other relevant outcomes. The new definition includes illness-related malnutrition and takes into account the etiology and the mechanism of the illness so that the root causes of malnutrition can be targeted. Ms Bouma went on to state that "the new definition wants us to ask 'why?'" Further, she described another paradigm shift, describing the advantages of using z scores vs other previously used measures such as percentage of median values for assessing the severity of pediatric malnutrition. Although both z scores and percentile rankings follow a normal distribution of values from a study population, only z scores can identify children with extreme values. Provision of the number of standard deviations above or below the mean for a child's age for a given value makes z scores more sensitive to acute changes. Finally, Ms Bouma highlighted another paradigm shift, that of "burden of proof." She stated that "if a child is more than 2 SD (standard deviations) below the norm for age, the clinician must prove that the child is not malnourished."

PUTTING PEDIATRIC MALNUTRITION GUIDELINES INTO PRACTICE

Beth Smith, RD, Children's Hospital of Philadelphia, Philadelphia, Pennsylvania, USA, cited case studies

to provide perspective on putting pediatric malnutrition guidelines into clinical practice. The first case was a 3-month-old, full-term male infant with a history of severe combined immunodeficiency, with cytomegalovirus, Epstein-Barr virus, and fungal pneumonia infections, plus diarrhea. The medical plan was for a bone marrow transplant from an unrelated donor. Although the growth history was unclear, the infant's nutrition history was per oral breast milk and fortified cow's milk formula, with inadequate per oral volume and diarrhea. The planned nutrition intervention was elemental formula, fortified to 24 kcal/ounce in a combined per oral/nasogastric regimen. This approach decreased the diarrhea and delivered the desired velocity of weight gain. The use of z scores for this patient more clearly identified malnutrition and provided more sensitive outcome measures as the patient's nutritional status improved. A second case study emphasized the flexibility of the guidelines in a situation where conventional weight measurements were not practical. The 7-year-old female patient in the case presented with malnutrition and a history of osteosarcoma in the left proximal tibia and previous limb salvage surgery. The patient had contracted an infection after her operation, with treatment requiring traction and subsequent application of bracing and multiple dressings. This situation presented a variety of limitations in obtaining adequate weight measurements. Enabled by procedures outlined in the new guidelines, the effective solution was to use mid upper arm circumference as a proxy measure for both weight and BMI. After concurring with the other speakers on the panel regarding the importance of using z scores to characterize malnutrition, Ms Smith concluded her talk by reviewing the role of the registered dietitian in treating malnutrition in pediatric patients. "The dietitian is responsible for routine review of macronutrient intake in undernourished patients. These observations are compared with standards of indirect calorimetry and use of predictive equations," said Ms Smith.

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