Clinical Nutrition (2008) **27**, 72–76

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ORIGINAL ARTICLE

Prevalence of malnutrition in paediatric hospital patients

Ingrid Pawellek, Katharina Dokoupil, Berthold Koletzko*

Dr. von Hauner Children's Hospital, University of Munich, Lindwurmstraße 4, D-80337 München, Germany

Received 14 January 2007; accepted 1 November 2007

KEYWORDS
Underweight;
Undernutrition;
Paediatric nutrition;
Wasting;
Failure to thrive

Summary
Background & aims: Childhood malnutrition has severe adverse effects on growth and development, but only limited information is available on the prevalence of malnutrition in paediatric hospital patients. We determined the prevalence of malnutrition in a series of unselected patients consecutively admitted as inpatients to a large tertiary care children's hospital in Germany.
Patients and methods: Data for weight and height upon admission were recorded in 475 unselected children aged 7.9±5 years (mean±SD). Weight for height 81–90 of median values were considered to indicate mild malnutrition, 70–80% moderate malnutrition and <70% severe malnutrition according to cut-off points defined by Waterlow.
Results: Some 24.1% of the patients were malnourished, with 17.7% of all patients who were mildly, 4.4% who were moderately and 1.7% who were severely malnourished. The largest proportion of malnourished patients was found among patients with multiple diagnoses (42.8% malnourished), mental retardation (40.0%), infectious diseases (34.5%) and cystic fibrosis (33.3%).
Conclusions: The very high prevalence of malnutrition among children admitted to a children's hospital is considered intolerable, given the adverse consequences for short- and long-term health and well-being. Strategies for systematic screening and treatment of malnutrition in paediatric patients need to be refined and implemented.

Introduction

A recent expert report of the Council of Europe highlighted major deficits in nutritional care for adult patients in European hospitals, indicating that some 20–30% of adult patients in Europe are malnourished upon hospital

*Corresponding author. Tel.: +49 89 5160 2826; fax: +49 89 5160 3336.
E-mail address: Berthold.Koletzko@med.uni-muenchen.de (B. Koletzko).

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doi:10.1016/j.clnu.2007.11.001

Table 1 Prevalence of malnutrition among paediatric patients upon hospital admission, based on national reference data for median weight for height[7] and cut-off points after Waterlow[6] and TSFT reference data of the NHANES survey and cut-off points after Frisancho.[30]

Nutritional status	Weight for height, $n = 475$	Nutritional status	Triceps skinfold thickness, $n = 134$
Normal	>90th centile 75.8%	Normal	>10th centile 73.1%
Malnutrition (total)	<90th centile 24.1%	Malnutrition (total)	<10th centile 17.2%
Mild malnutrition	81–90th centile 17.9%	Malnutrition	5–9th centile 7.5%
Moderate malnutrition	70–80th centile 4.4%	Severe malnutrition	<5th centile 9.7%
Severe malnutrition	<70% centile 1.7%		

admission.[1] However, this report devoted little attention to children. It is usually assumed that malnutrition is a severe problem particularly at old age,[2,3] but only limited data are available on the prevalence of malnutrition in paediatric hospital patients. This is rather surprising because malnutrition in children has particularly severe consequences for growth, development, health and well-being, both on a short- and long-term basis.[4] In developed countries, childhood malnutrition occurs mostly secondary to chronic diseases, and it may be aggravated by frequent hospital stays and diagnostic examinations.[5] We aimed at assessing the prevalence of malnutrition in a series of unselected patients admitted to a large tertiary care paediatric hospital.

Patients and methods

All patients consecutively admitted to one of two general paediatric wards or one paediatric surgery ward between October 1st and December 31st 2003 as well as between February 17th and April 1st 2004 were eligible for inclusion into the study if weight as well as length or height had been measured and documented. Upon admission, per standard of care, the nursing staff is supposed to record weight, and in infants supine length, or in children and adolescents standing height, with calibrated standard equipment (digital scales, stadiometer). In a subgroup of patients admitted between February 17th and April 1st 2004, triceps skin fold thickness (TSFT) was also measured within 48 h after admission by one author (IP).

Malnutrition was defined by the criteria established by Waterlow[6] that is 81–90% of the median of gender specific reference values of weight for height of this population[7] were considered to indicate mild malnutrition, 70–80% moderate malnutrition and values <70% were defined as severe malnutrition.[6] For comparative purposes, we also calculated the proportion of malnourished patients based on TSFT. Criteria used to define malnutrition and severe malnutrition, respectively, are TSFT values <10th or <5th centiles, respectively, of reference data based on the results of the US National Health and Nutrition Examination Survey I (NHANES I).[8]

Results

During the study period, 623 patients with available records were admitted to one of the three wards in the study.

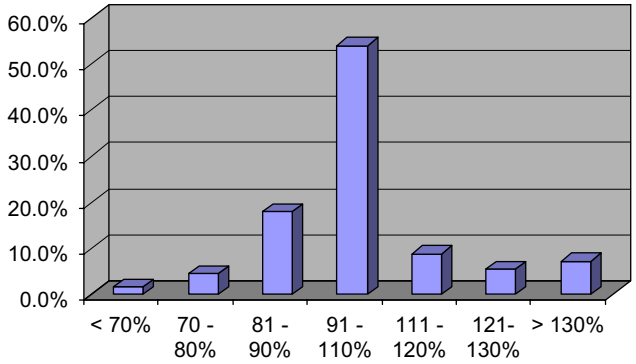

Figure 1 Distribution of weight for height (% of median values[7]) of the total study population.

Documented measurements were available for weight in 594 patients (95.3%), height or length in 476 patients (76.4%), and both weight and height/length measurements in 475 cases (76.2%) aged 7.9±5 years (mean±SD). 281 (59.2%) were male and 194 (40.8%) female.

During the six weeks when additional measurements were performed, TSFT was measured in 134 of the 233 patients admitted during this time period (57.5%). The remaining patients were not measured, either because they were missed by the person performing measurements due to absence from the ward for diagnostic or therapeutic procedures, due to a short hospital stay only, or because of fear about the use of the calliper, particularly in young children.

Based on weight for height data, 24.1% of the patients studied were malnourished, including 17.9% mildly malnourished, 4.4% moderately and 1.7% severely malnourished children (Table 1). TSFT results indicate 17.2% malnourished and 9.7% severely malnourished children.

In Figure 1 the distribution of weight for height or length, respectively, for the whole population studied is presented, demonstrating that 21.7% of the patients are above the 110th centile.

With respect to age, the highest risk for malnutrition is found in infants (28.6%; mild malnutrition 14.3%, moderate and severe malnutrition 7.1%, respectively) and in young children aged two to five years (28.1%; 23.8% mild, 4.3% moderate and 0.0% severe malnutrition) (Tables 2 and 3).

Among the different diagnoses, the greatest risk for malnutrition is found in patients with multiple diagnoses (42.8% malnourished), in children with mental retardation