Paediatric update

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Welcome to our new paediatric nutrition column 'Paediatric update'. Here, Kiran Atwal, Freelance Paediatric Dietitian, will update you on new guidance, tools and current affairs within each issue. In this column, Kiran takes a look at *'Measuring body composition of hospitalised children: why, and is it practical?'*

Why

Detecting malnutrition is important for clinical disease management in children. The mainstay of identification relies on simple anthropometry. However, measurement of body composition can offer precise analysis of fat-free mass (FFM), which has been associated with better prediction of adverse clinical outcomes.[1] Modalities include skinfold thickness (SFT), bio-electrical impedance analysis (BIA) and dual-energy x-ray absorptiometry (DEXA). Measuring body composition in hospitalised children is an age-old debate as a variety of anecdotal factors can influence its accuracy and little evidence or recommendations exist.

New evidence

In a recently published UK study, researchers explored the acceptability, practicality and validity of anthropometry (including weight, height, mid-upper arm circumference [MUAC] and body mass index [BMI]) and body composition measurements (SFT, BIA and DEXA) in hospitalised children with various complex diseases.[2]

Measurements most commonly documented in >90% of patients on admission included weight, height and MUAC. BIA and suprailiac and subscapular SFTs were least common (<70%). Biceps and triceps were more frequent sites of SFT measurement; however, this may have related to the sequence in which they were performed.

Reasons for incomplete measurements most commonly included clinical issues, such as patient condition (e.g. fluid shifts, metal implants or incapacitation) or medical procedures. Patient refusal was least common (though documented the most for SFT), and unavailability of equipment only impacted BIA and DEXA. The need to transfer patients to perform BIA and DEXA was especially a barrier for those in isolation or unable to keep a single position (e.g. cerebral palsy patients). Furthermore, the exposure to radiation was documented as a reason for refusal of DEXA, which is an important consideration for those with greater exposure risk (e.g. oncology patients).

SFT was most unfavourable as it received more negative scores compared with other techniques. Analysis predicted that an average of 17-33% of patients on admission could be uncomfortable with SFT measurements, whereas other measurements were deemed less.

The absolute difference (with 95% probability) between 2 repeated measurements of MUAC (≤0.3 cm), height (≤0.4 cm), weight (≤0.2 kg), BMI (≤0.2), triceps (≤1.1 mm), subscapular (≤0.8 mm), biceps and suprailiac (≤1.3 mm) SFTs were non-significant, demonstrating good repeatability.

There was good absolute agreement (>90%) for fat mass (FM) using SFT techniques compared with DEXA (considered the best reference). Triceps SFT had the highest level of absolute agreement. Interestingly, after further analysis suprailiac and biceps SFT almost had no association with DEXA FM. BIA had good absolute agreement for FFM with DEXA (92%).

So, what does this mean?

A range of (but not all) body composition measurements can be acceptable in most hospitalised children, contrary to popular opinion. However, the study setting was based in one centre which may differ in the level of available equipment, nursing experience, time and staffing compared to other settings.

BIA was most comparable to DEXA for assessing FFM, which is importance to clinical outcome prediction. Whereas FM alternatives to DEXA included both triceps SFT and BMI. However, any one measurement is not without limitation. The researchers highlighted that BIA estimations are based on non-specific data (limited by age/ethnicity) which may introduce bias. They also discuss caution with DEXA at high and low levels of adiposity, which has shown inaccuracies.[3] Further research is needed to guide routine implementation, which may clarify technique, benefit, harm and contraindications to each measurement.

References: **1.** Lara-Pompa NE, *et al.* (2020). Use of standardized body composition measurements and malnutrition screening tools to detect malnutrition risk and predict clinical outcomes in children with chronic conditions. Am J Clin Nutr.; 112(6): 1456-1467. **2.** Lara-Pompa NE, *et al.* (2023). Measuring body composition in pediatric patients with complex diagnoses: Acceptability, practicality, and validation of different techniques. Nutr Clin Pract.; doi.org: 10.1002/ncp.11098. **3.** Wiliams JE, *et al.* (2006). Evaluation of Lunar Prodigy dualenergy X-ray absorptiometry for assessing body composition in healthy persons and patients by comparison with the criterion 4-component model. Am J Clin Nutr.; 83(5): 1047-1054.