Improved assessment of child nutritional status using target weights and a novel, low-cost, weight-for-height slide chart

Marko Kerac MRCPCH MPH*‡**
Andrew Seal MSc PhD‡
Hannah Blencowe MRCPCH MRCGP*
James Bunn DTM&H FRCPCH†‡§

*Departments of Paediatrics; ‡Community Health, College of Medicine, Private Bag 360, Blantyre 3, Malawi; †UCL Centre for International Health and Development, Institute of Child Health, London; §Liverpool School of Tropical Medicine, Liverpool; **Valid International, UK

Correspondence to: Dr Marko Kerac, UCL Centre for International Health and Development, Institute of Child Health, 30 Guilford Street, London WC1N 1EH, UK
Email: marko.kerac@gmail.com

SUMMARY Correctly identifying malnourished or at-risk children is the critical first step towards appropriate nutritional interventions. To improve weight-for-height assessment and classification of nutritional status, we present a novel, low-cost, weight-for-height slide chart. We also describe a target weight system for monitoring children’s progress towards nutritional recovery.

Introduction

Undernutrition contributes to an unacceptably high global burden of disease. It accounts for over 50% of the 10 million deaths per year of children under five years old.1 Correctly identifying malnourished or at-risk children is the critical first step to ensuring appropriate nutritional intervention.

Current World Health Organization (WHO) guidelines for acute malnutrition recommend using either percent of median of Z-scores to compare a child’s weight-for-height (WH) or weight-for-length (WL) with a reference range for normal children.3

A Z-score is the number of standard deviations (SD) from the median of a normally distributed reference range. e.g. −1Z = 1 SD less than the reference median; +2Z = 2 SD greater than the median. Acute malnutrition defined by Z-score is:

- SAM = ≤ −3 Z and/or oedema;
- MAM = −3 < Z < −2 Z-score.

These give similar but not identical cut-offs to the percent of median system.

Objective

Our aim was to improve the assessment of children’s nutritional status using target weights and a novel, low-cost, weight-for-height MOYO slide chart.

Materials and methods

Our chart is named after the MOYO Nutrition Centre in Blantyre, Malawi, where it was developed (‘moyo’ means ‘life’ or ‘health’ in the local Chichewa language). It is:

1. Free-to-download in PDF or Excel format via the Centre for International Health and Development site [http://www.ucl.ac.uk/cihd/research/nutrition/tools]. Templates are based on Malawi’s National Guidelines for the Management of Acute Malnutrition. These are consistent with internationally accepted protocols2,6 and can thus be used in many settings without modification. In other settings where modifications are needed, this is easily done using the Excel versions of the chart. (If readers make any such adaptations, we would be grateful for an electronic copy to post on our website);
2. Simple and cheap to make;

- Materials needed: two clear A4 plastic pockets (cost ~US$ 0.15 each); six pieces of thick (grade 100 GSM) paper/card (cost ~US$ 0.05 each); staples or glue for sticking the front panels to the plastic pockets;
- Tables showing heights and weights are printed double-sided onto card, forming the sliding inserts (Figure 1). Lamination increases durability (~US$ 0.75 per
Figure 1 The MOYO chart front panel
laminate). Long edges should be trimmed by 2–3 mm for smooth sliding and a notch cut to enable the user to grip the table when it is inside the pocket. Two double-sided cards are needed to cover the entire height range from 49–130 cm;

- Four single-sided front panels are then printed (Figure 2) and windows cut out of the card to reveal height and weight cut-offs. Two front panels are then inserted into each plastic pocket facing outwards so that each pocket is double-sided. The top edge of each panel is glued/stapled to ensure that it stays fixed within the pocket;
- The sliding tables are then inserted into the plastic pockets and the MOYO WH chart is complete!

(3) Simple to use:

- Weight and height are measured according to standard anthropometric procedures.\(^7\) [It is convention to measure (standing) height in children >2 years or >85 cm and (supine) length in younger/shorter children. We use the term height in this paper, but emphasize the need to measure whichever is appropriate to child’s age. If a child is sick or uncooperative, length may be measured and converted to ‘height’ by subtracting 0.7 cm];
- Height is correctly rounded to the nearest 0.5 cm (the chart has a guide to help with this);
- The sliding table is pulled up or down to show the child’s height in the height window;
- The corresponding cut-off weights for SAM, MAM and normal appear in windows (a) and (b);
- Flow diagrams enable a correct interpretation of the WH result and indicate the appropriate referral pathways.

(4) Follow-up based on a target weight system: The nutritional cure is defined as regaining a weight within the normal range – usually over 80% depending on local context and protocols. To determine cure, many programmes measure weight and height, and calculate WH at each assessment visit. This results in multiple tasks and increased potential for error. In contrast, the MOYO chart uses a target weight system where just the weight is taken regularly. This is made possible by the fact that linear growth over the one to two months spent in a typical nutrition programme is minimal. Height can thus be measured only at the entry to programme (ideally using a WHO-recommended method to ensure high quality measurement).\(^8\) Using this baseline height, windows (b) or (c), show the corresponding target weights. The target is recorded in the patient-held child health record and nutritional recovery is monitored relative to this. Nutritional cure is achieved once the current weight exceeds the target on either one or two consecutive review visits - again, dependent on local protocols.

By eliminating the need for regular height measurement, we have found that our clinics run smoother and faster. Staff time is freed for other more important tasks.

Discussion

Commercially made slide charts are used in developed countries in many settings to help with fast and accurate data interpretation from potentially complex tables. We found the MOYO chart of great value for assessing nutrition in a developing country and hope that it will become a standard part of nutrition toolkits elsewhere. It is especially timely given some important recent developments in nutrition:

- International rollout of the Community-based Management of Acute Malnutrition (CMAM) programmes.\(^9\) CMAM success is dependent on high programme coverage. Quick, easy protocols and procedures are critical in order to achieve this goal. The MOYO chart fits well within the ethos of simplifying complex tasks;
Transition to the new WHO growth standards: New child growth standards have recently been released by WHO. Though there are some important differences from the old National Center for Health Statistics (NCHS), the new standards are likely to become increasingly common. The MOYO chart can help facilitate transition. All one needs to do is insert a new set of slide cards, using weight values derived from the new standards;

Other uses: The nutrition world is notorious for using multiple indicators of nutritional status (e.g. weight-for-age; height-for-age; body mass index-for-age; mid upper arm circumference for age). Similar slide charts can easily be made to help with these, or indeed any other tasks requiring look-up tables (e.g. calculating drug doses according to body weight; calculating lung capacity according to patient age or height; calculating ages from dates of birth).

We hope that there will be many incarnations of our basic design.

References