

Finding the best criteria to identify children at high risk of mortality

This article is a summary of the following paper:

Khara T, Myatt M, Sadler K, Bahwere P, Berkeley J, Black R (TBC) *Anthropometric criteria for best identifying children at high risk of mortality: A pooled analysis of 12 cohorts [submitted for publication]*.

Background

Previously published research has highlighted that being concurrently wasted and stunted (WaSt), even at moderate levels, is associated with considerable excess mortality in children comparable to that associated with severe wasting (McDonald et al, 2013). Given this high level of mortality risk, the question has been raised as to whether these children should be included in therapeutic feeding services if they are not already reached, as well as how these children might be identified at the community level for treatment.

To explore these questions and to understand how anthropometry can be used to identify children with WaSt who have a high risk of mortality, an analysis of data from a community-based cohort study in untreated children in Senegal in 1983-84 was conducted and published by ENN, with the Wasting and Stunting Technical Interest Group (WaSt TiG), in 2018. This analysis suggested that two anthropometric measures commonly used at community level – weight-for-age z-score (WAZ) and mid-upper arm circumference (MUAC) – were independently associated with near-term mortality and that if severely low MUAC (<115 mm) was used in combination with WAZ <-2.8, all deaths associated with severe wasting (weight-for-height z-score (WHZ) <-3) and with WaSt could be predicted in the studied context (Myatt et al, 2018). The paper concluded that many of these deaths could likely be avoided if those cases were included for treatment in community-based management of acute malnutrition programmes and suggested that therapeutic treatment may achieve a higher impact on averting mortality if a combination of WAZ and MUAC admission criteria was to be used (in addition to the presence of nutritional oedema). However, implications related to increased caseloads were noted.

Recognising that the results of a single study were unlikely to be valid across all contexts, this follow-on paper aims to expand the same analysis to 12 similar mortality cohorts of largely untreated children, captured when treatment options were not available. It reviews anthropometric criteria for the identification of children at elevated mortality risk across several parameters and explores the potential programmatic implications of applying the most appropriate criteria in therapeutic treatment programmes.

Methods

Data from 12 cohort study datasets from 12 different low-income countries, which included data on children aged 6-59 months collected between 1977 and 2013, was analysed. The original studies were all large prospective cohort studies or follow-up studies within randomized trials examining various health and nutrition interventions and

outcomes in Africa, the Americas, Asia, and the Pacific. The outcome of interest for this analysis was near-term mortality, defined as death within six months of anthropometric assessment.

Ten anthropometric case definitions were proposed for analysis with each evaluated against multiple evaluation criteria for its suitability for use in identifying the most at-risk children for entry into therapeutic feeding programmes. The ability of each case definition to predict mortality within six months of anthropometric assessment was assessed. Analysis was performed separately for all children, children aged 6-23 months and those aged 24-49 months. Evaluation criteria included sensitivity (ability to detect deaths), specificity (ability to exclude those who do not go on to die), informedness (the probability of an informed decision being made as opposed to a random guess), face validity (the extent to which the definition appears to measure what it is intended to measure), inclusivity (the possibility of identifying all, or nearly all, children with severe anthropometric deficits who are likely to die within six months of measurement), and compatibility/ practicability (the degree to which a case definition is compatible with current practices, tools, and case-defining thresholds). The operational consequences of the findings were modelled by exploring the effects on programme caseload and workload for health staff.

Results

Of the 10 anthropometric case definitions analysed, three measures, namely MUAC<115mm, WAZ<-3 and MUAC<125mm, had the highest level of informedness in predicting mortality. A combined case definition (i.e., MUAC <115mm or WAZ <-3) was better at predicting deaths associated with WHZ<-3 and WaSt than a single WAZ<-3 definition. When assessing all criteria, it appeared that WAZ<-3 and MUAC<115mm, or WAZ<-3, performed best, also meeting, for example, criteria of compatibility/ practicability (particularly as MUAC and WAZ are both measures commonly used at community level), and face validity. It was found that the simulated caseload for programmes admitting on MUAC <125mm was 5.23 (95% CI = 2.76, 25.99) times larger than programmes admitting on MUAC <115mm and 3.01 (95% CI = 1.48, 15.33) times larger if admissions were based on MUAC<115mm or WAZ<-3.

When different levels of risk within the subgroups of children identified was calculated and used to stratify the group into varying intensities and durations of treatment, it was found that the simulated workload for programmes admitting on MUAC <115mm or WAZ<03 was 1.87 (95% CI=1.03, 14.17) times larger than programmes admitting on MUAC <115mm alone.

Discussion

This analysis of 12 cohorts concurs with the findings from the 2018 Senegal analysis, concluding that a combined case definition of MUAC<115mm or WAZ <-3 performs best against all evaluation criteria and can predict nearly all deaths associated with severe anthropometric deficits (including WHZ<-3 and WaSt). Weight-for-age measures are used in many countries within several community-based child health and nutrition interventions, such as growth monitoring programmes and integrated management of childhood illnesses interventions. Thus, a case definition of WAZ <-3 could potentially be used within these established platforms for the identification of children at a high-risk of mortality requiring nutritional treatment. Furthermore, given that the combined case definition can detect all near-term deaths associated with WHZ<-3, the authors suggest that its use could remove the need for the current facility-based WHZ admission criterion by already including the most at-risk children in that group. This study illustrates that the use of the combined case definition would mean an increase in programmatic caseloads. However, the findings suggest that different levels of treatment intensity may be appropriate for some of the children identified. Further operational research is required to determine the appropriate treatment intensity levels.

A strength of the findings of this study is that it is based on the analysis of many datasets of untreated children in different contexts. However, there are several limitations including a potential bias introduced by loss to follow-up masking deaths within the cohorts, as well as the possible bias introduced by the absence of data on oedema.

Conclusion

A combined case definition (MUAC<115mm or WAZ<-3) has the ability to detect all, or nearly all, deaths associated with severe anthropometric deficits. The use of such definitions in existing community-level platforms suggests that therapeutic feeding programmes may achieve higher impact with this case definition. However, there remain questions related to the intensity of treatment required and also operational considerations that require further discussion.

References

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