Diagnostic performance of visible severe wasting for identifying severe acute malnutrition in children admitted to hospital in Kenya
Polycarp Mogeni, Hemed Twahir, Victor Bandika, Laura Mwalekwa, Johnstone Thitiri, Moses Ngari, Christopher Toromo, Kathryn Maitland & James A Berkleya

Objective To determine the diagnostic value of visible severe wasting in identifying severe acute malnutrition at two public hospitals in Kenya.

Methods This was a cross-sectional study of children aged 6 to 59.9 months admitted to one rural and one urban hospital. On admission, mid-upper arm circumference (MUAC), weight and height were measured and the presence of visible severe wasting was assessed. The diagnostic performance of visible severe wasting was evaluated against anthropometric criteria.

Findings Of 11 166 children admitted, 563 (5%) had kwashiorkor and 1406 (12.5%) were severely wasted (MUAC < 11.5 cm). The combined sensitivity and specificity of visible severe wasting at the two hospitals, as assessed against a MUAC < 11.5 cm, were 54% (95% confidence interval, CI: 51–56) and 96% (95% CI: 96–97), respectively; at one hospital, its sensitivity and specificity against a weight-for-height z-score below −3 were 44.7% (95% CI: 42–48) and 96.5% (95% CI: 96–97), respectively. Severely wasted children who were correctly identified by visible severe wasting were consistently older, more severely wasted, more often having kwashiorkor, more often positive to the human immunodeficiency virus, ill for a longer period and at greater risk of death. Visible severe wasting had lower sensitivity for determining the risk of death than the anthropometric measures. There was no evidence to support measuring both MUAC and weight-for-height z-score.

Conclusion Visible severe wasting failed to detect approximately half of the children admitted to hospital with severe acute malnutrition diagnosed anthropometrically. Routine screening by MUAC is quick, simple and inexpensive and should be part of the standard assessment of all paediatric hospital admissions in the study setting.

Introduction
Complicated severe acute malnutrition is a life-threatening condition requiring urgent, specialized treatment. The World Health Organization (WHO) defines severe acute malnutrition as a mid-upper arm circumference (MUAC) < 11.5 cm, a weight-for-height z-score (WHZ) below −3, or the presence of bilateral pedal oedema in children with kwashiorkor. In the absence of anthropometric assessment, severe acute malnutrition can also be diagnosed by assessing children for visible severe wasting, defined as the presence of muscle wasting in the gluteal region, loss of subcutaneous fat, or prominence of bony structures, particularly over the thorax. Severe acute malnutrition differs from chronic malnutrition, which manifests as stunting. Early recognition of severe acute malnutrition among sick children is important because standard management protocols may reduce mortality. MUAC is often used for community screening in therapeutic feeding programmes, and MUAC and/or WHZ are commonly used to assess the need for admission to therapeutic feeding programmes. However, in many hospitals in sub-Saharan Africa weight is the only systematically measured anthropometric index. Consequently, in practice, the diagnosis of severe acute malnutrition among children upon admission to hospital often depends on clinical recognition.

Few studies have examined the performance of visible severe wasting in identifying children with severe acute malnutrition. Bern et al. observed that visible severe wasting identified a group of children with a very high short-term mortality risk and that it was as strongly associated with mortality as a low WHZ (i.e. below −3 by National Center for Health Statistics growth reference standards). The sensitivity of visible severe wasting for detecting children with severe wasting diagnosed anthropometrically in a practical setting was 56% when assessed by Gambian nurses and 67% when assessed by Ethiopian health workers immediately following training.

The aim of this study is to evaluate the diagnostic value of visible severe wasting for diagnosing severe acute malnutrition, as defined by MUAC and WHZ using WHO growth reference standards, in children admitted to one rural and one urban public hospital in Kenya.

Methods
Location
The study was conducted at two hospitals on the Kenyan coast that were chosen to reflect urban and rural settings. Coast Provincial General Hospital in Mombasa is the largest provincial public hospital in Kenya, with 113 paediatric beds. The hospital, together with three smaller district hospitals, serves approximately 1 million people living in the urban and periurban areas of greater Mombasa, which includes several informal settlements, and it also receives provincial referrals. Inpatient care is provided by medical officers, and by medical officer and clinical officer interns under the supervision of two consultant paediatricians.

Kilifi District Hospital, located in a rural area about 60 km north of Mombasa, has 89 paediatric beds or cots. The hospital serves about 240 000 people, mainly farmers. A Kenya Medical Research Institute (KEMRI) centre and the KEMRI/Wellcome Trust Research Programme, which are based at this hospital, conduct research on severe childhood illness

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and malnutrition. Full-time research clinicians provide inpatient paediatric medical care, including care in a high-dependency unit. The long-term presence of the research programme at Kilifi District Hospital ensures the availability of additional resources, including a comprehensive microbiology laboratory, the capability to measure blood gases and other biochemical parameters, increased medical and nursing staff, and support for making available essential drugs and other clinical supplies.

Both hospitals used the treatment approach recommended in current WHO guidelines, including standardized antimicrobials, fluids, electrolytes, micronutrients and therapeutic feeding. Children with complicated severe acute malnutrition were provided with care at each hospital in a distinct area that has a nutritionist and a kitchen dedicated to preparing therapeutic milks (Formula 75 and Formula 100). The two hospitals also have outpatient therapeutic and supplementary feeding programmes for children with uncomplicated malnutrition and refer complicated cases to the paediatric wards.

Training and data collection

After obtaining approval from the Kenyan National Ethical and Review Committee, we collected data during the screening of all children admitted for participation in a clinical trial at Coast Provincial General Hospital and during screening for long-term surveillance of severe malnutrition at Kilifi District Hospital.

At Coast Provincial General Hospital, government-employed medical and clinical officers and interns usually in charge of admitting children were trained to measure MUAC using insertion tapes (TALC, St Albans, England), to identify visible severe wasting and to manage severe acute malnutrition. The training, repeated approximately every three months as interns rotated through the department, included background information on the anthropometric methods involved and practical sessions (which were assessed). For every patient admitted, these measures and other clinical findings were recorded on a standardized admission clerking sheet (the paediatric admission record) and entered into a database. Prior to this screening, severe acute malnutrition was diagnosed by clinical impression, and height was only measured among children admitted to the malnutrition ward.

At Kilifi District Hospital, trained research fieldworkers performed anthropometric measurements, including MUAC using insertion tapes, weight using a SECA 877 scale (Seca United Kingdom, Birmingham, England) and length or height using measuring boards of standard design as recommended by the United Nations Children’s Fund. Trained, full-time research clinicians who normally provided clinical care performed clinical assessments and recorded their results, including the presence or absence of visible severe wasting and signs of kwashiorkor. Clinical signs were defined according to the WHO pocket book of inpatient care for children in resource-poor settings. Human immunodeficiency virus (HIV) serostatus was determined from the results of rapid antibody tests undertaken on the wards as part of clinical care at both hospitals, as recommended by national guidelines.

Statistical analysis

We examined data for all children ranging in age from 6 to 59.9 months admitted to Coast Provincial General Hospital between 1 June 2009 and 31 May 2010 and to Kilifi District Hospital between 1 January 2007 and 31 December 2009. WHZ was calculated in accordance with WHO reference standards. To assess the performance of visible severe wasting for diagnosing severe acute malnutrition, we included in the analysis only children who had fully documented results for the presence or absence of visible severe wasting and MUAC. We calculated that a minimum sample size of 500 children anthropometrically diagnosed with severe wasting would allow sensitivities of between 40% and 90% to be described to within 5%.

Using MUAC and WHZ as gold standards, we first estimated the sensitivity, specificity, positive predictive value and negative predictive value of visible severe wasting. We also estimated the sensitivity and specificity for predicting inpatient death of visible severe wasting, MUAC < 11.5 cm, WHZ below −3, and of the combination criterion comprised by either a MUAC < 11.5 cm or a WHZ below −3. To compare the demographic and clinical characteristics of children with anthropometrically defined severe acute malnutrition (MUAC < 11.5 cm or WHZ below −3) who did and did not have visible severe wasting, we used the χ² test for proportions. For age, duration of illness and MUAC, which were not normally distributed, we used the Kruskal–Wallis rank test, a non-parametric method. To make the main results generalizable, we identified the clinical findings that showed a consistent association (i.e. those found at the two hospitals and for both anthropometric measures). All analyses were done using Stata version 11.0 (StataCorp LP, College Station, Unites States of America). Significance was set at P < 0.05.

Results

At Coast Provincial General Hospital, 4075 children aged 6 to 59.9 months were admitted during the one-year study period. Data on MUAC or visible severe wasting were missing for 122 children (3.0%), who were therefore excluded, leaving in the analysis 3953 children, 56% of them male, with a median age of 13 months (interquartile range, IQR: 9 to 24).

At Kilifi District Hospital, 7624 children aged 6 to 59.9 months were admitted during the two-year study period. Data on MUAC or visible severe wasting were missing in 411 (5.4%) children, leaving in the main analysis 7213 children, 56% of them male, with a median age of 19.4 months (IQR: 11.6 to 31.9).

At Coast Provincial General Hospital, the median MUAC was 13.4 cm (IQR: 12.2 to 14.7) and 171 children (4.3%) had kwashiorkor. Overall, 327 of 3953 children (8.3%) died in hospital (Table 1). At Kilifi District Hospital, the median MUAC and WHZ were 13.7 cm (IQR: 12.5 to 14.7) and −1.3 (IQR: −2.3 to −0.4), respectively, and 392 children (5.6%) had kwashiorkor. Overall, 192 of 7213 children (2.7%) died in Kilifi District Hospital (Table 1).

Severe wasting as defined by MUAC was more common among children admitted to Coast Provincial General Hospital than among those admitted to Kilifi District Hospital (Table 1). At Coast Provincial General Hospital, 103 of 327 deaths (31%) and, at Kilifi District Hospital, 117 of 192 deaths (61%) were associated with severe wasting as diagnosed by MUAC (Table 1). In both hospitals the highest case fatalities were reported among the most severely wasted children. The largest differences in the proportions of children that died between the two hospitals were found among the least wasted children.
The sensitivity and specificity of visible severe wasting for MUAC < 11.5 cm based on the combined results from the two hospitals were 54% (95% CI: 51–56) and 96% (95% CI: 96–97), respectively. The sensitivity and specificity of visible severe wasting when assessed against a WHZ below –3 (Kilifi District Hospital only) were 44.7% (95% CI: 42–48) and 96.5% (95% CI: 96–97), respectively (Table 2).

The sensitivity and specificity for predicting inpatient death at Kilifi District Hospital were 41% (95% CI: 34–48) and 91% (95% CI: 90–92), respectively, for visible severe wasting; 48% (95% CI: 41–55) and 90% (95% CI: 89–91), respectively, for MUAC < 11.5 cm; and 53% (95% CI: 46–60) and 86% (95% CI: 85–87), respectively, for a WHZ below –3.

The combination criterion of either a MUAC < 11.5 cm or a WHZ below –3 had a sensitivity for detecting inpatient death of 60% (95% CI: 53–67), which was the highest, but a specificity of 83% (95% CI: 82–84), which was the lowest. A MUAC < 11.9 cm showed the same specificity for predicting death (83%) but higher sensitivity (64%; 95% CI: 56–71).

The demographic and clinical characteristics of children with severe wasting as diagnosed by MUAC (in both hospitals) and by WHZ (in Kilifi District Hospital only), with and without visible severe wasting, are shown in Table 3. Most severely wasted children diagnosed by MUAC had a history of febrile illness, one third had signs of severe pneumonia, more than half had diarrhea and more than one third had signs of dehydration. In both hospitals, severely wasted children who were correctly identified by visible severe wasting were consistently older, more severely wasted, more often having kwasihiorok, more often positive for HIV antibodies and ill for a longer period at presentation. Among children who were severely wasted as defined by anthropometric parameters, those with visible severe wasting died in hospital more frequently than those without it. The combined sensitivity at the two hospitals of visible severe wasting as assessed against a MUAC < 11.5 cm was 39% (95% CI: 35–42) among children aged < 12 months and 66% (95% CI: 63–70) among children aged 12 months or more.

Table 1. Number of children aged 6 to 59.9 months admitted to two public hospitals in Kenya and proportion of deaths, by mid-upper arm circumference (MUAC), 2007–2010

<table>
<thead>
<tr>
<th>MUAC (cm)</th>
<th>CPGH</th>
<th>KDH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Admissions No. (%)</td>
<td>Deaths No. (%)</td>
</tr>
<tr>
<td>&lt; 11.5 (severely acute malnutrition)</td>
<td>604 (15.3)</td>
<td>103 (17.1)</td>
</tr>
<tr>
<td>11.5 to 12.4 (moderately acute malnutrition)</td>
<td>658 (16.7)</td>
<td>77 (11.7)</td>
</tr>
<tr>
<td>12.5 to 13.4 (at risk of acute malnutrition)</td>
<td>750 (19.0)</td>
<td>47 (6.3)</td>
</tr>
<tr>
<td>≥ 13.5 (not acutely malnourished)</td>
<td>1941 (49.1)</td>
<td>100 (5.2)</td>
</tr>
<tr>
<td>Total</td>
<td>3953 (100)</td>
<td>327 (8.3)</td>
</tr>
</tbody>
</table>

CPGH, Coast Provincial General Hospital; KDH, Kilifi District Hospital.

Table 2. Diagnostic performance of visible severe wasting against anthropometric diagnosis of severe wasting among children aged 6 to 59.9 months admitted to two public hospitals in Kenya, 2007–2010

<table>
<thead>
<tr>
<th>Parameter</th>
<th>CPGH</th>
<th>KDH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MUAC &lt; 11.5 cm</td>
<td>WHZ below –3</td>
</tr>
<tr>
<td></td>
<td>n = 3953</td>
<td>n = 7213</td>
</tr>
<tr>
<td></td>
<td>n = 6720</td>
<td></td>
</tr>
<tr>
<td>Sensitivity, % (95% CI)</td>
<td>47.2 (43.2–51.2)</td>
<td>58.7 (55.3–62.1)</td>
</tr>
<tr>
<td>Specificity, % (95% CI)</td>
<td>97.0 (96.3–97.5)</td>
<td>96.1 (95.6–96.5)</td>
</tr>
<tr>
<td>PPV, % (95% CI)</td>
<td>73.6 (69.0–77.8)</td>
<td>65.2 (61.7–68.6)</td>
</tr>
<tr>
<td>NPV, % (95% CI)</td>
<td>91.1 (90.1–92.0)</td>
<td>94.9 (94.3–95.4)</td>
</tr>
</tbody>
</table>

CI, confidence interval; CPGH, Coast Provincial General Hospital; KDH, Kilifi District Hospital; MUAC, mid-upper arm circumference; NPV, negative predictive value; PPV, positive predictive value; WHZ, weight-for-height z score.

The sensitivity and specificity of visible severe wasting as a parameter for detecting children with severe acute malnutrition (SAM) was based on inferring severe wasting from other clinical signs, such as poor feeding, history of diarrhea, and fever. However, SAM was not detected in a substantial proportion of children with severe acute malnutrition.

Discussion

Visible severe wasting failed to detect approximately half of the children with severe wasting diagnosed anthropometrically who were admitted to two Kenyan hospitals. Thus, if anthropometric screening is not routinely performed on admission, sick severely malnourished children may not receive the immediate specialized care they require, including oral glucose or early feeding, empiric antimicrobials, appropriate correction of fluid and electrolyte disturbances, therapeutic feeding and closer observation. Visible severe wasting consistently identified older children with severe acute malnutrition; MUAC and WHZ, on the other hand, consistently identified younger children with severe wasting.14 This suggests that the diagnostic performance of visible severe wasting is age-dependent. The specificity of visible severe wasting for the detection of children with anthropometrically defined wasting was high, but its sensitivity was low, particularly among infants. Visible severe wasting made it possible to detect the most severely wasted children (i.e. those who had, on average, a WHZ below −4).

Among children who had severe wasting by anthropometric criteria, those with visible severe wasting were at higher risk of death than those without. However, visible severe wasting was not useful in detecting many others at substantial risk of dying, as its sensitivity for predicting inpatient death was lower than that of the anthropometric criteria. Therefore, our results do not support the view that visible severe wasting is effective for identifying children with severe acute malnutrition.14 Such a view is largely founded on the results of studies focused on visible severe wasting as a parameter for detecting children
Table 3. Demographic and clinical characteristics of children aged 6 to 59.9 months with anthropometrically diagnosed severe acute malnutrition\(^a\), with and without visible severe wasting (VSW), admitted to two public hospitals in Kenya, 2007–2010

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>CPGH (n=432)</th>
<th>KDH (n=331)</th>
<th>P</th>
<th>CPGH (n=319)</th>
<th>KDH (n=471)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age, median (IQR)</strong></td>
<td>9.0 (7.0 to 13)</td>
<td>12 (9.0 to 17)</td>
<td>&lt;0.001</td>
<td>11 (8.0 to 16)</td>
<td>18 (11 to 25)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Male, No. (%)</td>
<td>149 (47)</td>
<td>140 (49)</td>
<td>0.58</td>
<td>179 (54)</td>
<td>232 (50)</td>
<td>0.18</td>
</tr>
<tr>
<td><strong>Duration of illness (days), median (IQR)</strong></td>
<td>3 (3 to 7)</td>
<td>4.5 (3 to 10)</td>
<td>0.003</td>
<td>3 (2 to 7)</td>
<td>4 (3 to 7)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>History of fever, No. (%)</td>
<td>285 (89)</td>
<td>226 (79)</td>
<td>0.001</td>
<td>262 (79)</td>
<td>341 (72)</td>
<td>0.03</td>
</tr>
<tr>
<td>History of cough or difficulty breathing, No. (%)</td>
<td>243 (76)</td>
<td>210 (74)</td>
<td>0.48</td>
<td>206 (62)</td>
<td>329 (70)</td>
<td>0.02</td>
</tr>
<tr>
<td>History of diarrhoea, No. (%)</td>
<td>172 (54)</td>
<td>170 (60)</td>
<td>0.16</td>
<td>164 (50)</td>
<td>233 (50)</td>
<td>0.98</td>
</tr>
<tr>
<td>Deep acidotic breathing, No. (%)</td>
<td>17 (5.3)</td>
<td>11 (3.9)</td>
<td>0.39</td>
<td>47 (14)</td>
<td>45 (9.6)</td>
<td>0.04</td>
</tr>
<tr>
<td>Lower chest wall indrawing, No. (%)</td>
<td>136 (42)</td>
<td>105 (37)</td>
<td>0.16</td>
<td>103 (31)</td>
<td>135 (29)</td>
<td>0.34</td>
</tr>
<tr>
<td>Sunken eyes, No. (%)</td>
<td>118 (37)</td>
<td>147 (52)</td>
<td>&lt;0.001</td>
<td>94 (29)</td>
<td>115 (25)</td>
<td>0.20</td>
</tr>
<tr>
<td>Skin pinch &gt; 2 seconds, No. (%)</td>
<td>42 (13)</td>
<td>96 (34)</td>
<td>&lt;0.001</td>
<td>4 (1.3)</td>
<td>128 (27)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Weak pulse, No. (%)</td>
<td>39 (13)</td>
<td>58 (21)</td>
<td>&lt;0.001</td>
<td>48 (15)</td>
<td>44 (9.7)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>MUAC, mean (95% CI)</strong></td>
<td>10.6 (10.5 to 10.7)</td>
<td>9.9 (9.7 to 10.1)</td>
<td>&lt;0.001</td>
<td>10.6 (10.5 to 10.7)</td>
<td>9.9 (9.7 to 10.1)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>WHZ, mean (95% CI)</strong></td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

*Defined as a MUAC < 11.5 cm or a WHZ below −3.

**Diagnosing severe acute malnutrition in Kenya**

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The greatest difference in the number of deaths between the two hospitals was found in children who were not severely malnourished. This may be attributable to the following factors at Kilifi District Hospital: (i) less severe disease in admitted children; (ii) better staffing owing to the presence of a research facility; (iii) less frequent turnover of first-line clinicians; (iv) the availability of tests such as blood gas analysis and microbiological culture, and (v) ensured supplies of drugs and fluids. The finding that more severely wasted children in both hospitals died at similar rates is somewhat surprising because at Kilifi District Hospital the factors just mentioned allowed for more rigorous application there of the WHO guidelines for the management of severe malnutrition. These factors, especially retention of trained staff, ensured the provision of overnight feeds, the availability of care in a high-dependency unit when required, closer observation of children by nurses, and the availability of high-quality laboratory facilities. This finding suggests that some aspects of the current guidelines may need re-evaluation to reduce mortality.\(^{15}\)

Because both MUAC and WHZ are used by some therapeutic feeding programmes to determine if a child should be admitted, we examined the performance of the two used together and individually. Although using either a MUAC < 11.5 cm or a WHZ below –3 resulted in the highest sensitivity for predicting death, specificity was markedly reduced. The MUAC cut-off value having the same specificity for predicting death as a combination criterion of either MUAC < 11.5 cm or WHZ below –3 yielded a greater sensitivity. These findings concur with those of a recent secondary analysis of the risk of dying in a community-based data set in rural Senegal\(^{16}\) and provide further evidence from a different setting that measuring both WHZ and MUAC does not result in improved identification of undernourished children at high risk of dying. Measurement of MUAC only could therefore replace the use of both at higher risk of death, rather than on diagnostic performance.
Conclusion

At a busy urban hospital and at a rural district hospital with a focus on research, visible severe wasting failed to result in the detection of approximately half of the children admitted with anthropometrically defined severe wasting, and this poor performance was particularly evident in younger children. Measuring MUAC is inexpensive and quick and training is straightforward, rendering the use of visible severe wasting unnecessary. Measuring MUAC and assessing children for the presence of kwashiorkor are more reliable and much more straightforward than measuring weight and height, then having to look up z scores on a reference table. Thus, MUAC should be routinely measured as part of the clinical assessment of all children admitted to hospitals in sub-Saharan Africa. Further research should be conducted to develop a stronger evidence base for diagnosing and managing severe acute malnutrition, especially in children outside the age range included in this study.

Acknowledgements

We are grateful to the children admitted to the paediatric wards at Coast Provincial General Hospital and Kilifi District Hospital, to their parents or caregivers and to the clinical staff.

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Competing interests: None declared.

MUAC and WHZ, depending on the MUAC cut-off value chosen.

This study has several limitations. HIV antibody testing results were not available for 60% of admissions to Coast Provincial General Hospital, and this could have introduced bias. However, the association between positivity to HIV and visible severe wasting found at that hospital was consistent with the association found at Kilifi District Hospital, where HIV testing was complete. We therefore doubt that bias had much effect on the overall findings. The proportion who died among the small proportion of admissions with missing data was 38% at Coast Provincial General Hospital and 12% at Kilifi District Hospital, and this could also have introduced bias. It also points to the difficulty of obtaining anthropometric measurements in children in extremis.
Resumen

Diagnóstica la emaciación grave visible en niños ingresados en hospitales de Kenia

Objetivo Determinar el valor diagnóstico de la emaciación grave visible en la identificación de la malnutrición aguda grave en dos hospitales públicos en Kenia.

Métodos Se realizó un estudio transversal de niños de entre 6 y 59,9 meses ingresados en un hospital rural y en un hospital urbano. En el ingreso, se midieron la circunferencia de la parte superior del brazo (MUAC, por sus siglas en inglés), el peso y la estatura. Asimismo, se evaluó la presencia de emaciación grave visible. Se evaluó el desempeño diagnóstico de la emaciación grave visible frente a criterios antropométricos.

Resultados Entre los 11 166 niños hospitalizados, 563 (5%) eran niños con malnutrición agravada, de los cuales 54% (95% CI: 51-56) tenían una MUAC < 11,5 cm. La sensibilidad y la especificidad asociadas de la emaciación grave visible y visible fueron comparadas con los criterios antropométricos. Las razones diagnósticas de la emaciación grave visible y visible fueron evaluadas en los dos hospitales comparados con un MUAC < 11,5 cm eran de 54% (intervalo de confianza de 95%, IC: 51-56) y de 96% (IC de 95%: 96-97), respectivamente. En el uno de los hospitales, su sensibilidad y su especificidad por un valor Z de los /muayta fueron inferiores a -3 eran de 44,7% (IC de 95%: 42-48) y de 96,5% (IC de 95%: 96-97), respectivamente. Los niños con un valor diagnóstico de la emaciación grave visible y visible eran diagnosticados con un valor Z de los /muayta subsecuentes en inmediato al causar un diagnóstico de multimodal, y y de 96,5% (IC de 95%: 96-97). Niños con valor diagnóstico de la emaciación grave visible, cuyo valor diagnóstico se definió como diagnóstico en los niños mayores y en los niños menores o menores con una media de edad de entre 6 y 59,9 meses, se evaluaron para el diagnóstico de la emaciación grave visible. Se evaluó la presencia de la emaciación grave visible. Se evaluó el desempeño diagnóstico de la emaciación grave visible frente a criterios antropométricos.
Resultados

De 11 166 niños ingresados, 563 (5%) padecían kwashiorkor y 1406 (12,5%) presentaban emaciación grave (MUAC < 11,5 cm). La sensibilidad y especificidad de emaciación grave combinadas en los dos hospitales, evaluados frente a un MUAC < 11,5 cm, fueron del 54% (95% de intervalo de confianza: IC: 51-56) y 96% (95% IC: 96-97), respectivamente; en un hospital, su sensibilidad y especificidad frente a un peso para la estatura de puntuación Z, inferior a −3, fueron del 44,7% (95% IC: 42-48) y 96,5% (95% IC: 96-97), respectivamente. Los niños con emaciación grave identificados correctamente por la emaciación grave visible eran constantemente mayores, con una emaciación más grave, padeciendo con mayor frecuencia kwashiorkor, con mayor frecuencia eran más positivos al virus de inmunodeficiencia humana, enfermos por un periodo más largo de tiempo y con un mayor riesgo de muerte. La emaciación grave visible presentó una sensibilidad menor para la determinación del riesgo de muerte que las medidas antropométricas. No se encontraron evidencias para apoyar la medición tanto de MUAC como de peso por estatura de puntuación Z.

Conclusión

Se falló en la detección de la emaciación grave visible en, aproximadamente, la mitad de los niños ingresados en el hospital con un diagnóstico antropométrico de desnutrición aguda. La evaluación rutinaria por MUAC es rápida, simple y económica y debería formar parte de la evaluación estándar de todos los ingresos pediátricos en el centro de estudio.

References


