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Abstract

Background: Identification of children at risk of malnutrition is not easily achieved in hospital settings.

Aims: To assess the merits of using the Screening Tool for Risk on Nutritional status and Growth (STRONG kids) as a nutrition screening tool in hospitalized children aged

Methods: This cross-sectional study was conducted on 500 children aged

Results: According to STRONGkids score, 19.6% of patients were low risk, 42.6% were moderate risk and 37.8% were high risk. Out of the enrolled patients, 62.4% were underweight, 58.4% were stunted and 57.8% were wasted. Among the 66 patients with severe wasting, nutritional status improved in 6.06% while deterioration was observed in 13.0% of the moderately wasted patients. STRONGkids score was worse among those who deteriorated, which together with its significant positive correlation with the duration of hospital stay, emphasized that STRONGkids score can be a predictive tool.

Conclusions: The use of STRONGkids screening tool can ensure early identification of children vulnerable to malnutrition, ensuring prompt interventions that may contribute to overall improvements in patient care, as well as shortening hospitalization period.

Keywords: malnutrition, screening, underweight, paediatrics, hospital.

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Introduction

Malnutrition in hospitalized children is an important pathological condition and a risk factor for unfavourable outcomes, prolonged hospital stay, delayed recovery and increased care costs. Reduction of dietary intake and increased energy requirements are the main causes of hospital undernutrition (1). The reported prevalence of acute malnutrition in infants and children admitted to hospitals from different countries ranges from 6.1 to 40.9% (2). In children with an underlying disease, higher prevalence of chronic malnutrition (44–64%) was reported in several studies (3).

To prevent hospital-acquired malnutrition, the risk of nutritional depletion needs to be identified as soon as possible, ideally at admission, so that appropriate nutritional intervention can be initiated at an early stage (4). Routine nutritional screening is rarely carried out in paediatric patients because of the lack of a simple and properly validated nutritional screening tool. The current practice of identifying children at risk of malnutrition is reliant on interpretation of anthropometric data and clinical judgement; the reliability of which is dependent on nutritional knowledge of paediatricians (5). Severe cases of malnutrition are easily recognized; however, the identification of children with lesser degrees of malnutrition or at risk of malnutrition, which is also important, is not as easily achieved. Reports of malnutrition prevalence among hospitalized Egyptian infants and children are lacking.

This study was thus designed to assess the merits of using the Screening Tool for Risk on Nutritional status and Growth (STRONGkids) as a nutrition screening tool in hospitalized Egyptian children aged

Methods

This cross-sectional study was conducted on 500 newly hospitalized children recruited from the Children's Hospital, Ain Shams University, Cairo, Egypt, between 1 January and 31 July 2015. There were 297 boys (59.4%) and 203 girls (40.6%). Their mean age was 13.73 [standard deviation (SD) 10.68] months with a range of 1–36 months; 315 patients (63%) were ≤ 12 months old and 185 (37%) were > 12 months old. The mean hospital stay was 6.62 (3.85) days with a range of 2–14 days. They were classified, as surgical or nonsurgical patients and underlying diseases were explored clinically and using laboratory and imaging assessment methods.

For all enrolled children aged

Anthropometric measurements were estimated by 2 trained investigators (Y. El-Gendy and B. El-Shaer). Height was measured to the nearest 0.1 cm with a portable stadiometer (Marsden, Rotherham, UK) with children standing bare foot, and recumbent length was measured by an infantometer (Model 416; Seca, Hamburg, Germany). Body weight was recorded to the nearest 0.1 kg using a calibrated baby scale (Model 834; Seca, Germany), with the patients' wearing only underpants or a clean diaper. Triceps skinfold thickness was measured vertically over the left triceps muscle midway between the acromion and olecranon process using a triceps skinfold caliper (Beta Technology Inc., Houston, TX, USA). Mid arm circumference was measured to the nearest centimetre using a nonstretchable tape (Butterfly, China), with the left arm hanging and relaxed in a sitting or lying position, midway between the tip of the acromion and the olecranon process.

Children with malnutrition were divided according to the World Health Organization (WHO) Global Database on Child Growth and Malnutrition, which uses a Z-score cutoff point of

IBM SPSS version 20 was used for data analysis. Descriptive statistics were generated and numbers and percentages were used. Multivariate logistic regression analysis was performed for predictors of higher STRONGkids score. Correlation studies were demonstrated in figures and r values provided (P

Results

According to disease type 86 (17.2%) patients had chronic illnesses and 414 (82.8%) had acute conditions; the most common causes of which were chest infection in 190 (38%) and gastroenteritis in 176 (35.2%). According to STRONGkids score, 98 (19.6%) patients were classified as low risk, 213 (42.6%) as moderate risk and 189 (37.8%) as high risk. Table 1 shows the details of the points given to the screened patients.

Two hundred and eighty-nine (57.8%) patients were underweight (weight for age Table 2 shows that among the 66 patients with severe wasting, nutritional state was not altered in 62 (93.93%)

while it improved in 4 (6.06%) who became moderately wasted. Nutritional deterioration was observed in 32 (13.00%) children, who had been moderately wasted at admission and progressed to severe wasting, while 214 (86.99%) remained moderately wasted. Also nutritional deterioration was observed in 6 (3.19%) children who had been normal at admission and progressed to moderate wasting while 182 (96.8%) remained normal.

Five of the 6 patients in the normal weight for height group and 28 of the 32 patients in the moderate wasting group who deteriorated were high risk according to STRONGkids score. Three of the 4 severely wasted patients who improved were moderate risk according to STRONGkids score, and the other one was high risk. Among the 62 severely wasted patients who showed no improvement, 51 were high risk and 11 moderate risk.

Figure 1 demonstrates a significant positive correlation between STRONGkids score and duration of hospital stay ($r = 0.114$, $P = 0.01$). However, there was a significant negative correlation between STRONGkids score and maternal education ($r = -0.633$, $P = 0.005$). The logistic regression showed that after elimination of all other factors, there was significant association between higher STRONGkids score and each of the following: low maternal education, high duration of hospital stay and low admission weight for age (Table 3).

Discussion

We showed that 17.2% of the patients had chronic illnesses and 82.8% had acute ones. The most common acute illnesses were chest infection in 38% and gastroenteritis in 35.2%. This patient profile is similar to that of Silveira et al. (8) and Saccardo Sarni et al. (9) who reported that respiratory diseases were the main reason for hospitalization. Additionally, Rocha et al. (5) found that the most frequent disease responsible for hospital admission was pneumonia (33%) followed by diarrhoea (6.4%). The noticeable difference in the current study figures is the percentage of hospitalization from gastroenteritis compared to pneumonia, which still has a high disease burden, despite the various preventive efforts of Egyptian governmental and nongovernmental agencies.

According to WHO cutoff values, 62.4% of our patients were underweight, 58.4% were stunted and 57.8% were wasted, which are higher than those for children aged

Nutritional deterioration was observed in 13% of the moderately wasted children and 3.19% of patients who were normal at admission. Ferreira and França (15) observed that 20% of children who were well nourished upon admission became malnourished. Rocha et al. (5) reported that 51.6% of 186 hospitalized children lost weight and 9.17% of well-nourished children developed mild malnutrition during hospitalization. Pacheco-Acosta et al. (16), also reported nutritional

deterioration in their series of hospitalized children with nonserious disease and advised early detection of children at risk to enable early interventions. Special attention should be paid to children who are already malnourished upon admission, as they are at risk of further nutritional deterioration during their hospital stay (17).

In the current study 42.6% of the patients were at moderate risk and 37.8% at high risk of developing malnutrition according to STRONGkids. These percentages are higher than the risk score recorded in a multicentre Dutch study by Hulst et al. (18). The latter authors reported that 62% of hospitalized children were classified at moderate and high risk by the STRONGkids tool. In Romania 58% of children were found to be at risk of malnutrition (24% high risk) by the STRONGkids tool (19). The higher figures in the present study can be attributed to the initial increased incidence of underweight, stunting and wasting, as well as persistence of the high rate of hospitalization for gastroenteritis which, if prolonged, can affect weight greatly (20).

The current study showed significant associations between STRONGkids score and both prolonged hospital stay and low admission weight for age. These findings are consistent with the above-mentioned Dutch study (18), which predicted a significant relationship between high risk score, a negative SD score for weight for height, and prolonged hospital stay. Several other studies have also documented that malnourished patients stay longer in hospital than well-nourished patients (21,22), confirming the need for early detection of such vulnerable patients.

The results of the current study showed that patients whose nutritional status deteriorated had initial high risk score by STRONGkids compared to moderate risk score for those who improved. In retrospect, this emphasizes that STRONGkids can be a predictive prognostic tool. Similarly, Sermet-Gaudelus et al. (23) advised implementation of their simple pediatric nutrition risk score to prevent hospital-acquired malnutrition. In contrast, Huysentruyt and associates (24) did not find a significant correlation between STRONGkids risk categories and weight loss during hospitalization. However, they mentioned that these categories correlated with the length of hospital stay and establishment of nutritional intervention during hospitalization.

To our knowledge, this is the first study to explore the STRONGkids as a screening and prognostic tool in an Egyptian hospital setting. Nevertheless, this study has its limitations; mainly in the small sample size and lack of long-term follow-up. Additionally, there should be a larger multicentre study including other age groups from all over Egypt to allow us to draw conclusions on a nationwide basis.

Conclusion

Use of the STRONGkids for screening hospitalized children aged

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Competing interests: None declared.

Évaluation du risque nutritionnel des enfants de plus de trois ans hospitalisés

Résumé

Contexte : L'identification des enfants à risque de malnutrition n'est pas une entreprise facile en milieu hospitalier.

Objectifs : Évaluer les mérites du recours à l'outil d'évaluation du risque pour l'état nutritionnel et la croissance (STRONGkids) en tant qu'outil de dépistage nutritionnel pour les enfants de plus de trois ans hospitalisés et le corréler à la sévérité des troubles nutritionnels.

Méthodes : La présente étude transversale a été réalisée auprès de 500 enfants de plus de trois ans admis à l'hôpital des enfants de l'Université d'Ain Shams, au Caire (Égypte). Le score STRONGkids a été utilisé pour évaluer le risque de trouble nutritionnel et les diagrammes de croissance de l'Organisation mondiale de la Santé ont été employés pour définir les enfants présentant une insuffisance pondérale, une émaciation et un retard de croissance à l'admission et à la sortie d'hôpital.

Résultats : Selon le score STRONGkids, 19,6 % des patients présentaient un faible risque, 42,6 % un risque modéré et 37,8 % un risque élevé. Sur les patients participant à l'étude, 62,4 % avaient une insuffisance pondérale, 58,4 % une émaciation et 57,8 % un retard de croissance. Sur les 66 patients présentant une émaciation sévère, l'état nutritionnel s'est amélioré pour 6,06 % et on a observé une détérioration de cet état chez 13,0 % des patients ayant une émaciation modérée. Le score STRONGkids était pire chez ceux ayant connu une détérioration de leur état, ce qui, en association avec sa corrélation positive significative avec la durée du séjour hospitalier, soulignait le fait que le score STRONGkids peut constituer un outil prédictif.

Conclusions : L'utilisation de l'outil de dépistage STRONG kids peut permettre l'identification précoce des enfants vulnérables à la malnutrition, ainsi que la mise en place d'interventions rapides qui peuvent contribuer à des améliorations générales des soins aux patients, ainsi qu'à une réduction de la période d'hospitalisation.

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المعرضين لخطر سوء التغذية، مما يساعد على التدخل الفوري الذي يساهم في تحسين رعاية
المرضى بشكل عام ويقلل من مدة الإقامة في المستشفى .

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