ORIGINAL ARTICLE

Nutritional Risk Screening in Children with Cerebral Palsy

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Abstract

Introduction: Validated and practical tools for nutritional risk screening are essential for the early recognition of children who would benefit from a complete nutritional assessment and subsequent nutritional interventions. In this regard, this study aimed to apply different nutritional risk screening tools for children with cerebral palsy and recognize the most appropriate tool.

Methods: In total, 30 children with cerebral palsy were involved in this cross-sectional study, from two Azores islands (where 60% of the total population live, in the Azores), Portugal. Children were assisted at a level III hospital unit and at the local cerebral palsy association. Clinical, sociodemographic, and anthropometric data were collected, and five nutritional risk screening tools were indirectly applied: screening tool for risk on nutritional status and growth, screening tool developed by Bell, cerebral palsy-malnutrition screening tool, screening tool developed by Bushell, and malnutrition risk score. Moreover, as a comparative method to define the most appropriate tool, two nutritional status classification instruments were applied (developed by World Health Organization and subjective global nutrition assessment).

Results: The screening tool for risk on nutritional status and growth showed high sensitivity and no specificity. Similarly, the screening tool developed by Bushell and cerebral palsy-malnutrition screening tool had high sensitivity and low specificity. The screening tool developed by Bell revealed high specificity and low sensitivity. The malnutrition risk score tool showed high sensitivity (> 87%) and specificity (> 71%) as well as the highest positive and negative predictive values (77.8% and > 83%, respectively) and also a kappa statistic value higher than 0.59.

Conclusion: Based on the results, malnutrition risk score seems to be the most appropriate tool for nutritional risk screening in children with cerebral palsy.

Keywords: Adolescent; Cerebral Palsy/complications; Child; Child Nutrition Disorders/diagnosis; Infant; Nutrition Assessment; Nutritional Status; Risk Assessment

Keypoints

What is known:

- Cerebral palsy is described as a pathology associated with prematurity and complications in childbirth, mainly characterized by spastic muscle stiffness.
- Nutritional consequences are triggered by their motor disabilities.
- Children at nutritional risk should be identified in order to ensure nutritional intervention before any malnutrition development.

What is added:

- The STRONGkids showed high sensitivity, without specificity, since it considered that cerebral palsy is a pathology with a risk of malnutrition.
- The screening tool developed by Bushell and the cerebral palsy-malnutrition screening tool showed high sensitivity and low-to-moderate specificity.
- For the screening tool developed by Bell, the results revealed a high specificity and low sensitivity, which make it an unreliable tool for nutritional risk screening.
- Malnutrition risk score seems to be the most appropriate tool for nutritional risk screening in children with cerebral palsy.

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Introduction

Cerebral palsy (CP) was first discovered in 1843 by William Little as a pathology associated with prematurity and complications in childbirth, mainly characterized by spastic muscle stiffness in the upper and lower limbs.[1-3] It is currently described as a group of permanent disorders of movement and posture development that are attributed to non-progressive disturbances and occur in the brain of the developing fetus or infant and cause activity limitation.[4,5] With the increase in life expectancy, nutritional consequences are triggered by their motor disabilities over time.[6,7]

Among the several motor disabilities that contribute to feeding difficulties, some are more significant, including lack of oro-motor control, difficulties or absence of chewing reflex and swallowing, lack of or decreased sucking reflex, emesis, drooling, incorrect body posture, and hypotonia. As a consequence, people with cerebral palsy can develop nutritional complications, such as malnutrition, obesity, and/or micronutrient deficiency.[7-11]

Children at nutritional risk should be identified to ensure nutritional intervention before the development of any malnutrition.[12] The development of validated and practical tools for nutritional risk screening (NRS) is essential since they allow to identify among the well-nourished cerebral palsy children, the ones who are at risk of developing malnutrition, and those who are less likely to develop malnutrition.[13] The nutritional risk screening should be a simple, viable, and rapid process to recognize early clinical characteristics of malnutrition and identify the prioritized nutritional intervention needs.[14]

In 2018, Portuguese legislation determined that all pediatric patients (from 1 month old to 18 years old) who had been hospitalized for less than 24 hours should be subjected to nutritional risk screening. The adopted nutritional risk screening tool was the screening tool for risk on nutritional status and growth (STRONGkids).[14-16] It is noteworthy that STRONGkids tool classifies all cerebral palsy children as being, at least, at moderate risk of malnutrition; however, in practice, due to the nature of the disease and anthropometric measurements, not all cerebral palsy children are malnourished. Moreover, this tool, which is currently being used in the pediatric population, is not validated for children with cerebral palsy. A more specific tool is needed for nutritional risk screening in this group of pediatric children, and for this reason, recently, other tools have been developed, specifically for cerebral palsy patients, such as a screening tool developed by Bell,[17] the cerebral palsy-malnutrition screening tool (CP-MST), a screening tool developed Bushell,[18] and malnutrition risk score (MRS).[19] In this regard, this study aimed to compare different nutritional risk screening tools for cerebral palsy (CP-NRS) and recognize the most appropriate one.

Methods

Study design and sample

This cross-sectional study was carried out at a level III hospital unit and at the local cerebral palsy association, in Ponta Delgada, Portugal. Participants were patients with cerebral palsy within the age range of 1 month to 18 years old, who were hospitalized or followed in the outpatient setting at the pediatrics service of the hospital or at the cerebral palsy association from February to December 2020.

Data collection

The clinical data of each participant was collected and registered through the clinical process. The collected data included cerebral palsy characteristics - type of cerebral palsy and gross motor function classification system (GMFCS) level -, other clinical conditions that may affect the nutritional status of patients (previous nutritional intervention and feeding route), and demographic data on gender, date of birth, and place of data collection (Hospital do Divino Espírito Santo or São Miguel cerebral palsy association).

Inclusion criteria was the existence of written consent for participation in the study, be aged between 1 month and 18 years and diagnosed with cerebral palsy. All patients for whom anthropometric assessment (weight and height) was not possible to obtain were excluded.

Anthropometry

Height was directly measured using a SECA® 220 stadiometer (SECA, Germany) (precision 1 mm) in patients with orthostatic balance (n = 13). In the case of children without orthostatic balance, due to scoliosis or contractures, their height was indirectly measured through the knee height using a caliper (precision 1 mm) (n = 17).[9,20] Predictive equations were used to estimate the height with the knee height measurement.[21-23]

The weight of children with orthostatic balance (n = 18) was measured using a SECA® 220 digital scale (SECA, Germany) (precision 100 g). In the case of children without orthostatic balance, the weight was obtained based on the difference between the weight of the caregiver and the weight of the caregiver carrying the child (n = 12). All children were weighed and measured in light clothing and without shoes. Moreover, body mass index (BMI) was calculated using the Quételet formula.

The arm circumference was measured using a SECA® 201 measuring tape (SECA, Germany) (precision 1 mm) (n = 29), and the triceps skinfold was measured with a Holtain® lipocalibrator (Holtain, United Kingdom) (precision 0.2 mm) (n = 29). The arm circumference and the triceps skinfold were used to calculate the arm muscle area. The obtained measurements were compared with the Frisancho age- and gender-specific reference percentiles, where the upper arm tissues were calculated based on measurements of triceps skinfold thickness and upper arm circumference of a cross-sectional sample derived from the United States health and nutritional examination survey of 1971-1974.[24] To control for bias, all data was collected by the same researcher.

Nutritional status assessment and nutritional risk screening

The nutritional status of each child was assessed using two classifications provided by World Health Organization (WHO) and Subjective Global Nutrition Assessment (SGNA). The obtained weight and height data of children under 5 years old were compared with the 2006 WHO growth curves. Moreover, the body mass index data of children over 5 years old were compared with the 2007 WHO growth curves. The comparisons were performed in WHO AnthroPlus® software (version 1.0.4, WHO, Geneva, Switzerland).[25]

Children were classified based on WHO definitions. Accordingly, they were considered to have acute malnutrition when their weight-for-height (W/H) (0-60 months old) or body mass index-for-age (BMI/A) (above 60 months old) z-score values were less than -2. Moreover, they were considered to have chronic malnutrition when their height-for-age (H/A) z-score value was less than -2.[26,27]

The SGNA was indirectly applied to the caregivers of each participant. It consists of a structured approach to nutritional status assessment, which combines a medical history focused on nutritional aspects and a physical examination that allows the classification of the global nutritional status through subjective clinical perception. This tool is validated for application in children with cerebral palsy and allows their classification as well-nourished, moderately malnourished, or severely malnourished.[18,28,29]

The same researcher collected information from the caregivers through interviews based on the aforementioned nutritional risk screening tools, namely STRONGkids[16], the tool developed by Bell,[18] CP-MST[6], the tool developed by Bushell,[17] and MRS.[6,19] Subjective assessment of each participant, required by the STRONGkids, was also performed by the same researcher.

Statistical analysis

Statistical analysis of data was performed in KNIME Analytics Platform® (KNIME AG, Zurich, Switzerland, version 4.1.2 for Windows). Descriptive analysis included medians, interquartile ranges, and relative frequencies. Moreover, The Shapiro-Wilk test was applied to confirm the normality of the continuous numerical variables. Continuous numerical variables were expressed by the median and interquartile range (25^{th} and 75^{th}), while categorical variables were expressed by relative frequencies (n, %).

Sensitivity, specificity, positive and negative predictive values, and the kappa statistic value were determined by comparing the results of the low-risk children with those of children with moderate and high nutritional risk. These results were obtained from the employed nutritional risk screening tools and the classifications of normal nutritional status or malnutrition according to the definitions of WHO and SGNA.

Results

In total, 30 children with cerebral palsy, and below 18 years old were included in this study. It should be mentioned that 46.7% of them were males. Most of these children had tetraplegic spastic cerebral palsy (53.3%, n = 16) and 60.0% of them (n = 18) had been submitted to a previous nutritional intervention. According to the GMFCS, 43.3% (n = 13), 16.7% (n = 5), and 40.0% (n = 12) of the children were in level I or II, level III, and level IV or V, respectively. Table 1 summarizes the characteristics of the sample.

According to the WHO definition, 10.0% (n = 3) and 53.3% (n = 16) of the participants had acute and chronic malnutrition, respectively. The SGNA showed that 50.0% (n = 15) of the participants were classified as moderately malnourished, while the remaining half of the sample was classified as well-nourished. According to the reference percentiles,[24] 26.7% (n = 8) of the participants had an arm circumference of < 5^{th}, 10.0% (n = 3) had a triceps skinfold thickness of < 5^{th}, and 26.7% (n = 8) had an arm muscle area of < 5^{th} (Table 2).

According to STRONGkids, all the participants had nutritional risks and the majority of them were identified to be at moderate risk. Regarding the CP-NRS tools, the screening tool developed by Bushell, categorized most of the participants as being at a possible risk of malnutrition. However, the screening tool developed

by Bell, classified most participants without nutritional risk, while the CP-MST and MRS identified most of them to be at high nutritional risk.[6,19] Table 3 tabulates the results obtained from each of the nutritional risk screening tools.

The tool with the highest sensitivity was STRONGkids (100%), but it specificity was the worst (0%). Regarding the CP-NRS tools, the tool developed by Bushell, showed high sensitivity, without specificity. In contrast, the tool developed by Bell, showed low sensitivity but high specificity, and the CP-MST[6] had high sensitivity values (> 93%), but moderate specificity values (< 36%). In addition, the MRS tool had high sensitivity (> 87%) and specificity (> 71%) values. As for the kappa statistic value, this tool also had the highest value, regardless of the nutritional status assessment method. The sensitivity, specificity, positive and negative predictive values, and the kappa statistic value for each of the tools are summarized in Tables 4 and 5, according to the definitions of WHO and SGNA, respectively.

Discussion

There was a homogeneous distribution in the classification of the motor severity of the participants included in the study, with a similar proportion of participants within level I or II (43.3%, n = 13) and within level IV or V (40.0%, n = 12) of GMFCS. This result is in line with those of other studies that evaluated patients with cerebral palsy.[30-32]

Regarding the cerebral palsy type, most participants had a diagnosis of tetraplegic spastic cerebral palsy, which is the most common type of cerebral palsy. This finding was consistent with those of another study.[33] Although 86.7% (n = 26) of the participants had exclusive oral feeding, it is necessary to take into account that most of these children had eating difficulties, such as dysphagia, gastric reflux, chewing difficulties, and emesis. In the present study, four participants needed to be partially or completely fed through a percutaneous endoscopy gastrostomy. Although this is a low number, it should be noted that 40% of our sample had a significant motor impairment (GMFCS IV or V) and the majority of them were followed by a multidisciplinary team who periodically evaluated their need for enteric nutritional support.

The main aim of a nutritional risk screening tool is to prevent the risk of malnutrition development in children identified as well-nourished. As such, the specificity of a nutritional risk screening tool becomes less important since a false positive result will only expose the child to a complete nutritional assessment, while a false negative result can lead to failure to recognize the risk of malnutrition.[17,34,35] The STRONGkids showed high sensitivity without specificity since when applied to children with cerebral palsy, this tool classified them all at moderate or high risk of malnutrition. This tool does not classify patients with cerebral palsy and low nutritional risk since cerebral palsy is considered a previous pathology with a risk of malnutrition, which has an influence on the score and leads to the direct classification of the participant as having at least moderate risk. The screening tool developed by Bushell, and CP-MST tools showed high sensitivity and low-to-moderate specificity, regardless of the nutritional status classification tool. The sensitivity of the first version of the tool applied by the screening tool of Bushell, was 37.5%, proving a considerable improvement in this study (> 93%).[17] For the tool developed by Bell, the results

Table 1. Sample characterization

	Total sample
Demographic characteristics	
Gender, male	14 (46.7)
Age, years (n = 30)	9.0 (6.0, 14.8)
Outpatient	28 (93.3)
Inpatient	2 (6.7)
HDES	17 (56.7)
APCSM	13 (43.3)
Clinical information	
Cerebral palsy type	
Unilateral spastic	4 (13.3)
Bilateral spastic	2 (6.7)
Ataxia	4 (13.3)
Dystonia	4 (13.3)
Tetraplegic spastic	16 (53.3)
GMFCS	
I	10 (33.3)
II	3 (10.0)
III	5 (16.7)
IV	3 (10.0)
V	9 (30.0)
Previous Nutritional Intervention	18 (60.0)
Feeding Route	
Oral	26 (86.7)
PEG	1 (3.3)
Oral + PEG	3 (10.0)
Anthropometric assessment	
z-score W/H (n = 5)	-0.50 (-0.95, -0.50)
Z-score BMI/A (n = 30)	-0.38 (-1.08, 0.86)
z-score H/A (n = 30)	-2.23 (-3.25, -0.78)
Arm circumference, cm (n = 29)	18.5 (17.0, 24.0)
Triceps skinfold thickness, mm (n = 29)	8.4 (6.0, 14.0)
Arm muscle circumference, cm (n = 29)	16.2 (13.2, 18.9)
Arm area, cm^2 (n = 29)	27.2 (20.1, 44.5)
Arm muscle area, cm^2 (n = 29)	21.0 (13.9, 28.5)
Arm fat area, cm^2 (n = 29)	8.3 (4.4, 12.8)

APCSM - Associação de Paralisia Cerebral de São Miguel; BMI/A - body mass index-for-age; GMFCS - gross motor function classification system; H/A - weight-for-age; HDES - Hospital Divino Espírito Santo; PEG - percutaneous endoscopy gastrostomy; W/H - weight-for-height. Variables are expressed by their median and interquartile range (25^{th}, 75^{th}) or by relative frequencies n (%).

revealed a high specificity and low sensitivity, which means that it is an unreliable tool for the detection of malnourished children with cerebral palsy. According to the validation study performed on the screening tool developed by Bell, its sensitivity value was much higher than that found in the present study (< 25.0%) based on the SGNA definition.[18] This variation may be due to the difference between the sample sizes of these two studies (n = 30 *vs* n = 89).

Finally, according to the WHO and SGNA definitions, the MRS tool presented high values of sensitivity (87.5% and 93.3%, respectively) and specificity (71.4% and 73.3%, respectively). This result is consistent with that obtained in the validation study of the MRS tool, in which it obtained a sensitivity of 89.0% and specificity of 73.8% for a score of ≥ 7.[19]

The kappa statistic value is a statistical measure that compares the agreement of a classification instrument with the worst case. Values closer to one indicate that the classification has greater assertiveness and that it is much better than the possible classification without using the instrument. Regardless of the nutritional status classification method (WHO or SGNA), the MRS tool had the highest kappa statistic value. The instrument developed by Bushell had the lowest kappa statistic value when the nutritional status classification was obtained through the WHO definition. This is possibly due to the fact that the total score of this tool is attributed through a subjective visual assessment, which makes it susceptible to variability depending on the professional who applies it. The STRONGkids presented the lowest kappa statistic value when the classification of nutritional status was obtained through the SGNA definition. This was due to the fact that this tool is not very specific in the identification of children with cerebral palsy and without nutritional risk.

A comparison of the nutritional risk obtained by each tool and the assessment of nutritional status based on the definitions of WHO or SGNA revealed that the MRS tool seems to be the most appropriate tool for nutritional risk screening in children with cerebral palsy. This tool showed higher sensitivity and specificity, higher positive and negative predictive values, and even a kappa statistic value of > 0.59, compared to the other tools, regardless of the nutritional status assessment method. These results are consistent with those obtained in another study.[19]

Nutritional intervention in children with cerebral palsy is complex; therefore, the validation of practical nutritional risk screening tools and assessment of nutritional status in this population requires further investigation.[36]

Table 2. Nutritional status assessment

	Total sample n (%)
WHO definition:	
z-score W/H (n = 5)	
Normal	5 (16.7)
Acute malnutrition	0 (0.0)
z-score BMI/A (n = 30)	
Normal	27 (90.0)
Acute malnutrition	3 (10.0)
z-score H/A (n = 30)	
Normal	14 (46.7)
Chronic malnutrition	16 (53.3)
SGNA definition (n = 30)	
Well nourished (SGNA-A)	15 (50.0)
Moderately malnourished (SGNA-B)	15 (50.0)
Severely malnourished (SGNA-C)	0 (0.0)
Frisancho reference percentiles 50, (n = 29)	
Arm circumference	
< 5	8 (26.7)
5-50	11 (36.7)
50-95	9 (30.0)
≥ 95	1 (3.3)
Triceps skinfold thickness	
< 5	3 (10.0)
5-50	13 (43.3)
50-95	12 (40.0)
≥ 95	1 (3.3)
Arm muscle area	
< 5	8 (26.7)
5-50	9 (30.0)
50-95	10 (33.3)
≥ 95	2 (6.7)

Variables are expressed by their relative frequencies (n[%]). *Notes: n- number; WHO- World Health Organization; Z-score W/H- Weight for Height Z-score; Z-score BMI/A- Body Mass Index for Age Z-score; Z-score H/A- Weight for Age Z-score; SGNA- Subjective Global Nutritional Assessment.*

Table 3. Nutritional risk screening, according to the score obtained in each nutritional risk screening tool

	Total sample (n = 30) n (%)
STRONGkids	
Low risk (score 0)	0 (0)
Moderate risk (score 1 to 3)	21 (70.0)
High risk (score 4 to 5)	9 (30.0)
Bell screening tool	
No nutritional risk (score < 3)	25 (83.3)
Nutritional risk (score ≥ 3)	5 (16.7)
CP-MST	
Low risk (score 0)	6 (20.0)
Moderate risk (score 0 to 10)	4 (13.3)
High risk (score > 10)	20 (66.7)
Bushell screening tool	
No nutritional risk	1 (3.3)
Possibly at nutritional risk	24 (80.0)
Nutritional risk	5 (16.7)
MRS	
Low risk (score < 3)	12 (40.0)
Moderate risk (score 3 to 5)	0 (0.0)
High risk (score ≥ 6)	18 (60.0)

CP-MST - Cerebral palsy malnutrition screening tool; MRS - malnutrition risk score; STRONGkids - screening tool for risk of impaired nutritional status and growth.

Table 4. Sensitivity, specificity, positive and negative predictive values and kappa statistics for each of the nutritional risk screening tools, according to the World Health Organization definition

	Sensitivity (%)	Specificity (%)	PPV (%)	NPV(%)	kappa
STRONGkids Moderate or high risk (score 1 to 5)	100.0	0.0	53.3	0.0	0.0
Bell screening tool Nutritional risk (score ≥ 3)	25.0	92.9	80.0	52.0	0.170
CP-MST Moderate or high risk (score > 0)	93.8	35.7	62.5	83.3	0.306
Bushell screening tool Possibly or at nutritional risk	93.8	0.0	51.7	0.0	-0.066
MRS Moderate or high risk (score ≥3)	87.5	71.4	77.8	83.3	0.595

CP-MST - cerebral palsy malnutrition screening tool; MRS - malnutrition risk score; NPV - negative predictive value; PPV - positive predictive value; STRONGkids - screening tool for risk of impaired nutritional status and growth.

Table 5. Sensitivity, specificity, positive and negative predictive values and kappa statistics for each of the nutritional risk screening tools, according to the subjective global nutrition assessment definition

	Sensitivity (%)	Specificity (%)	PPV(%)	NPV (%)	kappa
STRONGkids Moderate or high risk (score 1 to 5)	100.0	0.0	50.0	0.0	0.0
Bell screening tool Nutritional risk (score ≥ 3)	20.0	86.7	60.0	52.0	0.067
CP-MST Moderate or high risk (score > 0)	93.3	33.3	58.3	83.3	0.633
Bushell screening tool Possibly or at nutritional risk	93.3	0.0	48.3	0.0	0.467
MRS Moderate or high risk (score ≥3)	93.3	73.3	77.8	91.6	0.667

CP-MST - cerebral palsy malnutrition screening tool; MRS - malnutrition risk score; NPV - negative predictive value; PPV - positive predictive value; STRONGkids - screening tool for risk of impaired nutritional status and growth.

The strength of this study is that it compares different CP-NRS tools to verify their abilities in the identification of children with cerebral palsy at nutritional risk, according to their clinical condition. However, this work has some limitations, such as its cross-sectional design. Moreover, the selected sample does not allow the results to be extrapolated to the national population since the studied sample only represents 1.7% of the cerebral palsy children living in Portugal. Nevertheless, this sample size is representative of the population of children with cerebral palsy residing in São Miguel and Santa Maria Islands, two of the nine islands of the Azores archipelago. Another limitation of this study is that some of the CP-NRS tools applied in this study have been validated in a population with different characteristics than those included in this study. This factor might have led to differences between the results obtained in this study and those of the validation studies of each tool. As there is no gold-standard tool for nutritional risk screening, the tools included in this study were compared with the classifications of nutritional status defined by WHO and SGNA, which inform whether the patient is malnourished or not. This fact might have led to bias in the interpretation of the obtained results regarding the sensitivity and specificity of each tool.

Since the MRS tool includes questions related to socioeconomic factors, this study emphasizes the importance of these factors in the risk of malnutrition in children with cerebral palsy. Therefore, it is also considered relevant to investigate the influence of socioeconomic factors on the nutritional status of these children.[13] Despite being applied only to cerebral palsy children living in developing countries, MRS is an easy-to-use tool that can be applied by any healthcare professional, and it can be validated in the future for developed countries, which makes it possibly a suitable tool for nutritional risk screening in children with cerebral palsy.

Although STRONGkids is the nutritional risk screening tool adopted for the pediatric population, this tool is non-specific to nutritional risk screening in children with cerebral palsy. Despite the fact that the tool developed by Bell has been validated in a population of children with cerebral palsy with similar characteristics to the sample of this study, it proved to be the least reliable for the detection of malnutrition risk in children with cerebral palsy.[17]

It was also found that the tool developed by Bushell and CP-MST screening tool have high sensitivity, which means that they have the capacity to identify the nutritional risk of children who may develop malnutrition. However, these CP-NRS tools were compared with nutritional status classification methods, in which some children were identified to be at nutritional risk, while at the time of the assessment, they had a normal nutritional status. For this reason, longitudinal studies are needed to verify the accuracy of these tools in predicting the development of malnutrition in children who are identified to be at nutritional risk but have a normal nutritional status at the time of the assessment. According to the findings of this study, the MRS tool seems to be the most appropriate tool for the detection of nutritional risk in children with cerebral palsy.

Author Contribuitions

IM participated in the study conception or design. IM participated in acquisition of data. IM, AM participated in the analysis or interpretation of data. IM, RC, IA, SM, RA, IS and JS participated in the drafting of the manuscript. RC, IA, SM, RA, IS and JS participated in the critical revision of the manuscript. All authors approved the final manuscript and are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Conflicts of Interest

The authors declare that there were no conflicts of interest in conducting this study.

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Protection of human and animal subjects

The authors declare that the procedures followed were in accordance with the regulations of the relevant clinical research ethics committee and with those of the Code of Ethics of the World Medical Association (Declaration of Helsinki 2013).

Provenance and peer review

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Confidentiality of data

The authors declare that they have followed the protocols of their work center on the publication of patient data.

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Avaliação do Risco Nutricional em Crianças com Paralisia Cerebral

Introdução: A identificação de risco nutricional com recurso a ferramentas validadas e práticas é fundamental para o rastreio das crianças que necessitarão de uma avaliação nutricional completa e intervenção nutricional subsequentes. O objetivo deste estudo consistiu na aplicação de diferentes ferramentas de identificação de risco nutricional em crianças com paralisia cerebral e reconhecer a ferramenta mais apropriada.

Métodos: Trinta crianças com paralisia cerebral foram envolvidas no estudo, residentes em duas ilhas dos Açores (onde habitam 60% da população açoriana). As crianças foram observadas numa unidade hospitalar de nível III e na associação de paralisia cerebral local. Dados clínicos, sociodemográficos e antropométricos foram recolhidos, para além da aplicação indireta de cinco ferramentas de identificação de risco nutricional: ferramenta de rastreio de risco sobre o estado nutricional e crescimento - STRONGkids, ferramenta desenvolvida por Bell, ferramenta de rastreio de desnutrição na paralisia cerebral - CP-MST, ferramenta desenvolvida por Bushell e a classificação do risco de desnutrição - MRS. Para comparação e definição da ferramenta mais apropriada, dois instrumentos de classificação do estado nutricional foram aplicados, da Organização Mundial de Saúde e o formulário de avaliação nutricional global subjetiva.

Resultados: A ferramenta de rastreio de risco sobre o estado nutricional e crescimento apresentou elevada sensibilidade, sem especificidade. A ferramenta desenvolvida por Bushell e a ferramenta de rastreio de desnutrição na paralisia cerebral apresentaram elevada sensibilidade e baixa especificidade. Por outro lado, a ferramenta desenvolvida por Bell revelou uma elevada especificidade e baixa sensibilidade. A classificação do risco de desnutrição mostrou elevada sensibilidade (> 87%) e especificidade (> 71%), assim como os valores preditivos positivo e negativo mais elevados (77,8% e > 83%, respetivamente) e um kappa superior a 0,59.

Conclusão: Neste estudo, a classificação do risco de desnutrição demonstrou ser o instrumento mais apropriado para a identificação de risco nutricional em crianças com paralisia cerebral.

Palavras-Chave: Adolescente; Alterações da Nutrição Infantil/diagnóstico; Avaliação Nutricional; Avaliação de Risco; Criança; Estado Nutricional; Lactente; Paralisia Cerebral/complicações