Sarcopenia in dialysis centers in Brazil: a survey study about assessment and management

Sarcopenia em centros de diálise no Brasil: um estudo survey sobre avaliação e manejo

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ABSTRACT

Objective
To identify the Brazilian dialysis centers that assess sarcopenia in their clinical routine and how it is diagnosed and managed.

Methods
This is a web-based survey study, structured with quali-quantitative questions about how sarcopenia is routinely assessed in dialysis centers. Centers officially registered at the Brazilian Society of Nephrology website were contacted through e-mail and/or telephone. The survey included questions about the dialysis staff, instruments, methods, and criteria for diagnosing sarcopenia, and how it was managed if diagnosed.

Results
Sixty-two dialysis centers responded to the survey and 23 (37%) assessed sarcopenia as a clinical routine. Of these, 13 had an exercise professional (57%), and all had a dietitian. The main consensus adopted to diagnose sarcopenia was the revised European Working Group on Sarcopenia in Older People (EWGSOP2; n=10, 44%). The assessment frequency was mainly six-monthly and quarterly (n=8, 35% both). The most common methods to assess sarcopenia traits were handgrip strength (n=16, 70%) for physical function and bioimpedance analysis (n=15, 65%) for muscle mass. Centers with an exercise professional had a higher chance of assessing sarcopenia (OR=4.23, 95% CI: 1.37 to 13.07). Changes in the dietary plan (n=20, 87%) and prescription of resistance and combined exercises (n=8, 35% both) were the most adopted intervention strategies.

Conclusion
The assessment of sarcopenia and its traits in Brazilian dialysis centers as a clinical routine was low. The most used definition guideline was the EWGSOP2, while the most used assessments were handgrip strength and bioimpedance analysis.

Keywords: Body composition. Chronic kidney disease. Hemodialysis. Muscle mass. Muscle strength. Sarcopenia.

RESUMO

Objetivo

Identificar os centros de diálise brasileiros que avaliam a sarcopenia em sua rotina clínica, assim como os métodos de diagnóstico e manejo empregados.

Métodos

Estudo survey, estruturado com questões quali-quantitativas sobre como a sarcopenia é avaliada rotineiramente em centros de diálise. Os centros oficialmente cadastrados no site da Sociedade Brasileira de Nefrologia foram contatados por e-mail e/ou telefone. A pesquisa incluiu perguntas sobre o profissional de diálise, instrumentos, métodos e critérios para diagnosticar a sarcopenia e sobre como a sarcopenia foi tratada.

Resultados

Sessenta e dois centros de diálise responderam à pesquisa e 23 (37%) avaliaram a sarcopenia como rotina clínica. Destes, 13 contavam com profissional do exercício (57%) e todos contavam com nutricionista. Centros com profissional de exercício tiveram maior chance de avaliar sarcopenia (OR=4,23, IC 95%: 1,37 a 13,07). O principal consenso adotado para diagnosticar a sarcopenia foi o revisado European Working Group on Sarcopenia in Older People *(EWGSOP; n=10, 44%). A frequência de avaliação foi maioritariamente semestral e trimestral (n=8, 35% ambas). Os métodos mais comuns para avaliar os traços de sarcopenia foram força de preensão manual (n=16, 70%) para função física e bioimpedância (n=15, 65%) para massa muscular. Mudanças no plano alimentar (n=20, 87%) e prescrição de exercícios resistidos e combinados (n=8, 35% ambos) foram as estratégias de intervenção mais adotadas.*

Conclusão

A avaliação da sarcopenia nos centros de diálise brasileiros como rotina clínica foi baixa. A diretriz de definição mais utilizada foi o EWGSOP2, enquanto as avaliações mais utilizadas foram a força de preensão manual e a bioimpedância.

Palavras-chave: *Composição Corporal. Doença Renal Crônica. Hemodiálise. Massa Muscular. Força Muscular. Sarcopenia.*

INTRODUCTION

Sarcopenia is defined as an age-related phenomenon, characterized by a decline in muscle function and skeletal muscle mass [1]. Although sarcopenia is commonly observed in older people, patients with Chronic Kidney Disease (CKD) may be more susceptible to this condition due to the accelerated aging process, especially those on hemodialysis, who are generally ≥60 years old [2-4]. A recent meta-analysis showed that the prevalence of sarcopenia in CKD is 25%, and in those undergoing hemodialysis it is 29% [5]. In the latter patients, the presence of sarcopenia increases the risk of mortality by 87% [6].

Over the last years, the methods, criteria, and operational definitions for the diagnosis of sarcopenia have undergone updates and changes. The scientific community has adopted four well-recognized consensuses to diagnose sarcopenia; the revised European Working Group in Sarcopenia and Older People (EWGSOP2) [7], revised Asian Working Group on Sarcopenia (AWGS) [8], Foundation for the National Institutes of Health Biomarkers Consortium Sarcopenia Project (FNIH) [9], and the International Working Group on Sarcopenia (IWGS) [10]. Each consensus presents different cutoff values and operational definitions for identifying sarcopenia. Still, despite that, the sarcopenia traits are generally the same (*i.e.*, low muscle strength, low muscle mass, and/or low physical performance). Low muscle strength is generally assessed by handgrip strength or Sit-to-stand (STS) tests, low muscle mass by Bioelectrical Impedance Analysis (BIA) or limb circumference (e.g., calf and mid-arm), and low physical performance by gait speed or Timed-up and Go (TUG) [7,8,11].

Due to this range of methods and cutoff values, it is believed that there is a scenario of uncertainties on how to precisely assess and diagnose sarcopenia in dialysis centers, especially

in Brazil, where there is no national consensus or guideline. Therefore, the main objectives of the present survey were to identify the Brazilian centers that assess sarcopenia in their clinical routine, which criteria and diagnosis methods are used, and how it is managed.

METHODS

Study Design and Sample

This is a web-based survey study, structured with quali-quantitative questions about how sarcopenia is routinely assessed in dialysis centers, applied online in Brazil between August and October 2021. The Institutional Review Board of the University Center ICESP (#4.371.880) reviewed and approved this research project, and we adhered to the Declaration of Helsinki. We followed the Consensus-Based Checklist for Reporting of Survey Studies (CROSS) recommendations [12].

The study population consisted of all dialysis centers officially registered on the Brazilian Society of Nephrology website. We defined a non-probability sampling method for recruitment, and all dialysis centers were contacted via email and/or telephone calls to be invited to respond to the survey. All participants provided online informed consent.

Survey and Data Collection

The dialysis centers were first contacted by email including a standard message with the information on the study and the web link to the Google Form survey. Also, the following information was given within the email: (i) introduction of the researchers and institutions involved; (ii) presentation of the objectives of the study; (iii) brief explanation of the research and clinical questions to be answered; (iv) details of the benefits and risks; and (v) description of how the results would be reported to the scientific community as well as to the participating dialysis centers.

The dialysis centers were required to respond to the survey within 30 days, and a second email was sent with a reminder extending the deadline by one week. Additionally, telephone calls were made to the centers that did not respond to the emails within the initial and extension periods. We requested that the professional from the dialysis staff responsible for monitoring body composition and physical-related outcomes answer the survey. The survey consisted of questions regarding the assessment of sarcopenia as a clinical routine, which were divided into three sections: (i) nine questions about the dialysis professional responsible for responding to the survey; (ii) four questions about the instruments, methods, and criteria to assess and diagnose sarcopenia; and (iii) four questions concerning how sarcopenia was managed if diagnosed. If the same dialysis center responded twice, the first response was excluded. All survey questions can be seen at <https://drive.google.com/drive/folders/1mYMq9v_TqKsmuyfZnVPryyqwu_jMLa_m?usp=sharing>.

Statistical Analyses

Data were automatically converted from Google Forms into Google Spreadsheets and Excel for further statistical analysis. Due to non-normal distribution, the characteristics are described as relative and absolute frequencies and median and Interquartile Range (IQR). The Chi-square (χ^2)

or Fisher's exact tests were used to compare categorical variables, and the independent-samples Mann-Whitney U test was used to compare continuous variables.

Binary logistic regressions were conducted to investigate possible associated factors for the routine assessment of sarcopenia in dialysis centers. *Odds ratios* (OR) and 95% confidence intervals (95% CI) were interpreted. The findings were described by regions (South, Southeast, Midwest, Northeast, and North). We ran statistical analyses using the Statistical Package for the Social Sciences, version 26.0 (IBM®SPSS®, Armonk, NY, USA) and GraphPad Prism, version 8.0 (GraphPad Software, Inc., CA, United States). Two-tailed tests were applied, and significance was accepted at a *p*-value <0.05.

RESULTS

Characteristics of the Dialysis Centers

Dialysis centers officially registered at the Brazilian Society of Nephrology website were invited to respond to the survey. After repeated attempts to contact the centers (three emails and one phone call), 215 had incorrect email addresses or telephone numbers and 549 did not respond. Sixty-two centers responded and were included in the analysis. From these, 23 (37.1%) assessed sarcopenia as part of the clinical routine.

Table 1 describes the characteristics of the dialysis centers analyzed. Most were from the Southeast region of Brazil (n=32, 51.6%), and the most prevalent dialysis modality (n=57, 91.9%) was conventional treatment (i.e., thrice-weekly four-hour hemodialysis sessions). Among the professionals who responded to the survey, dietitians were the most prevalent (n=33, 53.2%).

Table 1 – Characteristics of participating dialysis centers.

Variables	All dialysis centers (n=62)	Sarcopenia is assessed (n=23)	Sarcopenia is not assessed (n=39)	*p*-value
Regions, n (%)				0.928
Southeast	32 (51.6)	11 (47.8)	21 (53.8)	
Mid-West	14 (22.6)	6 (26.1)	8 (20.5)	
Northeast	7 (11.3)	2 (8.7)	5 (12.8)	
South	6 (9.7)	3 (13.0)	3 (7.7)	
North	3 (4.8)	1 (4.3)	2 (5.1)	
Is the center from a state capital?	29 (46.8)	11 (47.8)	18 (46.2)	0.899
Dialysis modalities, n (%)*				0.351
Conventional hemodialysis	57 (91.9)	21 (91.3)	36 (92.3)	
Short daily hemodialysis	24 (38.7)	13 (56.5)	11 (28.2)	
Peritoneal dialysis	4 (6.5)	0 (0)	4 (10.3)	
Patients undergoing dialysis, median (IQR)	152 [63–237]	100 [50–235]	183 [96–240]	0.107
Does the center have a dietitian?	62 (100)	23 (100)	39 (100)	-
Does the center have an exercise professional?	20 (32.3)	12 (52.2)	8 (20.5)	**0.010**
Graduation area from the professional who responded to the survey, n (%)*				0.098
Nutrition	33 (53.2)	11 (47.8)	22 (56.4)	
Medicine	13 (21.0)	3 (13.0)	10 (25.6)	
Physiotherapy	11 (17.7)	7 (30.4)	4 (10.3)	
Exercise Physiology	3 (4.8)	2 (8.7)	2 (5.1)	
Nursing	2 (3.2)	0 (0)	2 (5.1)	

Note: *Sum is greater than 100% because more than one option could be responded. IQR: Interquartile Range. Bold values indicate a statistical difference (*p*<0.05).

Criteria and Methods to Assess Sarcopenia

Figure 1 shows the main consensuses adopted for sarcopenia diagnosis and its assessment frequency. The revised EWGSOP2 (n=10, 43.5%) was the most adopted, but 39.1% (n=9) used no consensus definition. The assessment frequency was mainly six-monthly and quarterly (n=8, 34.8% for both).
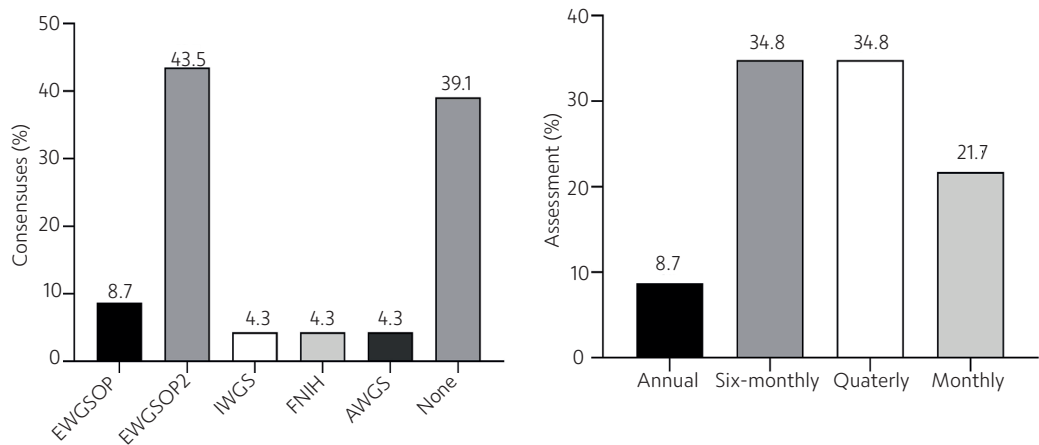

Figure 1 – The main consensuses adopted for sarcopenia and its assessment frequency in Brazilian dialysis centers.
Note: Sum may be greater than 100% because more than one option could be responded. AWGS: Asian Working Group on Sarcopenia; EWGSOP: European Working Group in Sarcopenia and Older People; EWGSOP2: revised European Working Group in Sarcopenia and Older People; FNIH: Foundation for the National Institutes of Health Biomarkers Consortium Sarcopenia Project; IWGS: International Working Group on Sarcopenia.

Figure 2 shows the methods used to assess sarcopenia traits. The most common methods were handgrip strength (n=16, 69.6%) for physical function and bioimpedance analysis (n=15, 65.2%) for muscle mass. Moreover, most dialysis centers (n=22, 95.7%) applied different cutoff values for male and female patients.
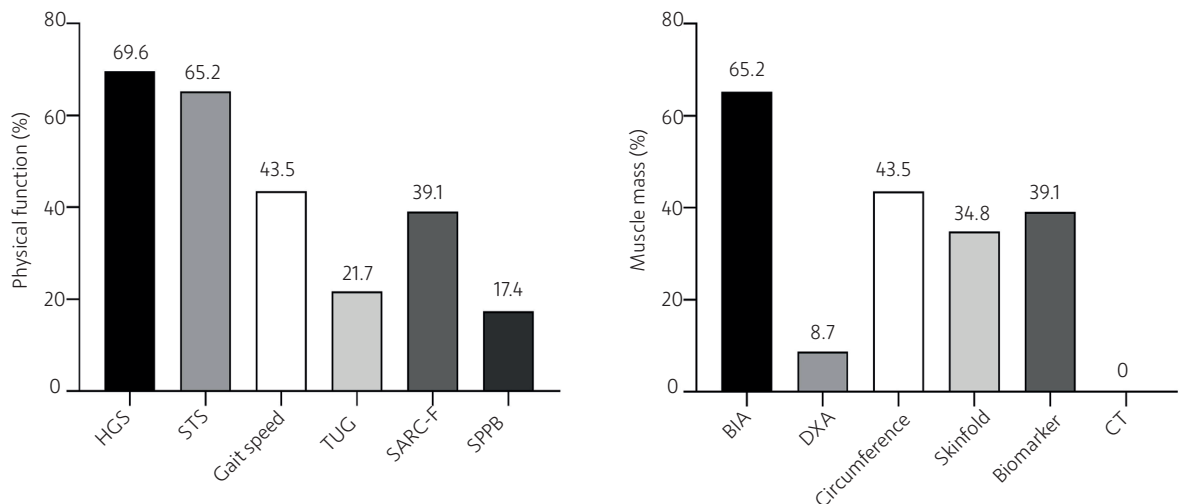

Figure 2 – The main methods adopted for assessing sarcopenia traits in Brazilian dialysis centers.
Note: Sum may be greater than 100% because more than one option could be responded. BIA: Bioelectrical Impedance Analysis; CT: Computed Tomography; DXA: Dual Energy X-Ray Absorptiometry; HGS: Handgrip Strength; SPPB: Short Physical Performance Battery; STS: Sit-To-Stand; TUG: Timed-Up and Go.

Associated Factors for Assessing Sarcopenia

Table 2 shows that the presence of an exercise professional was significantly associated with the assessment of sarcopenia in the dialysis center (OR=4.23, 95% CI: 1.37 to 13.07, p=0.012).

Table 2 – Identification of factors associated with the sarcopenia assessment in the dialysis centers.

Variables	Odds ratio	95% CI	p-value
Presence of an exercise professional	4.23	1.37 to 13.07	0.012
Dialysis center from a state capital	1.07	0.38 to 3.00	0.899
≥152 patients in the dialysis center#	0.37	0.13 to 1.08	0.069

Note: #Median value as reference (<152 patients). Bold values indicate a statistical significance (p<0.05). CI: Confidence Interval.

Management of Sarcopenia

Most dialysis centers reported performing any nutritional approach (n=22, 95.7%) and exercise counseling (n=15, 65.2%) for patients diagnosed with sarcopenia. In addition, 60.9% of the centers (n=14) always contact the family to suggest changes in the patient's lifestyle, while 30. Figure 3 shows the main intervention strategies to mitigate sarcopenia. Nutritional approaches were changes in the dietary prescription (n=20, 87.0%), prescription of multivitamins (n=4, 17.4%), and prescription of protein supplementation (n=15, 65.2%) such as whey. Regarding exercise, the prescription of resistance and combined (resistance and aerobic) exercises (n=8, 34.8% for both) were the most adopted approaches, and none of the centers prescribed aerobic exercise solely.
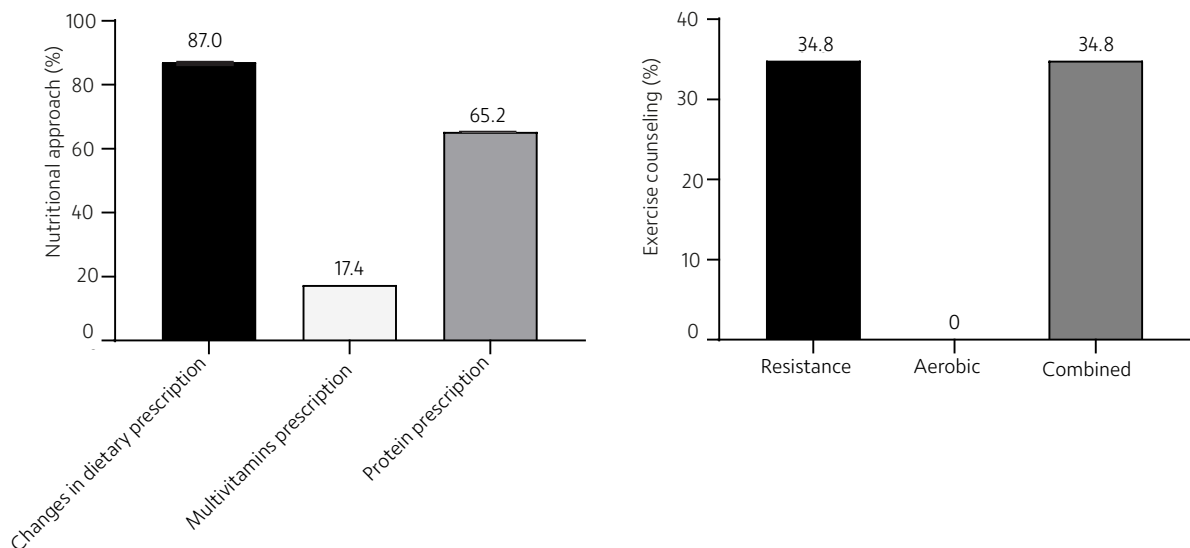

Figure 3 – The main intervention strategies adopted for sarcopenia management in Brazilian dialysis centers.
Note: Sum may be greater than 100% because more than one option could be responded. Combined: aerobic and resistance.

DISCUSSION

Our survey identified the Brazilian centers that assess sarcopenia in their clinical routine, the criteria and diagnosis methods adopted, and how it is managed. In general, we found a low number

of dialysis centers that include this assessment in their clinical routine, most of them adopting the EWGSOP2 criterion. For physical function and muscle mass assessments, handgrip strength and bioimpedance analysis were the most prevalent tests, widely adopted in clinical settings other than dialysis. Regarding its management, most dialysis centers reported adjustments in the dietary prescription and exercise counseling. These findings enhance the knowledge of sarcopenia in the clinical routine of dialysis centers in Brazil.

Our findings indicated that sarcopenia is not receiving as much attention as necessary within Brazilian dialysis centers. Previous evidence from the UK has shown a lack of standardization in assessing sarcopenia in the general population [13]. Despite the strong recommendation to standardize the operational definition of sarcopenia and its traits, a meta-analysis of studies evaluating sarcopenia in adults found a positive association with mortality, regardless of the definition adopted for sarcopenia [14]. Among older Brazilians, the prevalence of sarcopenia based on different traits was also similar [15]. Adopting different tools for assessing sarcopenia traits may be due to discrepancies in the setting and availability of equipment in clinical practice [13,16-19].

Due to the limited number of Brazilian dialysis centers that routinely assess sarcopenia, rather than proposing a procedure standardization, we believe that the assessment of sarcopenia traits should be initially established, independently of the tool and operational diagnosis. Our findings indicated that simple, low-cost, and accessible tools are already being used as a clinical routine, and their use should be increasingly encouraged among dialysis centers.

Although widely recognized as a condition associated with mortality in patients on dialysis [6], the assessment of sarcopenia and its traits remains low in clinical practice. The primary objective of an early sarcopenia diagnosis is to identify patients with a higher risk of adverse outcomes such as lower quality of life [20], higher inflammation [21,22], vascular calcification [23], increased risk of falls [24], hospitalization [25], and mortality [26]. A secondary objective would be to prescribe strategic interventions to mitigate the loss of skeletal muscle mass, strength, and physical performance, well-documented sarcopenia traits [27,28]. Additionally, the interdisciplinary effort among dietitians, nurses, nephrologists, and exercise professionals might be a key factor in promoting and encouraging considerable changes toward a healthier lifestyle, counteracting the negative effects of sarcopenia [29].

There are several consensuses for diagnosing sarcopenia and its traits, however, it remains unclear which could be mostly applied. The present survey found greater adoption of the revised EWGSOP2 in Brazilian dialysis centers. Although its revised operational criterion uses the same tools suggested in the previous version [1], the insertion of the questionnaires for screening sarcopenia risk, such as the SARC-F and the 10-Item Physical Function Scale (PF-10), represents new tools that can be easily implemented in the clinical setting [7,30,31]. Therefore, the presence of several tools to assess the different sarcopenia traits may contribute to an easier screening and diagnosis of sarcopenia in clinical practice. This gives dialysis centers many options to assess sarcopenia in their clinical routine. Our findings, showed that the most frequently used assessment tools were low-cost and easy to apply (*e.g.*, handgrip strength, sit-to-stand tests, BIA, and muscle circumferences). Even so, sarcopenia diagnosis in hemodialysis patients may change according to the operational criteria adopted [32], and this should be taken into account.

Apart from being responsible for prescribing and supervising intradialytic exercise/rehabilitation programs [33], exercise professionals also seem to play an important role in assessing sarcopenia traits. Our findings showed that exercise professionals are associated with a higher chance of assessing sarcopenia in the clinical routine. In Brazil, the legislation implemented in the

Unified Health System does not require the presence of exercise professionals (*i.e.*, physiotherapists or exercise physiologists) [34]. In addition, other factors can explain the low presence of exercise professionals in the dialysis centers from our survey [35,36]. The economic burden was a serious problem in Brazil even before the COVID-19 pandemic [37]. Around 80% of all dialysis-related costs are paid by the Brazilian Health Unified System [38]. Annually, the government spends US$1.36 billion on dialysis, generating an expensive cost, making the implementation of exercise professionals within dialysis centers almost economically impossible, despite the well-known benefits of integrating these professionals into the care of CKD patients [39,40].

We recognize the limitations in our study, but also some strengths. First, it was a web-based survey design, relying on a veracity bias, not allowing a precise confirmation of the routine in the dialysis centers that participated. However, an in-person approach was impossible because Brazil is a very large country. Second, some clinics assess sarcopenia annually and every six months, and a recall bias might have interfered with the responses. Lastly, there was a relatively small number of participants in relation to the total number of centers officially registered in Brazil, despite all centers having been contacted at least three times by email and/or phone calls. This low response rate may lead to bias, considering that centers that recognize sarcopenia as a clinically meaningful predictor might be more likely to answer the survey, and the actual percentage of Brazilian centers that perform this assessment could be even much lower. Even so, the survey collected data from real-world routines and had respondents from all regions of Brazil, thus, the findings might reflect the plural characteristics of Brazil, not only a specific state or region.

CONCLUSION

In conclusion, the assessment of sarcopenia in Brazilian dialysis centers as part of the clinical routine was low. The EWGSOP2 was the most adopted definition guideline from those that routinely assess sarcopenia. We believe that efforts of Brazilian dialysis staff teams to implement sarcopenia assessment and management as part of the clinical routine are necessary.

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