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Original Article

Comparison of Habitual and Maximal Gait Speed and their Impact on Sarcopenia Quantification in German Nursing Home Residents

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Abstract

Objectives: Sarcopenia is characterized by loss of muscle strength and muscle mass. The EWGSOP2 specifications include physical functioning determination for quantification of the sarcopenia severity. However, there is a lack in the use of habitual and maximal gait speed and their influence on sarcopenia quantification. We hypothesize differences in sarcopenia quantification using habitual and maximal gait speed. **Methods**: Sixty-six residents from five nursing homes were examined. Habitual and maximal gait speed were measured by 4-meter-walking-Test. McNemar-Test and χ^2-test were used to identify quantification differences. Effect sizes of both gait speeds were calculated with Spearman's rank-correlation-coefficient. **Results**: Significant difference was identified for twenty-two residents in physical functioning classification by McNemar-Test ($p<.001$). χ^2-Test identified a significant frequency distribution for sarcopenia categories between both gait speeds (χ^2 (df2)=11.215, $p=.004$; Cramer's V=.412). Significant correlations ($p<.05$) were only shown for maximal gait speed in variables falls in the last three months ($|r_s|$=.326), Barthel-Index ($|r_s|$=.415), and SARC-F ($|r_s|$=.335). **Conclusions**: The use of habitual and maximal gait speed has a significant impact on sarcopenia quantification in nursing home residents. An adapted standardization in the EWGSOP2 specifications should follow.

Keywords: EWGSOP2, Gait speed, Nursing home, Quantification, Sarcopenia

Introduction

Sarcopenia is a musculoskeletal disease that leads to increased risk of falls, immobility, and need for long-term care[1]. Furthermore, sarcopenia is associated with a relatively high degree of mortality[2,3]. Due to the fact that sarcopenia is positively correlated with age, it often goes along with a high level of care dependency and a number of comorbidities[4]. Long-term care facilities, such as nursing homes (NH) show a proportion of residents with sarcopenia ranged between 17.7% and 87.0%[1]. For the quantification of sarcopenia, standardized assessment methods are formulated according to the current European Working Group on Sarcopenia in Older People 2 (EWGSOP2) guidelines from 2019. The assessments follow an algorithm, which examines the loss of muscle strength, muscle mass and physical functioning. It is important to note, that the current EWGSOP2 guidelines consider a distinction in the severity of sarcopenia. This means that the loss of muscle mass and muscle strength

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represents confirmed sarcopenia. If limited physical functioning is also detected, it is referred to as severe sarcopenia[5]. An assessment of the severity of sarcopenia was not yet applied in the old EWGSOP specifications from 2010, which only allowed a division into physiological and pathological cases. However, the determination of physical functioning based on gait speed measurement was used for case identification[6]. The EWGSOP2 specifications are based on the findings of Rydwik et al. (2012), which reported a lack of scientific research in maximal gait speed[7]. Therefore, the classification of physical functioning is in accordance with the use of habitual gait speed over a 4-metre distance.

Accordingly, the EWGSOP specifications focused on muscle mass. In the new EWGSOP2 guidelines, however, muscle strength is considered to play a major role in the identification of sarcopenia[8]. This is mainly demonstrated by the discrepancy in the cut-off values for the assessments. For hand grip strength, the cut-off values were reduced by -4 kg for women (<20 kg to <16 kg) and -3 kg for men (<30 kg to <27 kg). Similar adjustments were also seen for muscle mass. Nevertheless, these changes in cut-off values have a significant impact on sarcopenia quantification[9-11]. In contrast, the cut-off values for the gait speed are independent of gender and unchanged set at 0.80 m/s in the EWGSOP and EWGSOP2 specifications[5,6]. In this context, it can be assumed that reduced attention is given to gait speed. This is also shown by the fact that further studies not examined the influence of different gait speeds on sarcopenia quantification.

Keogh and colleagues (2015) analyzed the habitual gait speed of NH residents in their study over a 2.4-meter walking distances. This revealed a habitual gait speed below 0.80 m/s for 97% and 0.50 m/s for 75% of all residents, respectively[12]. This result indicates a significant limitation of the physical functioning of NH residents, based on the classification by habitual gait speed. The study by Krumpoch et al. (2021) also reports significant influence by choose of the test distance. Therefore, a comparison of 4-meter and 8-meter walking distances shows significant differences for the habitual gait speed (0.12 m/s, $p<.001$). The static or dynamic start of the test also plays a key role in the evaluation of physical functioning[13]. From an economic point of view, a 0.10 m/s improvement in gait speed is a significant financial factor for the healthcare system[14]. A standardized measurement of gait speed is necessary to determine general statements about sarcopenia prevalence and individual changes in physical functioning of NH residents.

To the best of our knowledge, a comparison of habitual and maximal gait speed to quantify sarcopenia has not yet been scientifically determined. The aim of our study is to compare the sarcopenia quantification according to EWGSOP2 guidelines using the habitual and maximal gait speed in the NH setting. The influence of different gait speeds on sarcopenia classification according to severity and their correlations between characteristic variables of NH residents will be analyzed. This is to represent the importance of quantifying physical functioning and the associated severity of sarcopenia in the NH setting. We hypothesize that the use of maximal gait speed has significant impact on sarcopenia quantification in NH residents.

Materials and Methods

Study design and assessments

This study is part of the larger BaSAlt project (*Verhältnisorientierte Bewegungsförderung und individuelle Bewegungsberatung im Setting Altenwohnheim -ein biopsychosoziales Analyse- und Beratungsprojekt*) on physical activity promotion and counselling in NH funded by the German Federal Ministry of Health (2019–2022, grant no. ZMVI1-2519FSB114). Eight nursing homes in the Federal State of Baden-Württemberg (Germany) were included in the larger overall project. The BaSAlt study protocol has already been published[15]. The baseline assessments and staff training for this study were performed between September 2020 and July 2021 in seven NH as one facility had withdrawn its participation.

The assessments were performed by nursing staff (n=14) at the seven facilities after a two-days training workshop. Researchers of the BaSAlt project trained staff on geriatric assessments and their standardized practical application. After the workshops, two NH withdrew their participation because of limited time and structural problems in their daily care routines. Five NH participated in participant recruitment for the baseline assessment. A remuneration of 2000€ per NH was provided for the workshop, recruitment, and assessments in BaSAlt.

Residents' degree of care ≤4 (degrees of care 1-5 in the German care system) and their consent to voluntary participation were criteria for inclusion. The BaSAlt project was approved by the Ethics Committee of the Faculty of Economics and Social Sciences of the Eberhard Karls University of Tuebingen (no. AZ A2.5.4-096_aa).

Information on residents' 1) age (in years), 2) gender, 3) level of care (1-4) and 4) past falls in the last three months (number) were collected. Resident's 5) height (in m) and 6) weight (in kg) was measured for calculating the 7) Body-Mass-Index (BMI in kg/m^2). The 8) length of stay in the NH from entry to screening date (in days) was obtained. The variables (1-8) were collected through inspection of the resident's file. The 9) morbidity statues were categorized based on medical file review. Cognitive functioning was assessed using the self-assessment questionnaire 10) Mini-Mental-Status-Test (MMST in points). Therefore, a maximum of 30 points could be achieved for the MMST. The questions were divided into five categories (orientation, retentiveness, attention and numeracy, recall, and language)[16]. The need of care was defined with the external assessment questionnaire 11) Barthel-Index (BI in points). In the BI, a maximum of 100 points could be scored in ten individual categories of daily living (eating, sitting up and transferring, washing, using the

toilet, bathing/showering, getting out and walking, climbing stairs, dressing and undressing, stool control, and urine control)[17].

Based on EWGSOP2, identification on cases was performed by the subjective self-assessment 12) SARC-F. In total, 10 points can be reached. Five questions in different areas (strength ability, assistive support when walking, getting up from a chair, climbing stairs, and falls) were determined with the use of a point score. Cut-off value for the SARC-F questionnaire is ≥ 4 points and should be interpreted as positive sarcopenia suspicion[18]. The muscle strength was tested by 13) maximal hand grip strength (HFM in kg) using a hand force dynamometer (Hydraulic Hand Force Dynamometer Saehan Model SH5001, Saehan, Changwon-si, South Korea). The best value from six trials (three trials alternating with the right- and left-hand) was used for the quantification[19]. Gender-specific cut-off values of the HFM were <16 kg for women and <27 kg for men, respectively[20]. If the gender-specific cut-off values were not reached, categorization as "possible sarcopenia" was applied.

The muscle mass was examined by measuring the 14) appendicular skeletal muscle mass (ASMM in kg)[21] via bioimpedance analysis (BIA) by Akern (impedance vector analyzer BIA 101 BIVA, 50 kHz ± 1% measuring frequency). Further evaluation was assessed by the BodygramPlus Enterprise software (Version 1.2.2.9, Akern s.r.l., Pontassieve, Italy). Gender-specific cut-off values for ASMM were <15 kg for women and <20 kg for men, respectively[22]. If the values for HFM and ASMM are below the gender-specific cut-off values, the resident was classified in the category "confirmed sarcopenia". The physical functioning was assessed to determine the severity of sarcopenia. The quantification was evaluated by 15) gait speed. Standardization according to the Short Physical Performance Battery (SPPB) specifications was used. The test track consists of a run-on distance of 2 meters, a measuring distance of 4 meters, and a run-off distance of 2 meters[23]. Only the measuring distance of 4 meters was determined by a handheld stopwatch (the time for run-on and run-of distances was not measured). Both, the habitual gait speed (4 MWThab in m/s) and the maximal gait speed (4 MWTmax in m/s) were performed over the same test track. One trial each was performed with 4 MWThab (with the request resident should walk the speed they can usually be realized in everyday life) and for 4 MWTmax (with the request resident should walk as fast as possible, but safe). In case of a failed trial (e.g. distraction by a third person or holding the person to avoid a fall), only one additional trial each could be performed. Cut-off values for 4 MWT are independent of gender. For both sexes, resident with a gait speed value ≤0.80 m/s were described with a reduction in physical functioning[6,24]. In addition, residents who cannot walk independently (with or without walking aids) are defined as physical limited. If the resident categorized as "confirmed sarcopenia" and the 4 MWT value is below the cut-off value, the resident was classified in the category "severe sarcopenia".

Statistical analysis

The data analysis was performed after transferring handwritten data to the statistical program SPSS (IBM SPSS version 27.0.1.0). The standard deviation (Mean±SD), median values (Md), and percentages of distributions were used to represent the study characteristics of NH residents. The sarcopenia quantification was possible into the four categories "no sarcopenia", "possible sarcopenia", "confirmed sarcopenia", and "severe sarcopenia". First, the quantification of sarcopenia was determined by the habitual gait speed (SQhab). A second quantification model was created with the maximal gait speed (SQmax). This was followed by the McNemar-Test to assess the quantification difference of both models. The significance level was defined at 5% (*exact p<.05*, two-sided testing). Thereafter, the Chi-Square-Test (χ^2-Test with *p<.05*, two-sided testing) was calculated to assess the differences in SQhab and SQmax. Effect sizes for the χ^2-Test are specified by Cramer's V. In addition, the Spearman's rank-correlation-coefficients (r_s with *p≤.05*, two-sided test) were used to calculate effect sizes. For the interpretation, effect sizes from $|r_s|$=.10 were described as small, $|r_s|$=.30 as moderate, and $|r_s|$=.50 as large effects.

Results

In total, 66 residents were included in the study. Missing values were recorded for the data analysis. For one resident, access to the medical file was denied and subsequently an evaluation of falls and morbidity status was not allowed. For two other residents, it was not possible to assess the number of falls in the last three months due to their length of stay in NH being shorter than three months. Classification of cognitive status with the MMST into the respective categories was not feasible for twelve residents (18.2%). Reasons for this were severely impaired vision (n=6), lack of motivation (n=4), and severe cognitive impairment (n=2). The SARC-F could not be performed by ten residents (15.1%). Reasons therefore were severe cognitive impairment (n=8) and a lack of motivation (n=2). Two residents (3.0%) were unable to assess HFM due to severe cognitive impairment. The severity of sarcopenia was determined by 4 MWThab. In total, 14 residents (21.1%) were not able to move independently. They were only able to move with a wheelchair. Reasons for this were dyspnea (n=1), blindness (n=1), pain (n=1), hemiparesis (n=1), and other limitations (n=10). These residents had a limited walking ability and were classified as limited in the category of physical functioning in both models. In addition, aids in the form of rollators were needed by 41 residents (62.1%). Eleven residents (16.7%) were independently mobilized without walking aids.

74.2% of the residents were female (n=49) and 25.8% were male (n=17), respectively. The degree of care was 3

Characteristic	Mean±SD
Age in years (n = 66)	87.3±7.3
Falls in last three months (n = 63)	0.5±0.8
BMI in kg/m2 (n = 66)	26.5±5.4
Length of stay in days in NH (n = 66)	697.4±731.3
Morbidity status in number of categories (n = 65)	3.3±1.7
MMST in 0-30 points (n = 54)	19.4±7.8
BI in 0-100 points (n = 66)	64.1±23.5
SARC-F in 0-10 points (n = 56)	3.1±2.6
HFM in kg (n = 64)	16.2±7.0
ASMM in kg (n = 66)	17.8±4.5
4MWThab in m/s (n = 52)	0.60±0.19
4MWTmax in m/s (n = 52)	0.82±0.31

BMI: Body-Mass-Index; MMST: Mini-Mental-Status-Test; BI: Barthel-Index; HFM: maximal hand grip strength; ASMM: appendicular skeletal muscle mass; 4MWThab: habitual gait speed; 4MWTmax: maximal gait speed.

Table 1. Characteristics for the BaSAIt study.

		SQmax	
		4MWT normal	*4MWT reduced*
SQhab	*4MWT normal*	n = 8	n = 2
	4MWT reduced	n = 20	n = 36

SQhab: sarcopenia quantification model with habitual gait speed; SQmax: sarcopenia quantification model with maximal gait speed; 4MWT: gait speed.

Table 2. McNemar-Test for quantification differences between SQhab and SQmax in physical functioning.

(Md) for women and men. For the classification of degrees of care, 19.7% (n=13) residents had a degree of care 2, 57.6% (n=38) a degree of care 3, and 22.7% (n=15) a degree of care 4. The view into the medical files showed morbidity categories by residents with 1) past cardiovascular events 30.3% (n=20), 2) arterial hypertension 68.2% (n=45), 3) coronary heart disease 21.2% (n=14), 4) cardiac insufficiency 31.8% (n=21), 5) cardiac pacemaker 9.1% (n=6), 6) post-stroke/ cerebral hemorrhage/ TIA 27.3% (n=18), 7) chronic lung disease 9.1% (n=6), 8) cancer 16.7% (n=11), 9) diabetes mellitus II 27.3% (n=18), 10) osteoarthritis of lower extremity 30.3% (n=20) with TEP 15.2% (n=10), and 11) psychological/ emotional/ nervous disease 59.1% (n=39). The cognitive status with the MMST demonstrated a classification into "no dementia" 12.1% (n=8), "mild cognitive impairment" 18.2% (n=12), "mild dementia" 16.7% (n=11), "moderate dementia" 18.8% (n=19), and "severe dementia" 6.1% (n=4) of the residents. The need of care was assessed with BI, which showed a classification into "completely independent" for 4.5% (n=3), "partially in need of care" for 22.7% (n=15), "in need of care" for 59.1% (n=39) and for "dependent on care" 19.6% (n=9) of the residents. Table 1 showed the characteristics for the BaSAIt study.

For the detection of sarcopenia suspicion, the SARC-F questionnaire was used. Sarcopenia suspicion was observed in 31.8% (n=21) of the residents. Reduced hand grip strength based on HFM, 60.6% (n=40) of the residents was detected. ASMM measurement via BIA calculated for 74.2% (n=49) residents a reduction in muscle mass. The 4MWThab indicated a limitation of physical functioning for 84.8% (n=56) of the residents. In comparison, the 4MTWmax identified a limitation in physical functional for 57.6% (n=38) of the residents. Table 2 presents the quantification

		Confirmed sarcopenia	Severe sarcopenia
SQhab	*n*	0	11
	%	0.0%	16.7%
SQmax	*n*	5	6
	%	7.6%	9.1%

SQhab: sarcopenia quantification model with habitual gait speed; SQmax: sarcopenia quantification model with maximal gait speed.

Table 3. Sarcopenia quantification by SQhab and SQmax.

Quantification model	Falls in last three months	BI	SARC-F
SQhab	$\|r_s\| = .243$	$\|r_s\| = .197$	$\|r_s\| = .180$
	$p = .055$	$p = .113$	$p = .184$
SQmax	$\|r_s\| = .326$	$\|r_s\| = .415$	$\|r_s\| = .335$
	$p = .009$*	$p < .001$*	$p = .012$*

** Significant result for $|r_s|$ with $p \leq .05$ (two-sided test); SQhab: sarcopenia quantification model with habitual gait speed; SQmax: sarcopenia quantification model with maximal gait speed; BI: Barthel-Index.*

Table 4. Spearman's rank-correlation-coefficients ($|r_s|$) for SQhab and SQmax models.

differences of physical functioning by 4MWThab and 4MWTmax using the McNemar-Test.

Therefore, the quantification of physical functioning remained identical for 44 (66.6%) residents in both models. For 22 (33.3%) residents, a significant change (*p<.001*) in the category of physical functioning could be determined with the McNemar-Test. The sarcopenia quantification for specific models is reported in Table 3.

In both models, 39.4% (n=26) were classified in the category" no sarcopenia" and 43.9% (n=29) in the category "possible sarcopenia", respectively. For the SQhab model, no case of confirmed sarcopenia was quantified. 16.7% (n=11) of the residents had severe sarcopenia. According to the SQmax model, 7.6% (n=5) of the residents had a confirmed sarcopenia. Moreover, 9.1% (n=6) of the residents were severe sarcopenic. In addition, the χ^2-Test identified a significant frequency distribution between SQhab and SQmax (χ^2 (df2)=11.215, *p=.004*; Cramer's V=.412) for sarcopenia categories. Table 4 presents the effect sizes with the Spearman's rank-correlation-coefficients for quantification in the category physical functioning by both models.

The determination of the correlations demonstrated no significant associations with variables of study characteristic with the SQhab model (all *p≥.05*). In comparison, significant moderate effects for the variables falls in the last three months ($|r_s|$=.326, *p=.009*), BI ($|r_s|$=.415, *p<.001*), and SARC-F ($|r_s|$=.335, *p=.012*) could be identified when applying the SQmax model.

Discussion

The relevance of sarcopenia quantification is of high importance for the NH. The aim of this study was to determine the difference between habitual and maximal gait speed and their influence on the quantification of sarcopenia in German NH residents. In the 2019 EWGSOP2 specifications, the severity of sarcopenia is assessed based on physical functioning. However, the assessment methods differ and also have a significant impact on sarcopenia quantification[25]. The demand for a uniform specification of assessment methods for the quantification of sarcopenia is becoming more apparent[26]. Nevertheless, not only the individual assessment methods show differences in sarcopenia quantification, but also the instructions for the respective implementation. Therefore, EWGSOP2 does recommend a standardized use of habitual gait speed over a 4-meter distance in determining the severity of sarcopenia. In 2020, the BaSAlt study examined the feasibility and differences of EWGSOP2 assessments for sarcopenia quantification in NH residents. Not all assessments were found to be useful for the population-specific setting[27]. We hypothesized that the use of the maximal gait speed has a significant impact on sarcopenia quantification in NH residents.

The aim of our study was to quantify sarcopenia using HFM, ASMM, and 4 MWT with habitual and maximal gait speed according to the EWGSOP2 specifications. Using the 4MWThab, physical functioning limitation was detected in 84.8% of the residents. In comparison, the 4 MTWmax

showed physical functional limitation for 57.6%. Some studies already examined sarcopenia using habitual and maximal gait speed in the context of EWGSOP2 specifications. However, different standardizations will be used. The study by Gade and colleagues (2020) examined hospitalized geriatric patients in Denmark. The usual gait speed (0.66±0.29 m/s) of the subjects was determined over a test distance of 4 meters[28]. However, they show comparably means of habitual gait speed with our studied group (0.60±0.19 m/s). Purcell et al. (2020) evaluated the influence of different international definitions on sarcopenia quantification. The maximal gait speed over a measurement distance of 4 meters was used. Compared to our study results (0.82±0.31 m/s), the maximal gait speed was higher by a mean of 0.2m/s (0.98±0.20 m/s)[29]. Nonetheless, both studies also show a lack of information on the standardized method using the run-on run-off distance. No information was provided on this. Another study, which investigated the prevalence of sarcopenia in community-dwelling older men from Sweden, used a measurement distance of 6 meters. A run-on run-off distance of 2 meters each was implemented. The usual comfortable gait speed (1.36±0.31 m/s) was recorded[30]. The different methods highlight the problem of an unstandardized approach to determining gait speed for sarcopenia quantification.

A significant frequency distribution between the SQhab and SQmax models was identified for sarcopenia categories with the χ^2-Test (*p=.004*) in our study. Consistent specifications for the measurement distance, the run-on run-off distance, as well as the verbal guidance are essential for scientific research. In our study, significant change (*p<.001*) in the category of physical functioning was analyzed for 33.3% with the McNemar-Test. Also, the comparison of habitual and maximal gait speed in different populations and settings show inconsistent data. The study by Karpman and colleagues (2014) addressed usual (walk at a comfortable/ normal pace) and maximal (walk as fast as you can safely, without running) gait speed in the clinical setting. High acceptance of both habitual and maximal gait speed was reported. Therefore, the authors recommend the practical use of the 4 MWT with standardized measurement distance, run-on run-off distance, and the verbal guidance in the clinical practice. The test of the maximal gait speed should be performed only by an automatic timing system[31]. In our opinion, practicality by using a stopwatch is sufficient for our study population. However, it should be mentioned that there is a pronounced risk of falls among residents in nursing homes. An automatic measuring system could therefore ensure the resident's safety during the assessments and should be used if possible.

Our study used different quantification methods SQhab and SQmax. Significant correlations were only shown for maximal gait speed of NH residents with falls in the last three months, BI, and SARC-F (all *p<.05*). In contrast, differences for sarcopenia category muscle mass were shown between habitual and maximal gait speed in the study by Kim et al. (2016). They found significant correlations between skeletal muscle mass and maximal gait speed (r=.301-.308; *p<.001*). Furthermore, it is important that the correlations are independent of the measurement distances of 4, 6, and 10 meters. Authors recommend habitual gait speed for assessment of physical functioning and progression of chronic disease. On the other hand, the maximal gait speed should be used for the classification of general health and muscle mass of elderly persons[32]. In the context of sarcopenia quantification, this statement is contradictory because sarcopenia is associated with reduced muscle mass. The reduced physical functional limitation allows the grading of the severity of sarcopenia. These results are not compatible with those from our study. A previous study has also identified significant association of muscle mass (*p<.001*) and muscle strength (*p=.003*) with increasing maximal gait speed[33]. Mainly low gait speed is associated with reduced hand grip strength[34]. In addition, decreased gait speed has been attributed to increased cognitive impairment and all-cause mortality in older people[35-37]. Moreover, low gait speed is seen as an essential mediator of sarcopenia and functional pendency in the elderly[38]. From our point of view, maximal gait speed should be used for sarcopenia quantification in NH residents to differentiate the severity of sarcopenia more efficiently. There were no falls or other adverse outcomes during the assessments. This is mainly important for further scientific research on the topic of sarcopenia prevalence in NH setting.

The results of our study show the relevance to adaptations and specific consideration of gait speeds in the clinical context. Accordingly, the survey of habitual gait speed overestimates severe sarcopenia. This mainly influences the setting-specific prevalence and diagnosis of sarcopenia in NH residents.

Limitations of our study can be seen in the number of cases. Only 66 residents could be included in the evaluation. Of these, 14 residents were unable to walk. In addition, the assessments were conducted by trained assessors from the respective NH. Standardization was to be achieved through the sequence of 4 MWT. First, the 4MWThab was determined to allow a subjective impression of the walking ability and to be able to exclude possible risks for falls. This was followed by the determination of the 4 MWTmax. Possible fatigue or bias can therefore not be excluded. Moreover, the setting-specific condition caused by the COVID-19 pandemic should be considered. In this context, the contact restrictions and their widespread limitations within the NH represent possible influences on the physical functioning of the residents. The negative effects of statutory restrictions in NH have already been examined in muscle mass[39].

To the best of our knowledge, no studies comparing sarcopenia quantification by habitual and maximal gait speed have been performed. Our hypothesis of a significant influence on sarcopenia quantification by the use of habitual

and maximal gait speed in NH residents was confirmed. We support a standardized approach to implementing assessments for grading physical functioning with maximal gait speed in NH setting. It is necessary for further survey of setting-specific sarcopenia prevalence according to EWGSOP2 specifications.

Conclusions

The testing of physical functioning based on maximal gait speed to quantify sarcopenia is insufficiently described. The use of habitual and maximal gait speed shows significant differences in quantifying the sarcopenia severity in the NH setting. This has a direct impact on the sarcopenia prevalence and should therefore be considered by EWGSOP2 and validated by further scientific studies.

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Authors' contributions

DH and SW collected, analyzed and, interpreted the patient data regarding the geriatric assessments. DH was a major contributor in writing the manuscript. The conceptualization and methodology were developed by DH, AN, and GE. AF and AT were responsible for the project administration. The funding acquisition was conducted by AF, AT, GS, AN, and GE. All authors read and approved the final manuscript.

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