Characterizing the first 6-year hospital data for sarcopenia using its first International Classification of Diseases (ICD-10-CM) diagnosis code

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Introduction

Sarcopenia is an aging-related disease characterized by muscle mass loss and wasting, and is among the most significant causes of frailty among the elderly. The estimated worldwide prevalence of sarcopenia lies between 10-16% in elderly patients[1]. Despite it being a detrimental condition, it only received the International Classification of Diseases (ICD)-10-CM code, M62. 84 in October 1, 2016, thus being recognized as a disease[2]. Sarcopenia is associated with multiple adverse health outcomes, ranging from susceptibility to falls and fractures to increased mortality[3]. One risk factor of interest is neighborhood walkability, quantified by a walk score (WS). A neighborhood with a low walkability score has been shown to be correlated with lower overall physical activity in addition to higher rates of obesity, diabetes, hypertension, and cardiovascular disease[4]. Sarcopenia differs from cachexia; cachexia is characterized by muscle loss driven by an underlying illness, such as cancer or anorexia[5]. Previous research on the relationship between sarcopenia and walkability has shown mixed results, and results may not be generalizable to populations in the US[6]. Thus, this study seeks to further evaluate a potential association between sarcopenia and walkability, and additionally seeks to provide updated descriptive statistics on the demographic factors associated with sarcopenia after the adoption of the ICD-10 code.

Study Population

The Mass General Brigham (MGB) Research Patient Data Registry (RPDR) was used to identify sarcopenia cases (having a recorded incidence of ICD-10-CM diagnosis code, M62. 84) from the Massachusetts General Hospital (MGH) and Brigham and Women's Hospital (BWH) between October 1, 2016 and Oct 1, 2022. The case search within the RPDR was limited to Massachusetts zip codes. MGH employees were excluded from selection as cases and controls. All remaining sarcopenia cases in the RPDR after these two exclusion criteria were used as cases in this study. For each sarcopenia case, a healthy control with routine annual wellness visit data was identified from the RPDR, matched on age, sex, and race. 2 cases and 3 controls with a P.O. box zip code were excluded from the final analysis.

Table 1: Baseline Characteristics of Study Participants

	Sarcopenia cases (n=343)	Controls (n=342)	p-value
Walk score (mean ± SD)	56.3 ± 29.5	49.5 ± 27.1	0.002
Walkability:			<0.001
Car-dependent (walk score 0-49)	142 (41.4%)	168 (49.1%)	
Somewhat walkable (walk score 50-69)	49 (14.3%)	83 (24.3%)	
Very walkable (walk score 70-89)	107 (31.2%)	73 (21.3%)	
Walker's paradise (walk score 90-100)	45 (13.1%)	18 (5.3%)	
Median household income	105569.3 ± 43585.5	112554.5 ± 41549.2	0.031
Age of sarcopenia diagnosis	77.7 ±11.6	NA	NA
Legal sex:			0.851
Female	201 (58.6%)	197 (57.6%)	
Male	142 (41.4%)	145 (42.4%)	
Race:			0.681
Asian	8 (2.3%)	11 (3.2%)	
Black or African American	32 (9.3%)	33 (9.6%)	
Native American or Alaska Native	0 (0%)	1 (0.3%)	
White	260 (75.8%)	257 (75.1%)	
Two or more races	1 (0.3%)	4 (1.2%)	
Other	22 (6.4%)	17 (5.0%)	
Unknown (declined or unavailable)	20 (5.8%)	19 (5.6%)	
Ethnicity:			0.164
Hispanic	7 (2.0%)	7 (2.0%)	
Non-Hispanic	303 (88.3%)	286 (83.6%)	
Unknown (declined or unavailable)	33 (9.6%)	49 (14.3%)	
Marital Status:			0.001
Divorced	31 (9.0%)	20 (5.8%)	
Legally Separated	4 (1.2%)	5 (1.5%)	
Married	130 (37.9%)	183 (53.5%)	
Other	1 (0.3%)	3 (0.9%)	
Partner	4 (1.2%)	1 (0.3%)	
Single	67 (19.5%)	41 (12.0%)	
Unknown	6 (1.7%)	11 (3.2%)	
Widowed	100 (29.2%)	78 (22.8%)	

Results

Table 2: Odds Ratios and 95% CIs of Univariable and Multivariable Logistic Regression Models

Univariable model	OR [95% CI]	p-value
Walkability:		
Car-dependent (walk score 0-49)	1 (reference)	NA
Somewhat walkable (walk score 50-69)	0.698 [0.458 - 1.058]	0.092
Very walkable (walk score 70-89)	1.734 [1.197 - 2.522]	0.004**
Walker's Paradise (walk score 90-100)	2.958 [1.664 - 5.455]	<0.001***
Multivariable model	**OR [95% CI]**	**p-value**
Walkability:		
Car-dependent (walk score 0-49)	1 (reference)	NA
Somewhat walkable (walk score 50-69)	0.647 [0.414 - 1.002]	0.0529
Very walkable (walk score 70-89)	1.648 [1.069 - 2.551]	0.02418*
Walker's Paradise (walk score 90-100)	2.624 [1.404- 5.078]	0.00313**
Legal Sex:		
Male	1 (reference)	NA
Female	0.825 [0.579, 1.172]	0.24415
Race:		
White	1 (reference)	NA
Asian	0.576 [0.203, 1.554]	0.28133
Black	0.602 [0.332, 1.083]	0.09107
Other	0.709 [0.354, 1.415]	0.32858
Unknown/Missing	0.743 [0.350, 1.585]	0.43793
Ethnicity:		
Non Hispanic	1 (reference)	NA
Hispanic	0.776 [0.239, 2.526]	0.66791
Unknown/missing	0.719 [0.433,1.183]	0.19755
Median Household Income	1.000 [1.000, 1.000]	0.29227
Marital Status:		
Married	1 (reference)	NA
Divorced/Legally Separated	1.741 [0.957, 3.205]	0.07117
Other/Unknown	0.820 [0.289, 2.160]	0.69486
Single	1.981 [1.227, 3.226]	0.00545**
Widowed	1.840 [1.215, 2.799]	0.00414**

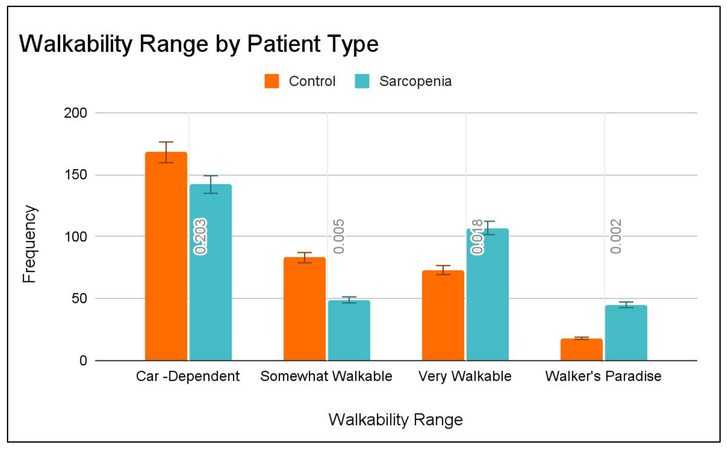


Figure 1: Walk score 'walkability' distribution in sarcopenia patients and controls, p-values shown after Chi-square test with Bonferroni correction.

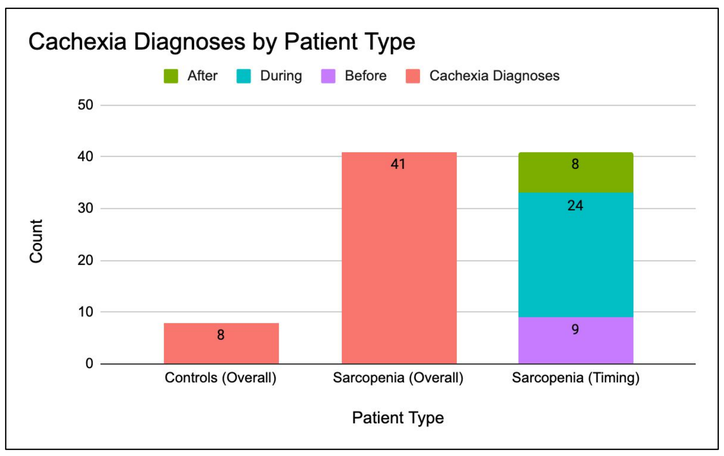
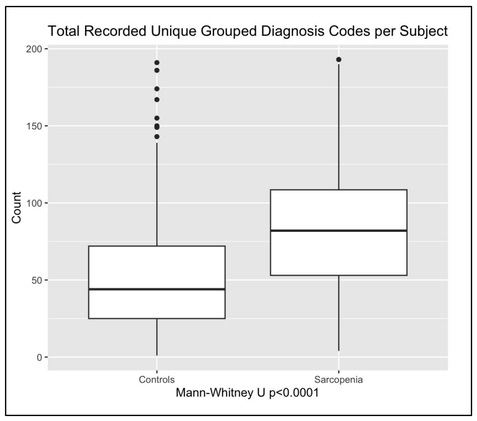


Figure 2a & 2b: Cachexia diagnoses by patient type (p-value <0.00001) and timing relative to sarcopenia diagnosis; median number of unique diagnoses in the RPDR by patient type



Discussion

Contrary to the negative correlations between high walk score and poor health outcomes previously found in the literature, this case control analysis suggests a positive correlation between walk score and sarcopenia. While the underlying mechanisms of this potential relationship are not fully understood, there are a few possible explanations. Due to the lack of temporal data in the RPDR, it is not known how long each patient resided at each address. It is possible that sarcopenia patients who had other comorbidities moved into urban areas from rural areas for increased healthcare access. Increased physical activity in walkable areas can be attributed to an increase in incidental walking as a means of transportation, replacing car travel. Thus, perhaps grand muscle loss as seen in sarcopenia cannot simply be prevented through incidental exercise, but rather through a more concerted effort to increase physical exercise through activities such as resistance training. Previous literature conducted on the relationship between walkability and walking behavior among elderly individuals in East Asian urban areas hypothesized that those living in 'walkable' yet densely populated areas with heavy vehicle traffic actually may be disincentivized to walk, due to safety concerns. The relationship between walkability, physical activity, and sarcopenia must be further characterized in US urban settings to make effective and salient policy recommendations.

Limitations/Future Directions

Additional longitudinal studies are needed to assess the impacts of residential walkability as patients age. Study participation was restricted by a Massachusetts zip code, potentially limiting the generalizability of the relationship between walkability and sarcopenia in other US states. MGH services a less racially diverse population compared to Massachusetts' demographics. Walk Scores were derived from RPDR patient database zip codes, limiting the granularity of the Walk Score which would be most accurately calculated using a full address. Heterogeneity in the clinical presentation of sarcopenia may not be completely captured by the ICD-10 code. Future prospective studies using clinical monitoring would be best suited to fully capture the diagnostic intricacies of sarcopenia and its presentation in patients. The major urban area in this study's group of patient zip codes is Boston, known nationally for its urban walkability. Future research is needed to characterize the relationship between sarcopenia and walkability in urban areas that have a lower average walk score than Boston.

References

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