TO THE EDITOR:

In-person and virtual assessment of short physical performance battery test in older adults with myeloid malignancies

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Impairment in physical function is an independent predictor of disability, hospitalization, and mortality.[1-4] Geriatric oncology guidelines recommend performing both self-reported [eg, activities of daily living (ADL) and instrumental ADLs (IADL)] and performance-based measures as part of a geriatric assessment.[5,6]

The short physical performance battery (SPPB) is an objective physical performance measure consisting of: gait speed, chair stand, and balance components, with a score ranging from 0 (worst) to 12 (best) points.[7] Among older adults with cancer, impairment in SPPB (≤ 9 of 12 points) is associated with morbidity and mortality.[8,9] The virtual SPPB uses the same scoring and components of SPPB, which patients rate after watching a video demonstration.[10] Previous studies among older adults without cancer have shown the virtual SPPB is valid, reliable, and moderately correlated with the in-person SPPB (correlation coefficient, r = 0.60-0.69).[10,11]

In this study of older adults with myeloid malignancies, we examined the correlation between the in-person SPPB and virtual SPPB with each other and with other self-reported measures: comorbidity, ADL, and IADL.

Data for this secondary analysis were collected from 3 studies (supplemental Table 1): University of Rochester Geriatric Oncology Assessment for Acute myeloid leukemia (UR-GOAL; NCT04625413),[12] Geriatric Oncology-Exercise for Cancer Patients (GO-EXCAP; NCT04035499) single arm study,[13] and GO-EXCAP pilot randomized controlled trial (GO-EXCAP 2; NCT04981821).[14] In this analysis, we included patients who completed both the in-person SPPB and virtual SPPB.

The virtual SPPB was administered using a website (see supplemental Methods; supplemental Table 2). Demographic and clinical information was collected from electronic medical records and self-reports, including Katz ADL (range, 0-6; impairment <6) and Older American Resources and Services IADL (range, 0-14; impairment <14).[15,16] Patients reported the number and severity of their comorbidities using the Older American Resources and Services physical health scale (impairment ≥ 3 comorbidities or any that severely limit activity).[17,18]

We calculated descriptive statistics for the participants' demographic and clinical characteristics, in-person SPPB, and virtual SPPB total and component scores. Correlations between in-person SPPB and virtual SPPB total scores, component scores, self-reported ADL and IADL, and the number of comorbid conditions were assessed using Spearman's rank correlation coefficient because of the skewed distribution of variables. To ensure a valid estimation of variance in our sample with repeated

The full-text version of this article contains a data supplement.

Table 1. Correlation of in-person SPPB and virtual SPPB total and component scores (N=48)

	SPPB balance		SPPB gait		SPPB strength		SPPB total	
	r	95% CI / P	r	95% CI / P	r	95% CI / P	r	95% CI / P
Virtual SPPB balance	0.17	−0.23, 0.53	0.38	0.06, 0.65	0.53	0.31, 0.70	0.53	0.30, 0.71
Virtual SPPB gait	0.04	−0.32, 0.39	0.54	0.28, 0.74	0.60	0.40, 0.75	0.62	0.40, 0.80
Virtual SPPB strength	0.04	−0.36, 0.41	0.41	0.12, 0.67	0.56	0.32, 0.75	0.52	0.28, 0.74
Virtual SPPB total	0.07	−0.35, 0.47	0.52	0.26, 0.73	0.64	0.45, 0.78	0.63	0.42, 0.79

Spearman correlation: 95% CI bootstrapped with 5000 resamples.

observations, we report all SPPB-related statistics with measures of uncertainty (95% confidence interval [CI], standard error [SE], and interquartile interval [IQI], as appropriate) from bootstrapped variance estimates, with 5000 resamples at the patient level and with replacements. The total scores were compared using a paired t test and bootstrapped SE. Analyses were performed using RStudio (version 2022.2.3.492) and SAS software (version 9.4, SAS Institute Inc).

We included 34 patients who provided 48 assessments of both in-person and virtual SPPB. The mean age was 71.09 years (SE, 0.88; range, 62-81 years); 10 of 34 individuals (29.41%) were females, and all were White. Most patients were diagnosed with acute myeloid leukemia (64.70%; 22/34); 9 of 34 individuals (26.47%) had myelodysplastic syndrome and 3 of 34 (8.82%) had other myeloid malignancies (supplemental Table 3).

The timing and method of virtual SPPB administration are shown in supplemental Table 4. The mean SPPB total scores were significantly higher for the in-person than for the virtual setting (9.31 [SE 0.29] vs 7.71 [SE 0.41]; mean difference = 1.60 [SE 0.31]; $P < .001$). For most assessments (32/48; 66.67%), the virtual SPPB total score was lower than that of the in-person SPPB. For 9 of 48 (18.75%) assessments, the virtual SPPB total score was higher, and for the remaining, the scores were identical. None of the patients had the lowest ("floor" = 0 points) total score on either measure, but similar proportions (in-person SPPB = 10.41% [95% CI = 1.52-19.32]; virtual SPPB = 8.33% [95% CI = 0.24-16.42]) scored the maximum

("ceiling" = 12 points). The mean virtual SPPB component scores were lower than corresponding in-person SPPB scores, although the median scores were similar except for the gait component (in-person SPPB = 3 [IQI = 0]; virtual SPPB = 4 [IQI = 0]; supplemental Table 5). supplemental Figure 1 shows a Bland-Altman plot comparing the mean paired measurement (in-person SPPB and virtual SPPB) for each patient to the difference in their virtual SPPB and in-person SPPB scores. There was a subtle increasing trend in the difference between these measures as the mean score increased; however, this trend was within the agreement limits.

Tables 1 and 2 present the correlations between in-person SPPB and virtual SPPB total and component scores and between these scores and measures of self-reported physical function and comorbidities. The total scores were correlated at 0.63 (95% CI = 0.42-0.79), whereas component scores ranged from 0.004 (95% CI = −0.36 to 0.41]; virtual SPPB strength vs in-person SPPB balance) to 0.64 (95% CI = 0.45-0.7]; total virtual SPPB vs in-person SPPB strength). supplemental Table 6 shows the correlations for the subgroup in which the virtual SPPB was completed before in-person assessment, which were almost similar. Overall, the scores for both measures were positively correlated with the independence in ADLs and IADLs, and negatively correlated with the number of comorbidities.

The COVID-19 pandemic has accelerated the rise of remote health care delivery. A better understanding of remotely assessed physical function is needed to ensure quality care when patients cannot be

Table 2. Correlation of in-person SPPB and virtual SPPB total and component scores with function and comorbidities (N=48)

	ADLs		IADLs		Comorbidity count	
	r	95% CI	r	95% CI	r	95% CI
SPPB total	0.29	−0.04, 0.57	0.60	0.34, 0.80	−0.38	−0.64, −0.04
SPPB strength	0.21	−0.10, 0.49	0.63	0.41, 0.80	−0.34	−0.57, −0.10
SPPB balance	0.11	−0.22, 0.44	0.09	−0.29, 0.45	−0.16	−0.46, 0.20
SPPB gait	0.46	0.16, 0.71	0.42	0.09, 0.68	−0.23	−0.46, 0.03
vSPPB total	0.27	−0.02, 0.52	0.45	0.18, 0.67	−0.26	−0.49, 0.01
vSPPB strength	0.32	0.05, 0.56	0.38	0.10, 0.62	−0.21	−0.44, 0.05
vSPPB balance	0.27	−0.02, 0.53	0.34	0.03, 0.61	−0.12	−0.39, 0.16
vSPPB gait	0.007	−0.30, 0.33	0.40	0.10, 0.66	−0.29	−0.50, −0.06

Spearman correlation: 95% CI bootstrapped with 5000 resamples.
Comorbidities (range, 0-13; higher = more comorbid conditions).
ADL (range, 0-6; higher = more independent); and IADL (range, 0-14; higher = more independent).

seen in person. As a central component of geriatric assessment, it is critical to establish the strengths and limitations of self-reported physical function assessments, including the virtual SPPB.

The in-person SPPB and virtual SPPB total scores were moderately correlated in our study, and the difference between them did not appear to vary systematically based on the score. This aligns with other studies showing that the virtual SPPB is a valid assessment of low extremity function.[10,11] However, although total scores for the 2 measures were similar among other groups of older adults, average virtual SPPB scores were lower than in-person SPPB in our sample of older adults with myeloid malignancies. Furthermore, patients in our sample rated all virtual component scores lower than their corresponding in-person performance, whereas previous studies reported underestimation of gait speed and overestimation of balance on the virtual SPPB.[10] However, consistent with past results, we found that more in-person than virtual assessments achieved the maximum score for the gait component (56.25 vs 14.58%). Furthermore, although both total virtual and in-person SPPB scores were positively correlated with independence in ADLs and IADLs and negatively correlated with comorbidities, the strength of the correlation varied for component scores. Overall, the in-person SPPB showed a trend toward stronger associations with self-reported function and comorbidities, consistent with evidence that self-reported and performance-based assessments provide distinct information regarding physical function and should not be used interchangeably.[19,20] This analysis adds to the literature by showing that although the virtual SPPB approximates in-person results, component-specific details vary between the 2 measures. In particular, the weak associations of in-person SPPB balance with the virtual SPPB suggest that there are complexities in translating this component to a virtual format in which participants must judge their ability to complete tasks they may not perform commonly if they have balance impairments.

This exploratory analysis is limited by our relatively small, homogenous sample, which may not be generalizable to those with other types of cancers or demographic characteristics. The order and timeframe of the virtual and in-person SPPB assessments varied. Although administering virtual after in-person SPPB may contribute to a greater similarity of scores, we found that correlations between measures were similar among the subgroup who had the virtual assessment completed before the in-person one. Furthermore, test-retest reliability is relatively high for both measures (in-person ICC = .889; virtual ICC = .896).[10]

Our study is the first to investigate the relationship between the virtual SPPB and other self-reported health characteristics and the correspondence between the virtual SPPB and in-person SPPB among older adults with cancer. The virtual SPPB provides distinct information from both the objective SPPB and self-reported assessments of function (ie, ADLs). Future studies are needed to determine the clinical use of virtual SPPB in predicting outcomes among older adults with hematologic malignancies. As the use of telemedicine continues to increase, rigorous evaluation of virtual assessments of physical performance among older adults with cancer should be a research priority.

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