

The Short Physical Performance Battery as a Predictor of Functional Capacity after Stroke

Alyssa D. Stookey, PhD,* Leslie I. Katznel, MD, PhD,*† Gregory Steinbrenner, MS,*†
Marianne Shaughnessy, PhD,*† and Frederick M. Ivey, PhD*‡

Background: The short physical performance battery is a widely used instrument for quantifying lower extremity function in older adults. However, its utility for predicting endurance-based measures of functional performance that are more difficult to conduct in clinical settings is unknown. An understanding of this could be particularly relevant in mobility impaired stroke survivors, for whom establishing the predictive strength of simpler to perform measures would aid in tracking broader categories of functional disability. This cross-sectional study was conducted to determine whether the short physical performance battery is related to functional measures with a strong endurance component. *Methods:* Functional measures (short physical performance battery, peak aerobic capacity, and 6-minute walk) were obtained and compared for the first time in stroke survivors with hemiparetic gait. Pearson correlation coefficients were used to assess strength of the relationships ($\alpha P < .05$). *Results:* Forty-three stroke participants performed a standardized short physical performance battery. Forty-one of the subjects completed a 6-minute walk, and 40 completed a peak treadmill test. Mean short physical performance battery (6.3 ± 2.5 [mean \pm SD]), 6-minute walk (242 ± 115 meters), and peak aerobic capacity (17.4 ± 5.4 mL/kg/min) indicated subjects had moderate to severely impaired lower extremity functional performance. The short physical performance battery was related to both 6-minute walk ($r = 0.76$; $P < .0001$) and peak fitness ($r = 0.52$; $P < .001$). *Conclusions:* Our results show that the short physical performance battery may be reflective of endurance-based, longer-distance performance measures that would be difficult to perform in standard clinical stroke settings. Additional studies are needed to explore the value of using the short physical performance battery to assess rehabilitation-related functional progression after stroke. **Key Words:** Exercise—rehabilitation—stroke recovery.

Published by Elsevier Inc. on behalf of National Stroke Association

Effectively tracking the long-term progression of lower extremity function after stroke is challenging but essential, considering the high prevalence of this condition and the degree to which stroke-related deficits com-

pound over time secondary to physical inactivity.^{1,2} The majority of survivors are left with residual neurologic deficits that impair both function and mobility,³ such that clinicians in the field would benefit from having

From the *Department of Veterans Affairs and Veterans Affairs Medical Center, Geriatric Research, Education and Clinical Center (GRECC); †Departments of Medicine; and ‡Neurology, University of Maryland School of Medicine, Baltimore, Maryland.

Received June 8, 2012; revision received November 2, 2012; accepted November 4, 2012.

Supported by a Veterans Affairs (VA) RR&D CDA-1 Award (Dr. Stookey), Department of VA and VA Medical Center, Geriatric Research, Education and Clinical Center (GRECC), The National Institute on Aging (NIA) Claude D. Pepper Older Americans

Independence Center (P30-AG028747), and the Department of VA, VA RR & D Exercise & Robotics Center of Excellence. Dr. Ivey was supported by VA Merit Award funding.

Address correspondence to Alyssa D. Stookey, PhD, Baltimore Veterans Affairs Medical Center, Geriatrics Service/GRECC BT (18) GR, 10 N Greene St, Baltimore, MD 21201-1524. E-mail: alyssa.stookey@va.gov.

1052-3057/\$ - see front matter

Published by Elsevier Inc. on behalf of National Stroke Association
<http://dx.doi.org/10.1016/j.jstrokecerebrovasdis.2012.11.003>

predictive instruments that adequately capture diverse aspects of disability progression/regression. However, many functional tests are impractical in routine clinical settings because of a number of factors. For example, treadmill peak aerobic capacity (VO₂ peak) is considered the criterion standard measure of functional performance for aging and disabled populations,^{4,5} but widespread use in stroke clinical practice would be limited by constraints related to time, equipment, and expertise. Similarly, the 6-minute walk (6MW) test is a broadly recognized functional performance outcome for long distance, community-based ambulation,⁶ but can be difficult to perform because of the extensive amount of floor space required. Establishing easier to use surrogate measures that are related to endurance-based functional capacity after stroke would therefore be clinically relevant.

The short physical performance battery (SPPB)—a brief performance battery based on a timed short distance walk, repeated chair stands, and a set of balance tests—is a validated assessment tool for measuring lower extremity function that is widely used in both clinical and research settings.⁷⁻¹⁴ The popularity of this instrument stems, in part, from its relative ease of use, perceived potential for implementation in clinical practice, and good association with physical activity levels and general walking disability in nonstroke elderly.⁷⁻¹⁰ It has also been found to predict mortality,^{9,11} hospitalization rate,^{11,12} and a variety of comorbid disease conditions.^{13,14} Nevertheless, little is known about this measure in the context of stroke recovery and rehabilitation. In addition, it is entirely unknown whether SPPB scores reflect endurance capacity during longer-distance ambulatory functional tests in this population.

Our study sought to clarify the clinical utility of the SPPB for functional performance measures that more closely mimic the endurance and distance requirements of community-based ambulation. Specifically, we obtained results from SPPB, VO₂ peak, and 6MW in a cohort of hemiparetic stroke patients for the purpose of characterizing the relationship of SPPB with these indices of functional performance.

Methods

Subjects

This study was approved by the institutional review board of the University of Maryland, and all subjects provided written informed consent. Community dwelling stroke patients between 40 and 87 years of age with residual mild to moderate hemiparetic gait were recruited from the University of Maryland Medical System, the Baltimore Veterans Affairs Maryland Health Care System, and the surrounding greater Baltimore area for ongoing exercise rehabilitation studies. Mild to moderate hemiparetic gait was defined as observable asymmetry of gait

including reduced stance time, or reduced stance and increased swing time in the affected limb. Participants had preserved capacity for ambulation with an assistive device (e.g., a walker or cane) and/or a standby aid, as needed. Participants were required to have completed all conventional inpatient and outpatient physical therapy and were >6 months (ischemic stroke) or 12 months (hemorrhagic stroke) after the index stroke date.

All participants underwent evaluations for eligibility, including a comprehensive history and physical examination, a neurologic examination by a neurologist or nurse practitioner, and a graded exercise test with electrocardiographic monitoring. The intent was to enroll each subject into an exercise interventional study. Exclusion criteria were established to ensure participant safety for exercise participation and included any chronic medical condition that would be a contraindication to exercise, such as cardiac history of unstable angina, recent (<3 months) myocardial infarct, congestive heart failure (New York Heart Association category II-IV), hemodynamically significant valvular dysfunction, a medical history of peripheral arterial occlusive disease with claudication, pulmonary or renal failure, active cancer, untreated or poorly controlled hypertension measured on at least 2 occasions (>160/100 mm Hg), poorly controlled diabetes (HbA1c >10%), or anemia (hematocrit <30). Participants were also excluded if they met the screening criteria consistent with dementia (Mini-Mental Status Examination [MMSE] score <23), symptomatic angina, or severe silent myocardial ischemia (>2 mm ST segment depression on the exercise treadmill test), or had current, untreated major depression (Center for Epidemiological Studies–Depression [CESD] scale score >16).

Short Physical Performance Battery

The SPPB is a functional test that measures gait speed (8-foot walk), standing balance, and lower extremity strength and endurance (chair rise task). During the 8-foot walk, participants were instructed to walk at their normal comfortable pace over a flat, 8-foot walking surface demarcated by traffic cones. The average of 3 trials was used. For safety, participants wore a gait belt and used their assistive device and/or orthoses. Standing balance was assessed for 3 different static positions: feet side by side, semitandem (side of the heel of 1 foot touching the big toe of the other), and full tandem (heel of 1 foot in front of and touching the toes of the other foot). Participants were instructed to try to hold each of these positions for 10 seconds. For the chair rise task, participants were instructed to stand up and sit down 5 times in a row as quickly as possible. Each test was scored on a scale of 0 to 4 points, with a summary performance score range of 0 to 12 points using cutpoint criteria established by Guralnik et al.⁹ If the participant was unable to perform a specific test, a score of a 0 was assigned.

Download English Version:

<https://daneshyari.com/en/article/2706147>

Download Persian Version:

<https://daneshyari.com/article/2706147>

[Daneshyari.com](https://daneshyari.com)