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A New Clinically Applicable Measure of Functional Status in Patients With Heart Failure

The 60-Foot Walk Test

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ABSTRACT

OBJECTIVES This study reports the development and predictive value of the 60-foot walk test (60ftWT), a brief functional status measure for patients with heart failure (HF). The goal was to develop a test suitable for clinical settings and appropriate for patients with walking impairments.

BACKGROUND The 6-min walk test (6MWT) has considerable predictive value, but requires a long walking course and has limited utility in patients with mobility-related comorbidities. A shorter, more clinically practical test is therefore needed.

METHODS A total of 144 patients (age 57.4 ± 11.4 years; 111 males) with symptomatic HF received baseline assessments using the 60ftWT, 6MWT, and self-reported symptom and health status. Patients were tested 3 months later to determine stability of assessments. HF hospitalizations or death from any cause were recorded for 3.5 years following baseline.

RESULTS Median 60ftWT completion time was 26 seconds (interquartile range: 22 to 31). Longer 60ftWT time was associated with shorter 6MWT distance ($r = -0.75$; $p < 0.001$), and with higher symptom severity at baseline ($r = -0.40$; $p < 0.001$). Longer 60ftWT times also predicted increases in 6MWT and symptoms from baseline to 3 months ($p < 0.01$). Both WTs predicted long-term clinical outcomes, with patients taking longer than 31 seconds to complete the 60ftWT at greatest risk for HF hospitalization or death (hazard ratio: 2.13; 95% confidence interval: 1.18 to 3.84; $p = 0.01$).

CONCLUSIONS The 60ftWT is an easily administered functional status measure that predicts adverse events, symptoms, and health status. It has the potential for considerable clinical utility to help identify patients at risk for future events and to calibrate treatments designed to improve functional status and quality of life. (J Am Coll Cardiol HF 2017;■:■–■) Published by Elsevier on behalf of the American College of Cardiology Foundation.

Treatment strategies and medical management of heart failure (HF) often rely on assessment of symptoms and on impairments in functional status. Current methods for assessment of functional status and the effects of symptoms on daily activity include peak oxygen consumption during cardiopulmonary exercise testing and the 6-min walk test (6MWT). The 6MWT has been validated against clinical outcomes and accepted as a safe and inexpensive alternative to

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ABBREVIATIONS AND ACRONYMS

CI = confidence interval

HF = heart failure

HR = hazard ratio

KCCQ = Kansas City Cardiomyopathy Questionnaire

LVEF = left ventricular ejection fraction

NYHA = New York Heart Association classification

6MWT = 6-min walk test

60ftWT = 60-foot walk test

WT = walk test

cardiopulmonary exercise testing for inpatient risk stratification (1,2).

The 6MWT has the advantage of being self-paced and easily administered. However, its clinical use is limited because it is time consuming and requires a long continuous hallway course, which may not be available in clinical settings. Furthermore, many patients with HF present with multiple comorbidities and physical disabilities other than HF that prohibit them from walking significant distances (e.g., gout, foot ulcers, claudication, arthritis) (3-5).

Alternative methods for functional status assessment have been developed, but do not specifically address limitations of the 6MWT. For instance, a 15-foot walk test has previously been used in elderly populations as a measure of frailty, as well as a 2-min walk test in stroke patients, and in patients with chronic obstructive pulmonary disease (6-8). However, these methods have not been systematically validated against HF-related clinical outcomes. Therefore, to enhance the clinical applicability of functional status assessment in HF, we developed a short and efficient walk test (WT) that can be administered in typical clinical settings, a 60-foot walk test (60ftWT) consisting of 4 laps of 15 feet. Associations of the 60ftWT with HF symptoms and clinical outcomes were tested and compared with the 6MWT.

METHODS

PATIENT POPULATION. A total of 144 patients with HF (mean age, 57.4 ± 11.4 years; age range, 23 to 87 years; 111 [77.1%] men) were enrolled in the BETRHEART (Behavioral Triggers of HF) study (9-11). BETRHEART is a prospective observational cohort study designed to examine biobehavioral triggers of symptom exacerbations among patients with HF. The study design is presented in **Figure 1**. The present study represents a planned secondary analysis of this larger study. Patients were recruited from outpatient clinics at University of Maryland Medical Center and Baltimore VA Medical Center, with all assessments performed at University of Maryland Medical Center. Time between baseline and the most recent prior hospitalization varied across patients with 76% (n = 110) hospitalized >1 month from baseline, 22% (n = 31) hospitalized within 1 month of baseline, and 2% (n = 2) never previously hospitalized. Inclusion criteria included diagnosis of symptomatic HF for at least 3 months, New York Heart Association (NYHA) functional class II to IV, and a left ventricular ejection fraction (LVEF) ≤40% measured within the last year. Exclusion criteria were clinically significant valve disorder as primary diagnosis, myocarditis in past 6 months, thyroid dysfunction as primary etiological factor, current or past 6-month alcohol abuse, left ventricular assist device, prior heart transplantation, active cancer treatment, living in a nursing home, and cognitive impairments (≤12 on the Mini-Mental State Examination-Brief Version) (12). This study was approved by the institutional review boards at University of Maryland Medical Center and the Uniformed Services University of the Health Sciences, and all patients provided written informed consent before participation.

PROCEDURES. As part of the larger BETRHEART study, 144 participants received baseline assessments of functional status and symptoms, and 126 of these completed a second 3 month assessment. During each assessment, patients completed psychological and behavioral questionnaires, followed by blood collection, measurement of blood pressure, the 60ftWT, a 5-min rest period, and the 6MWT. Study staff members completed all assessments and procedures were standardized to minimize measurement variability. For each WT, patients were allowed to use any walking aids they typically used when ambulating (i.e., canes). No patients in the study were prescribed oxygen.

Between baseline and 3-month assessments, 18 participants were withdrawn from the study either because they no longer met eligibility criteria (i.e., received a left ventricular assist device, began abusing alcohol, were determined to have cognitive impairments [n = 3]), were lost to follow-up (n = 12), or died (n = 3). Individuals who withdrew were more symptomatic ($x^2[2] = 9.4$; p = 0.009), primarily NYHA class III and IV, and had a lower body mass index (27.1 ± 5.5 vs. 31.4 ± 7.6) ($t[142] = 2.3$; p = 0.02). There were no differences in baseline WT performance among participants that withdrew and those that did not.

60ftWT PROCEDURE. A 15-foot distance was marked in a flat hospital corridor. The following instructions were provided to patients: "For this task we ask that you walk 4 laps of 15 feet. Your goal is to complete the task in as short a time as possible. However, to do so please walk at a comfortable pace, do not run. When completing this task, walk in a straight line and make sure that both feet are behind the hall marker before turning. Your turns should be small, staying as close as possible to the marker." Inclusion of the statement "comfortable pace" was added to ensure patient safety and reduce the likelihood of adverse events (i.e., falls) as patients traversed the short distance and completed several turns in a relatively short