

Research Correspondence

Prognostic Value of Self-Reported Versus Objectively Measured Functional Capacity in Patients With Heart Failure

Results From the TIME-CHF (Trial of Intensified Versus Standard Medical Therapy in Elderly Patients With Congestive Heart Failure)

To the Editor: A central aspect of quality of life in patients with heart failure (HF) is their ability to perform daily activities, which may be quantified by the Duke Activity Status Index (DASI) questionnaire (1). Lower DASI scores were shown to be related independently to event-free survival in patients after hospitalization for HF, whereas the 6-min walk distance (6MWD) assessment was not retained in multivariate analysis (2). These data suggest that a HF patient's subjective perception may be of greater clinical importance than an objective measure of exercise capacity would be. However, hospitalized patients may have difficulties assessing their daily limitations accurately, as well as performing exercise tests optimally. Moreover, DASI score and 6MWD may change over time. Therefore, we evaluated to what extent DASI score and 6MWD change over 1 year and whether such changes might affect prognosis in patients with chronic HF. We hypothesized that an increase in DASI score and an increase in 6MWD would be accompanied with reduced risk.

Patients from the TIME-CHF (Trial of Intensified Versus Standard Medical Therapy in Elderly Patients With Congestive Heart Failure) who completed the evaluation at baseline and after 1 year were analyzed. TIME-CHF has been described in detail elsewhere (3). In brief, the DASI (points), a simple 12-item patient-reported questionnaire that estimates functional capabilities based on daily activities was used (1). DASI and 6MWD were done on the same day. Patients were divided below and above the median change in DASI or 6MWD. The primary endpoint of the present analysis was all-cause mortality; secondary endpoints were HF hospitalization and all-cause hospitalization up to 4 years after 1-year assessment. Results are presented as mean \pm SD or median (interquartile range [IQR]). Between-group comparisons were performed using Student *t*, Mann-Whitney *U*, or Pearson chi-squared test, as appropriate. Kaplan-Meier curves were used for calculating time-dependent occurrences of events. We estimated hazard ratios (HR) by Cox proportional hazards model. A 2-sided *p* value of ≤ 0.05 was considered statistically significant. All calculations were performed with the use of the SPSS (version 19.0, SPSS Inc., Chicago, Illinois).

In 309 patients (35.3% women), complete data were available. At baseline, mean age was 76 ± 8 years, ejection fraction was $34 \pm 12\%$, and body mass index was 25.6 ± 4.2 kg/m². Coronary artery disease was the cause of HF in 56% of the patients. At

baseline, patients had low median DASI scores (10.0 [IQR: 4.5 to 19.0] points). Moreover, baseline median 6MWD (293 [IQR: 203 to 377] m) was poor, as healthy elderly walk on average >600 meters (4). One year after initial evaluation, the DASI improved by a median of 5.5 (IQR: 0 to 15.2) points, whereas the 6MWD improved by a median of 40 (IQR: -10 to 103) m.

During follow-up (median: 1,071 days; IQR: 769 to 1,375 days), 59 patients passed away, and 165 patients were hospitalized at least once, of which 66 admissions were HF related. Absolute numbers of events per strata are reported in Table 1.

Patients with change in DASI scores below median had a worse survival than did patients with a change above median (HR: 2.08, 95% confidence interval [CI]: 1.25 to 3.47, *p* = 0.0051) (Fig. 1A). Lack of an increase in 6MWD by >40 m did not affect all-cause mortality significantly (HR: 1.35, 95% CI: 0.81 to 2.25, *p* = 0.26) (Fig. 1B).

Lack of increasing DASI score of >5.5 points did not affect HF hospitalization-free survival significantly (HR: 1.39, 95% CI: 0.86 to 2.26, *p* = 0.18) (Fig. 1C), but all-cause hospitalization-free survival (HR: 1.53, 95% CI: 1.12 to 2.08, *p* = 0.0072) (Fig. 1E). Lack of increasing 6MWD by >40 m did not affect HF hospitalization-free survival significantly (HR: 1.40, 95% CI: 0.86 to 2.26, *p* = 0.18) (Fig. 1D), but all-cause hospitalization-free survival (HR: 1.54, 95% CI: 1.14 to 2.10, *p* = 0.0056) (Fig. 1F).

These findings suggest that improved self-reported physical capacity after 1 year seems to be associated with a better prognosis in patients with HF, whereas objective measures of improvement in physical capacity seem to have a limited value. Thus, the patient's ability to estimate his own daily "working" capacity seems to carry a higher prognostic value than that estimated from repeat

Table 1 Changes in DASI Score and 6MWD

	Change in DASI Score		Change in 6MWD	
	< Median	> Median	< Median	> Median
Deaths, n	39	20	34	25
HF hospitalization, n	36	30	39	27
AC hospitalization, n	91	74	98	67

AC = all-cause; DASI = Duke Activity Status Index; HF = heart failure; 6MWD = 6-min walk distance.

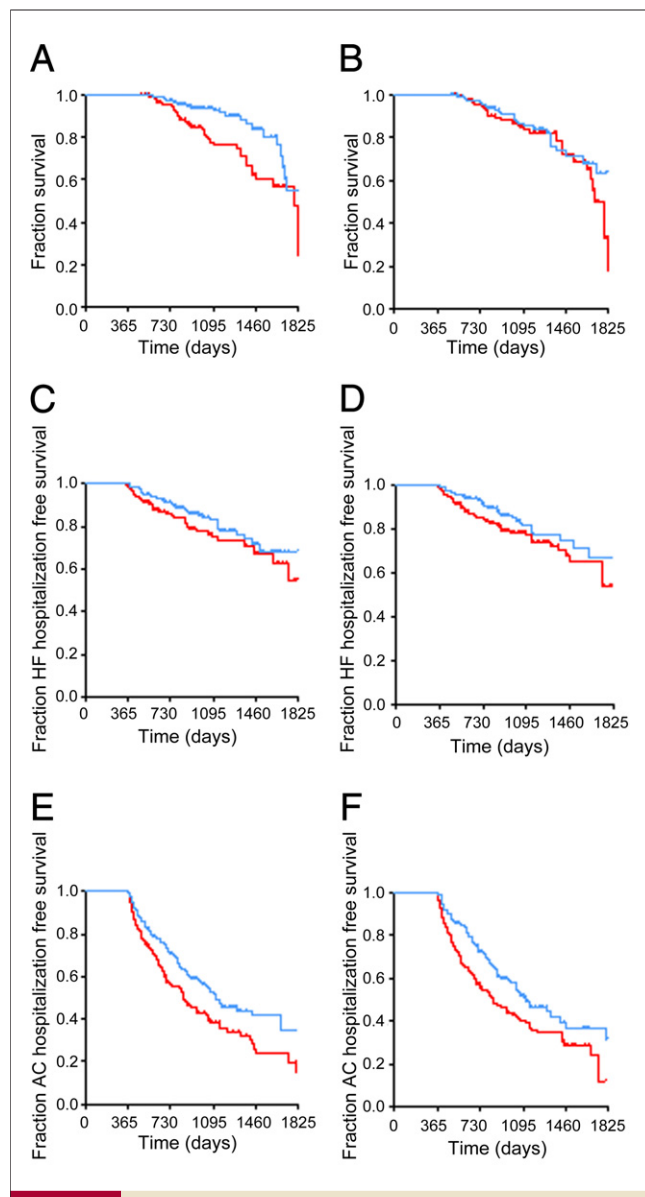


Figure 1 Kaplan-Meier Curves for Survival, HF Hospitalization-Free Survival, and All-Cause Hospitalization-Free Survival

Kaplan-Meier curves for survival (A, B), heart failure (HF) hospitalization-free survival (C, D), and all-cause (AC) hospitalization-free survival (E, F) after stratification for change in Duke Activity Status Index (above median, blue line; below median, red line) (A, C, E) and for change in 6-min walk distance (above median, blue line; below median, red line) (B, D, F).

functional exercise testing. Although shorter 6MWD is more likely in HF patients with lower peak aerobic capacity, 6MWD is no surrogate for peak aerobic capacity (5). Therefore, 1-year changes in peak aerobic capacity may still have a prognostic value in patients with HF.

Although the current findings are hypothesis-generating rather than definitive and require further study, it seems reasonable to recommend estimating self-reported physical capacity by using the DASI in daily clinical practice. It is a short, simple, and readily available office screening tool. In HF, it allows individual risk assessment. Current findings stress the importance to increase the levels of regular daily activities in patients with HF, as this is associated with improved prognosis and lower healthcare costs. This is in line with data from the Copenhagen City Heart Study in healthy subjects. Those who were able to adopt a higher degree of self-reported physical activity had lower mortality rates during follow-up (6).

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REFERENCES

- Hlatky MA, Boineau RE, Higginbotham MB, et al. A brief self-administered questionnaire to determine functional capacity (the Duke Activity Status Index). *Am J Cardiol* 1989;64:651-4.
- Parissis JT, Nikolaou M, Birmipa D, et al. Clinical and prognostic value of Duke's Activity Status Index along with plasma B-type natriuretic peptide levels in chronic heart failure secondary to ischemic or idiopathic dilated cardiomyopathy. *Am J Cardiol* 2009;103:73-5.
- Pfisterer M, Buser P, Rickli H, et al., for the TIME-CHF Investigators. BNP-guided vs symptom-guided heart failure therapy: the Trial of Intensified vs Standard Medical Therapy in Elderly Patients With Congestive Heart Failure (TIME-CHF) randomized trial. *JAMA* 2009;301:383-92.
- Annegarn J, Spruit MA, Savelberg HH et al. Differences in walking pattern during 6-min walk test between patients with COPD and healthy subjects. *PLoS One* 2012;7:e37329.
- Lucas C, Stevenson LW, Johnson W, et al. The 6-min walk and peak oxygen consumption in advanced heart failure: aerobic capacity and survival. *Am Heart J* 1999;138:618-24.
- Schnohr P, Scharling H, Jensen JS. Changes in leisure-time physical activity and risk of death: an observational study of 7,000 men and women. *Am J Epidemiol* 2003;158:639-44.