Socioeconomic and partner status in chronic heart failure: Relationship to exercise capacity, quality of life, and clinical outcomes

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Background Prognosis in patients with heart failure (HF) is commonly assessed based on clinical characteristics. The association between partner status and socioeconomic status (SES) and outcomes in chronic HF requires further study.

Methods We performed a post hoc analysis of HF-ACTION, which randomized 2,331 HF patients with ejection fraction ≤35% to usual care ± aerobic exercise training. We examined baseline quality of life and functional capacity and outcomes (all-cause mortality/hospitalization) by partner status and SES using adjusted Cox models and explored an interaction with exercise training. Outcomes were examined based on partner status, education level, annual income, and employment.

Results Having a partner, education beyond high school, an income >$25,000, and being employed were associated with better baseline functional capacity and quality of life. Over a median follow-up of 2.5 years, higher education, higher income, being employed, and having a partner were associated with lower all-cause mortality/hospitalization. After multivariable adjustment, lower mortality was seen associated with having a partner (hazard ratio 0.91, 95% CI 0.81-1.03, *P* = .15) and more than a high school education (hazard ratio 0.91, CI 0.80-1.02, *P* = .12), although these associations were not statistically significant. There was no interaction between any of these variables and exercise training on outcomes (all *P* > .5).

Conclusions Having a partner and higher SES were associated with greater functional capacity and quality of life at baseline but were not independent predictors of long-term clinical outcomes in patients with chronic HF. These findings provide information that may be considered as potential variables impacting outcomes. (Am Heart J 2017;183:54-61.)

Heart failure (HF) is a complex medical condition requiring multiple medications and lifestyle modifications to manage. Socioeconomic status (SES) and social support are thought to affect medical management and outcomes in HF.[1,2] For instance, HF patients with partners have higher medication adherence and event-free survival.[3] Furthermore, individuals with HF living in socioeconomically disadvantaged areas have higher rates of hospitalization than do their counterparts living in less disadvantaged areas.[4]

With a growing body of evidence regarding the impact of SES on health, the American Heart Association recently released a statement emphasizing the need to focus on social determinants of health in addition to traditional modifiable and nonmodifiable lifestyle, physiologic, and genetic risk factors when treating patients with heart disease.[5] Prior studies, however, have not systematically investigated partner status and SES in a population of patients with chronic HF receiving optimal medical therapy. Moreover, the data regarding SES and social support in HF are derived from small studies that did not examine the multiple components of SES and partner status together.

In the HF-ACTION study, data on partner status and SES were obtained at baseline by patient report. We investigated the associations between baseline partner status/SES and outcomes in patients with chronic systolic HF enrolled in HF-ACTION.

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Methods

HF-ACTION (clinicaltrials.gov, NCT00047437) was a randomized controlled clinical trial of aerobic exercise training in patients with chronic HF; the design, rationale, and primary results have been published.[6,7] The study enrolled 2,331 ambulatory patients between April 2003 and February 2007 who had left ventricular ejection fraction (EF) ≤35% and New York Heart Association (NYHA) class II to IV HF while on optimal HF therapy for at least 6 weeks. Patients were randomized to either usual care or exercise training in addition to usual care and followed up for at least 12 months. Exercise training consisted of 36 supervised exercise sessions over the initial 3 months, followed by home training on a treadmill or stationary cycle for another 2 years. The protocol was approved by the institutional review board for each site involved in the study, and written informed consent was obtained for all patients.

Partner status and *SES* were defined as reported in prior analyses from the HF-ACTION trial data set.[8] Partner status was ascertained by self-report of either having a partner (married or living with a partner) or no partner (single, never married, divorced, separated, or widowed). Socioeconomic status was measured by self-reported income (most recent annual household income before taxes; lower income defined as <$25,000 and higher income defined as ≥$25,000), employment status (employed defined as student, self-employed, part-time employed, or full-time employed; unemployed defined as homemaker, volunteer, retired, disabled, or unemployed), and education level (lower education defined as high school graduate/equivalent or less and higher education defined as greater than high school education, including some college, associate degree, college graduate, and/or graduate school degree).

Functional capacity was assessed by cardiopulmonary exercise testing to evaluate peak oxygen consumption (peak VO_2) as well as by 6-minute walk test to measure distance walked. Adherence to therapy was evaluated in patients randomized to exercise training by measuring total time of exercise performed during supervised training sessions and patient self-report of home training sessions. Quality of life was measured by the Kansas City Cardiomyopathy Questionnaire (KCCQ). The primary end point was all-cause mortality and hospitalization, with secondary end points including all-cause death and composite cardiovascular death or HF hospitalization. These outcomes were adjudicated by a committee blinded to treatment assignment.

Statistical analysis

Patients were grouped per independent variable of interest in dichotomous categories (eg, partner or no partner) and baseline characteristics were described. Continuous variables were reported as the median with 25th-75th percentiles and compared with the independent variable of interest using the Wilcoxon rank sum statistic. Categorical variables were reported as percentages and compared with the independent variable of interest with Pearson χ^2 or exact test.

The relationship of the independent variables of interest with outcomes was assessed using Cox proportional hazards ratios and was adjusted based on the variables consistently used in HF-ACTION post hoc analyses (see Table II footnote).[9] Regression models used complete case data. In addition, several additional variables were included that were thought to potentially confound outcomes associations: age, sex, race, history of depression, and Beck Depression Score.[10,11] Kaplan-Meier estimates were generated for the primary outcome. The relationship of independent variables was also investigated with regard to functional capacity and adherence to therapy. We also assessed for interaction of the independent variables and exercise treatment. A 2-tailed *P* value <.05 was considered statistically significant for all analyses. No adjustment was made for the assessment of multiple end points in the present article given the exploratory nature of the investigation. The SAS system, version 9.2, was used for analyses (SAS, Cary, NC), all of which were conducted by Duke Clinical Research Institute.

Results

The baseline characteristics of patients based on partner status and SES are described in Table I. Of the patients included in the study, 61% reported having a partner, 60% had more than a high school education, 59% had an income ≥$25,000, and 24% were employed. Patients with a current partner had higher income and tended to be older, male, and white. Patients with greater than a high school education included a larger proportion of women and white. Higher-income patients tended to be older, male, and white. Employment was more common in younger individuals. There were no statistically significant differences in medical therapies based on partner status or SES, with the exception of β-blocker use being more prevalent in individuals who were employed. Internal cardioverter/defibrillator use was significantly more prevalent among those who had a partner, had greater than a high school education, had higher income, and were unemployed. Comorbidities such as diabetes and hypertension were more common in individuals with less education, lower income, and unemployed status. The NYHA class was also worse in patients with less education, lower income, and unemployed status.

Table II describes baseline functional capacity and quality of life of patients based on partner status and SES. There were statistically significant differences in all groups with regard to exercise tolerance (measured by peak VO_2 and 6-minute walk test) and health-related quality of life (measured by the KCCQ), favoring having a partner, higher level of education, higher income, and being employed.