Published in final edited form as:

J Cardiopulm Rehabil Prev. 2009 ; 29(3): 171–178. doi:10.1097/HCR.0b013e31819a0266.

Quality of life in a diverse population of heart failure patients:

Baseline findings from the Heart Failure Adherence and Retention Trial (HART)

Carlos F. Mendes de Leon, PhD^{1,2}, Kathleen L. Grady, PhD, APN³, Claudia Eaton, MS², Cheryl Rucker-Whitaker, MD², Imke Janssen, PhD², James Calvin, MD⁴, and Lynda H. Powell, PhD²

¹Department of Preventive Medicine, Rush University Medical Center, Chicago, IL

²Rush Institute for Healthy Aging, Department of Internal Medicine, Rush University Medical Center, Chicago, IL

³Division of Cardiothoracic Surgery, Bluhm Cardiovascular Institute, Northwestern Memorial Hospital, Chicago, IL

⁴Section of Cardiology, Rush University Medical Center, Chicago, IL

Abstract

PURPOSE—The exact role of psychosocial status in quality of life (QOL) of heart failure (HF) patients is not fully clarified. This report investigates the association of depression and social support in 2 subdomains of QOL, overall satisfaction with QOL (S-QOL), and limitations in physical functioning (PF-QOL) in a diverse group of HF patients.

METHODS—Baseline data were used from a behavioral clinical trial, with complete information on 695 HF patients, of whom 33% were black and 24% had diastolic dysfunction. Data were collected via structured questionnaires, chart review, and a 6-minute walk test. QOL outcomes included the Quality of Life Index (QLI) as a measure of S-QOL, and the SF-36 physical functioning scale (SF-36 PF) as a measure of PF-QOL.

RESULTS—After adjustment for sociodemographic variables, clinical and functional characteristics of disease status accounted for 19% of the variance in the QLI. Depressive symptoms and social support were significantly associated with QLI scores ($P < .001$), and accounted for an additional 26% of the variance. Clinical and functional characteristics accounted for 33% of the variance in SF-36 PF scores, whereas depressive symptoms and social support accounted for an additional 1% of the variance.

CONCLUSIONS—Depression and social support play a substantially greater role in satisfaction with QOL than in perceived limitations in basic physical functions. Targeting depression and low social support may be more important to improve overall QOL, whereas medical management of HF symptoms and functional capacity may have a greater impact on reducing basic physical limitations.

CONDENSED ABSTRACT—We examined the role of psychosocial status in quality of life (QOL) in a sociodemographically and clinically diverse group of heart failure (HF) patients. Results suggest that depression and social support have greater importance for the impact of HF on overall satisfaction with QOL than on limitations in basic activities.

Keywords

Heart failure; quality of life; depression; social support; functional capacity

Heart failure (HF) is a common, debilitating, and costly syndrome. Approximately 5 million patients in the U.S. have HF and more than 550,000 new cases are identified each year.¹ HF has a substantial adverse impact on quality of life (QOL). HF patients generally report significantly poorer QOL than patients with other common cardiac conditions or other chronic medical conditions.²⁻⁴ The impact of HF on QOL is related to stage of disease, although disease symptoms and functional capacity tend to have a greater adverse effect on QOL than clinical indicators of disease severity, such as ejection fraction or abnormal wall motion.⁵⁻⁹

QOL in HF may also be affected by the psychosocial status of the patient. Psychosocial characteristics of particular interest include depression and social support, as these characteristics have been found to predict long-term prognosis in HF.¹⁰⁻¹⁴ Although several studies have focused on these characteristics in relation to QOL in HF patients,^{5,6,9,15-17} their exact role in HF-related QOL remains poorly specified. With few exceptions,⁹ most studies have been conducted in small samples with limited data on disease aspects that may affect QOL, in particular well-validated measures of disease symptoms or functional capacity. In addition, previous studies generally have been limited to patients with systolic dysfunction, rather than the full spectrum of HF, and have lacked sufficient representation of minority patients. Patients with diastolic dysfunction and from minority backgrounds tend to account for substantial portions of the total HF patient population.¹⁸⁻²⁰ Thus, our understanding of how depression and social support affect various aspects of QOL across a sociodemographically and clinically broad range of HF patients remains limited.

This study was aimed at investigating the cross-sectional association of depression and social support with QOL in HF patients, using baseline data from a large behavioral clinical trial. Two QOL domains are the focus of analysis. The first domain emphasizes satisfaction with health, daily functioning, and psychological and spiritual aspects of life, or satisfaction with QOL (S-QOL). The second domain emphasizes limitations in the ability to perform basic activities due to poor health, or physical functioning QOL (PF-QOL). Both domains fall under the general definition of QOL as “the functional effect of an illness and its consequent therapy upon a patient as perceived by the patient”.²¹ Based on Wilson and Cleary’s conceptual framework of QOL in chronic disease populations,²² we hypothesize that depression and social support account for a greater portion of the impact of HF on satisfaction with QOL (S-QOL) than on perceived limitations in basic activities (PF-QOL).

METHODS

Data for this study came from the baseline assessment of the Heart Failure Adherence and Retention Trial (HART). Details have been described previously.²³ Briefly, HART is a randomized behavioral clinical trial aimed at testing the effect of a self-management skills training program on clinical outcomes in HF patients. Patients were recruited from 10 Chicago-area hospitals and clinics through inpatient and outpatient screening and referrals from local physicians. Patients were eligible if they had a diagnosis of HF for ≥ 3 months, and either had a left ventricular ejection fraction $\leq 40\%$ or had been on diuretic therapy for > 3 months with ≥ 1 previous hospitalization for HF. Exclusion criteria included New York Heart Association (NYHA) class I or IV; patients with an uncertain 12-month prognosis due to other conditions; patients with acute coronary disease within the last month; patients unlikely to benefit from behavioral treatment; logistical issues that would jeopardize participation in the treatment; and patient or physician refusal. The study was approved by the Institutional Review Board of Rush University Medical Center and all other participating institutions, and all patients provided informed consent.

Study Measures

Quality of Life—HART included 2 measures of QOL, the Quality of Life Index (QLI) - Cardiac Version modified,²⁴ and the Physical Functioning scale of the Medical Outcomes Study (MOS)-SF 36.²⁵ The QLI - Cardiac Version modified is specifically designed for cardiac patients to evaluate degree of satisfaction with areas of life that are important to them. This version consists of 22 items that are intended to represent 2 sub-domains of QOL: health and functioning, and psychological and spiritual well-being. Each question is rated on a 6-point Likert-type scale (from 1=very dissatisfied to 6=very satisfied). Total QLI scores were computed by averaging scores across all non-missing items, with higher scores indicating better S-QOL. The previously reported reliability coefficient (Cronbach alpha) of the QLI in HF patients was .89,²⁶ and it was 0.94 in this patient sample. The QLI has been validated extensively in cardiac patient populations.^{24,27} The MOS-SF-36 is a widely-used measure of health-related QOL that has been validated extensively.^{28,29} The SF-36 Physical Functioning (PF) scale includes 10 items and assesses the degree to which poor health limits a person's ability to perform basic physical activities, such as bathing or dressing, or lifting or carrying groceries. Each item is scored on a 3-point scale (limited a lot, limited a little, and not limited at all), and scores are summed and converted to a scale of 0-100. The SF-36 PF scale has a reliability coefficient of .93,³⁰ in this patient sample Cronbach alpha = .88.

Sociodemographic data—Information on sociodemographic characteristics included age, sex, race, marital status, and education. Because the large majority (>90%) of patients was either non-Hispanic white or African-American, race/ethnicity was categorized as African American (black) or other. Marital status was coded as married or not married. Education was measured in 7 categories, ranging from no formal education to 17 years or more (graduate/professional school). For descriptive purposes, educational levels were grouped into 4 categories: less than high school diploma; high school diploma; some college; college degree or higher.

Clinical and functional status—Disease status-related variables included clinical status and symptoms, functional capacity, and co-morbidity. Medical records were abstracted to ascertain type of HF and NYHA functional class. Systolic dysfunction was defined as an ejection fraction of $\leq 40\%$; all others were classified as diastolic dysfunction. Prevalence of disease symptoms was assessed using a modified version of the Heart Failure Symptom Checklist (HFSC).³¹ The HFSC is a self-report instrument of symptoms related to heart failure, HF medications, and HF complications.³² HART included 4 subscales for symptoms that occur most commonly in moderate HF: cardiopulmonary (12 items), gastrointestinal (11 items), genitourinary (3 items), and neuromuscular symptoms (14 items). Patients rated whether they had experienced a symptom during the last month, and a total symptom score was computed by summing the number of reported symptoms divided by the maximum number of symptoms (40), yielding a potential range from 0-1. The HFCS has been validated for HF patients and has an internal consistency reliability of 0.95.³¹ Functional capacity was measured using the 6-minute walk test. This test has shown excellent reliability and validity in cardiac patient populations^{33,34} and is predictive of clinical outcomes in patients with HF.^{35,36} Following standard protocols, all patients were instructed to cover the greatest distance possible during the allotted time.^{35,37} History of physician-diagnosed, self-reported medical conditions, and current use of prescription and non-prescription medications were obtained during the baseline interview. Total co-morbidity was coded as the total number of co-morbid chronic conditions (range 0-9, from a list of 13 conditions, such as myocardial infarction, hypertension, cancer, stroke, diabetes), and total number of medications was a count of the self-reported medications (range 0-18).

Psychosocial Variables—Depressive symptoms were measured using the Geriatric Depression Scale (GDS). The 30-item GDS is designed to assess depressive symptoms in the elderly or in patients with chronic medical conditions by de-emphasizing somatic symptoms.³⁸ The GDS assesses key components of depressive disorder, including depressed mood, anhedonia, hopelessness, and negative thoughts. Items are coded in a yes/no format, and summed across items (range 0-30). The GDS has been shown to have a high degree of internal reliability (Cronbach alpha= 0.94; in this patient sample Cronbach alpha = 0.89) and has been validated against clinical criteria of depression and other measures of depressive symptoms.^{38,39} For the purpose of this study, social support was defined on the basis of the perceived availability of functional forms of social support, and was measured by the MOS Social Support Survey (MOS-SSS).⁴⁰ The 19-item MOS-SSS assesses the perceived availability of emotional and informational support, tangible support, affectionate support, and positive social interactions. Each item is rated on a frequency scale and scores are summed across items and converted to a scale of 0-100. The MOS-SSS has shown high internal reliability (Cronbach alpha = 0.90; in this patient sample Cronbach alpha = 0.96), and 1-year stability (stability coefficient >.70).⁴⁰

Analysis

Descriptive statistics were computed as mean and standard deviation (SD) for continuous variables and proportions for categorical variables. We also computed the unadjusted mean QLI and SF36-PF levels for each category of the independent variables. For this analysis, continuous variables were categorized into approximate tertiles (education in 4 groups). As this analysis was done for descriptive purposes only, we did not present significance levels for differences in QLI or SF36-PF scores by categories of the independent variables. The primary analysis consisted of 2 nested, sequential linear regression models, with each model being restricted to patients who had non-missing values on all variables. The first model included the sociodemographic and disease-related variables only. In the second model, the 2 psychosocial variables (GDS and MOS-SSS) were added to the first model, to test the association of depressive symptoms and social support with QOL net of the other variables in the model. For each model, we computed the proportion of explained variance (R^2) as well as the change in explained variance relative to the previous model. Separate models were fitted for each QOL outcome. An alpha-level of .05 was used to test the primary hypotheses. All analyses were conducted using SAS® statistical software.⁴¹

RESULTS

Of the 902 patients enrolled in HART, 207 (23%) were excluded from analysis due to incomplete psychosocial questionnaires (n=129), or missing data on the 6-minute walk test (n=68), sociodemographic variables (n=9), or the GDS (n=1), leaving a total of 695 patients included in the analysis. Compared with these, the excluded patients were more likely to be black ($P=.002$), not married ($P=.001$), NYHA class III ($P=.001$), have a higher total number of medications ($P=.001$), a lower 6-minute walk test ($P=.02$), and lower SF36-PF scores ($P=.01$). They did not differ in age, gender, education, proportion with systolic dysfunction, number of co-morbid conditions, total symptom frequency, depressive symptoms, social support, or QLI scores (all $P>.10$).

Patients included in the analysis were on average 63.3 years old (range 19-89), 47% of patients were female, 33% were black, 43% had a high school diploma or less, and 55% were married (see Table 1). Also, 29% were in NYHA Class III, 76% had systolic HF, 23% had diastolic HF, and on average, these patients took 7.0 medications and had 3.2 co-morbid conditions. The correlation between the 2 QOL measures ($r=.40$) suggests a moderate degree of overlap between these 2 domains of QOL. In descriptive analysis, the most notable differences in QLI

scores were apparent for sub-groups of the HFSC, GDS, and MOS-SSS (2nd column, Table 1). Differences in SF-36 PF scores were largest for subgroups of education, NYHA class, number of co-morbidities, HFSC, 6-minute walk test, and the GDS (3rd column, Table 1).

In the multivariate analysis, older age ($\beta = .018, P < .001$) and being black ($\beta = 0.311, P < .001$) were significantly associated with higher QLI scores (Table 2). In addition, lower HFSC scores ($\beta = -0.059, P < .001$) and greater 6-minute distance walked ($\beta = 0.013, P < .001$) were associated with higher QLI scores. The entire set of sociodemographic and clinical/functional disease variables accounted for 25% of the variance in QLI scores. In the second model, GDS scores showed a significant negative association ($\beta = -0.082, P < .001$), while MOS-SSS scores showed a significant positive association ($\beta = 0.009, P < .001$) with QLI scores, after adjustment for all other variables. Addition of these 2 variables resulted in an increase of 26% of the explained variance.

Analysis of the SF36-PF showed a different pattern of results. Lower SF36-PF scores were associated with younger age ($\beta = -0.236, P < .001$) and black race ($\beta = -5.564, P < .001$) (Table 3, 1st column). Education was associated with higher SF36-PF scores ($\beta = 1.441, P < .05$). Lower SF36-PF scores were also associated with higher number of co-morbidities ($\beta = -1.709, P < .001$), NYHA class III ($\beta = -10.672, P < .001$), higher HFSC scores ($\beta = -1.288, P < .001$). Greater 6-minute distance walked was associated with higher SF-36 scores ($\beta = 0.667, P < .001$). Sociodemographic and disease-related variables accounted for a total of 42% of the variance in SF36-PF scores. In the second model, the GDS was associated with lower SF36-PF scores ($\beta = -0.550, P < .001$), but the MOS-SSS was not significantly associated with this outcome ($\beta = 0.043, P = .26$). Compared to the first model, the psychosocial variables accounted for an additional 1% in variance in the SF36-PF.

DISCUSSION

Findings from this large and both clinically and sociodemographically diverse group of HF patients confirm the association of depressed affect and social support with QOL. They further suggest that the importance of psychosocial status varies for specific aspects of QOL. Disease status-related variables of symptom burden and functional capacity were associated with both domains of QOL, but co-morbidities and functional class were only related to PF-QOL. Older patients and black patients tended to report lower levels of PF-QOL but higher levels of S-QOL.

Findings for depressive symptoms confirm those reported previously from smaller and less heterogeneous samples of HF patients^{5,6,9,15-17} and further underscore the importance of depression in QOL in this patient population. In this study, we focused on a quantitative measure of depressive symptoms, as opposed to a diagnostic definition, as other studies have shown a clear gradient relationship between the full spectrum of depressive symptoms and QOL in HF patients.^{9,17} Social support was associated only with the impact of HF on S-QOL, and not on PF-QOL. This may explain the inconsistent results found for social support in previous studies of QOL in HF.⁴²⁻⁴⁴ These findings suggest that social support may be relevant only for perceptions of satisfaction with QOL, and less influential in modifying the impact of HF on functional limitations. Independent of sociodemographic and disease-related variables, the psychosocial characteristics accounted for a much greater portion of the variance in S-QOL than PF-QOL. These QOL domains are important aspects of patient functioning and well-being, and both domains tend to predict future course of disease and clinical outcomes.⁴⁵⁻⁴⁸

As expected, patients with a higher symptom burden and lower functional capacity had poorer QOL. Symptom levels and functional capacity have generally shown more consistent

associations with QOL outcomes in HF than markers of disease severity, such as ejection fraction, wall motion abnormalities or B-type natriuretic peptide (BNP).^{5,6,8,9,49} This may explain the lack of differences in QOL outcomes between patients with systolic and diastolic dysfunction. Other indicators of disease status, such as functional class and number of co-morbidities, were associated with PF-QOL, but not with S-QOL. Consistent with a general framework of the impact of chronic disease on different aspects of QOL,²² our findings suggest that clinical and functional characteristics of disease status have a greater impact on limitations in basic physical functions than on satisfaction with various aspects of overall QOL. On the other hand, a socially supportive environment and absence of depressive symptoms may be more important for overall QOL in these patients. However, the relationships between clinical symptoms and functional capacity, psychosocial status, and QOL are complex and likely involve various reciprocal pathways. For example, depression may mediate the impact of clinical symptoms on QOL, but also may make a patient more sensitive to the impact of the disease on bodily symptoms.^{5,9,22} In addition, although depression tends to show a strong cross-sectional association with QOL, it is not necessarily predictive of changes in QOL over time.¹⁶ Detailed prospective studies are required to elucidate the causal pathways involved among these processes.

A better understanding of factors that are associated with distinct sub-domains of QOL in HF patients may provide guidance in identifying patients at risk for poor QOL and have therapeutic implications that inform strategies to improve QOL. Thus, differences in QOL based upon sociodemographic, clinical, and psychosocial variables may provide targets for assessment and therapy. For example, our findings of poorer S-QOL in younger patients with depression and reduced availability of social support provide evidence of the need for psychosocial referral for assessment and intervention by social workers or psychologists. Likewise, our findings related to limitations in activities of daily living among older, black, and NYHA class III patients provide direction for physical or occupational rehabilitation, as well as assistance with activities of daily living (eg, routine housekeeping and meal preparation) via tailored programs, often available through state or local resources. In addition, the association of higher symptom burden with poorer QOL provides an opportunity for educating patients about symptoms of HF and self-management skills in order to reduce the frequency of symptoms or increase knowledge about when to notify one's health care provider of symptoms that require immediate attention.

A major strength of this study is the large sample of systolic and diastolic HF patients with considerable diversity in age, education, and racial/ethnic background. Another strength is the inclusion of widely-used and well-established measures of important domains of QOL, measuring the impact of disease on both basic daily activities, and perceptions of overall well-being. An important limitation is the cross-sectional design of the analysis, which limits the ability to draw causal inferences about the relationship between clinical and psychosocial predictor variables and QOL outcomes. This is likely a more important issue for psychosocial characteristics, which may be related to QOL through more complex, reciprocal mechanisms than a simple cause and effect relationship. Another limitation is the absence of more detailed markers of clinical severity, such as exact ejection fraction, wall motion abnormalities, and physiological measures of disease status, such as B-type natriuretic peptide. Although such information might have increased the relative importance of characteristics of disease severity for QOL, other studies suggest that these markers are unrelated to a wide spectrum of QOL domains.^{8,9,49} Also, the study included only 1 of the MOS SF-36 sub-scales and the findings do not necessarily apply to other aspects of health-related QOL measured by this instrument. Finally, data were derived from patients who agreed to participate in a behavioral clinical trial and who had complete data, which may restrict the generalizability of the findings, in spite of the diversity of the patients that were included. More studies with prospective data are needed in similarly diverse patient populations with more complete information on clinical severity to

gain a better understanding of the exact role of depression, social support and other psychosocial characteristics in relation to disease prognosis and rehabilitation needs of patients with HF.

In conclusion, depressive symptoms and social support are important correlates of QOL outcomes in patients with HF, although the strength of these associations varied by domains of QOL. A comprehensive set of psychosocial and clinical/functional characteristics of disease status accounted for a substantial amount of individual differences in QOL in this patient population. Based on these findings, medical management and rehabilitative therapies may need to target HF-related physical symptoms and poor functional capacity, as well as depression and low social support to improve QOL in patients with HF.

Acknowledgments

A list of participating centers, clinical investigators, and members of the data safety and monitoring board has been published previously.²³

Supported by a grant from the National Institutes of Health (R01 HL65547).

REFERENCES

- (1). Rosamond W, Flegal K, Friday G, et al. Heart disease and stroke statistics--2007 update. *Circulation* 2007;115:e69–171. [PubMed: 17194875]
- (2). Hobbs FD, Kenkre JE, Roalfe AK, Davis RC, Hare R, Davies MK. Impact of heart failure and left ventricular systolic dysfunction on quality of life: a cross-sectional study comparing common chronic cardiac and medical disorders and a representative adult population. *Eur Heart J* 2002;23:1867–1876. [PubMed: 12445536]
- (3). Juenger J, Schellberg D, Kraemer S, et al. Health related quality of life in patients with congestive heart failure: comparison with other chronic diseases and relation to functional variables. *Heart* 2002;87:235–241. [PubMed: 11847161]
- (4). Stewart AL, Greenfield S, Hays RD, et al. Functional status and well-being of patients with chronic conditions. Results from the Medical Outcomes Study. *JAMA* 1989;262:907–913. [PubMed: 2754790]
- (5). Bekelman DB, Havranek EP, Becker DM, et al. Symptoms, depression, and quality of life in patients with heart failure. *J Card Fail* 2007;13:643–648. [PubMed: 17923356]
- (6). Carels RA. The association between disease severity, functional status, depression and daily quality of life in congestive heart failure patients. *Qual Life Res* 2004;13:63–72. [PubMed: 15058788]
- (7). Gorkin L, Follick MJ, Geltman E, et al. Quality of life among patients post-myocardial infarction at baseline in the Survival and Ventricular Enlargement (SAVE) trial. *Qual Life Res* 1994;3:111–119. [PubMed: 8044157]
- (8). Mattera JA, Mendes de Leon CF, Wackers FJ, Williams CS, Wang Y, Krumholz HM. Association of patients' perception of health status and exercise electrocardiogram, myocardial perfusion imaging, and ventricular function measures. *Am Heart J* 2000;140:409–418. [PubMed: 10966538] see comments
- (9). Ruo B, Rumsfeld JS, Hlatky MA, Liu H, Browner WS, Whooley MA. Depressive symptoms and health-related quality of life: the Heart and Soul Study. *JAMA* 2003;290:215–221. [PubMed: 12851276]
- (10). Friedmann E, Thomas SA, Liu F, Morton PG, Chapa D, Gottlieb SS. Relationship of depression, anxiety, and social isolation to chronic heart failure outpatient mortality. *Am Heart J* 2006;152:940–948. [PubMed: 17070164]
- (11). Jiang W, Alexander J, Christopher E, et al. Relationship of depression to increased risk of mortality and rehospitalization in patients with congestive heart failure. *Arch Intern Med* 2001;161:1849–1856. [PubMed: 11493126]comment
- (12). Krumholz HM, Butler J, Miller J, et al. Prognostic importance of emotional support for elderly patients hospitalized with heart failure. *Circulation* 1998;97:958–964. [PubMed: 9529263]

- (13). Rohrbaugh MJ, Shoham V, Coyne JC. Effect of marital quality on eight-year survival of patients with heart failure. *Am J Cardiol* 2006;98:1069–1072. [PubMed: 17027573]
- (14). Vaccarino V, Kasl SV, Abramson J, Krumholz HM. Depressive symptoms and risk of functional decline and death in patients with heart failure. *J Am Coll Cardiol* 2001;38:199–205. [PubMed: 11451275]
- (15). Muller-Tasch T, Peters-Klimm F, Schellberg D, et al. Depression is a major determinant of quality of life in patients with chronic systolic heart failure in general practice. *J Card Fail* 2007;13:818–824. [PubMed: 18068614]
- (16). Sullivan M, Levy WC, Russo JE, Spertus JA. Depression and health status in patients with advanced heart failure: a prospective study in tertiary care. *J Card Fail* 2004;10:390–396. [PubMed: 15470649]
- (17). Sullivan MD, Newton K, Hecht J, Russo JE, Spertus JA. Depression and health status in elderly patients with heart failure: a 6-month prospective study in primary care. *Am J Geriatr Cardiol* 2004;13:252–260. [PubMed: 15365288]
- (18). Brown DW, Haldeman GA, Croft JB, Giles WH, Mensah GA. Racial or ethnic differences in hospitalization for heart failure among elderly adults: Medicare, 1990 to 2000. *Am Heart J* 2005;150:448–454. [PubMed: 16169322]
- (19). Loefer LR, Rosamond WD, Chang PP, Folsom AR, Chambless LE. Heart failure incidence and survival (from the Atherosclerosis Risk in Communities study). *Am J Cardiol* 2008;101:1016–1022. [PubMed: 18359324]
- (20). Redfield MM, Jacobsen SJ, Burnett JC Jr, Mahoney DW, Bailey KR, Rodeheffer RJ. Burden of systolic and diastolic ventricular dysfunction in the community: appreciating the scope of the heart failure epidemic. *JAMA* 2003;289:194–202. [PubMed: 12517230]
- (21). Spilker, B. *Quality of Life & Pharmacoeconomics in Clinical Trials*. Lippincott-Raven; Philadelphia: 1996.
- (22). Wilson IB, Cleary PD. Linking clinical variables with health-related quality of life. A conceptual model of patient outcomes. *JAMA* 1995;273:59–65. [PubMed: 7996652]
- (23). Powell LH, Calvin JE, Mendes de Leon CF, et al. for the HART Investigators. The Heart Failure Adherence and Retention Trial (HART): Design and Rationale. *Am Heart J*. in press
- (24). Ferrans CE, Powers MJ. Quality of life index: development and psychometric properties. *ANS Adv Nurs Sci* 1985;8:15–24. [PubMed: 3933411]
- (25). Ware JE, Sherbourne CD. The MOS 36-item short-form health survey (SF-36). *Med Care* 1992;30:473–483. [PubMed: 1593914]
- (26). Scott LD, Setter-Kline K, Britton AS. The effects of nursing interventions to enhance mental health and quality of life among individuals with heart failure. *Appl Nurs Res* 2004;17:248–256. [PubMed: 15573333]
- (27). Ferrans CE, Powers MJ. Psychometric assessment of the Quality of Life Index. *Res Nurs Health* 1992;15:29–38. [PubMed: 1579648]
- (28). Hays RD, Shapiro MF. An overview of generic health-related quality of life measures for HIV research. *Qual Life Res* 1992;1:91–97. [PubMed: 1301123]
- (29). Ware JE Jr. The status of health assessment 1994. *Ann Rev Publ Health* 1995;16:327–354.
- (30). Ware JE, Kosinski M, Bayliss MS, McHorney CA, Rogers WH, Raczek A. Comparison of methods for the scoring and statistical analysis of SF-36 health profile and summary measures: summary of results from the medical outcomes study. *Med Care* 1995;33:AS264–AS279. [PubMed: 7723455]
- (31). Grady KL, Jalowiec A, Grusk BB, White-Williams C, Robinson JA. Symptom distress in cardiac transplant candidates. *Heart Lung* 1992;21:434–439. [PubMed: 1399662]
- (32). Grady KL. Quality of life in patients with chronic heart failure. *Crit Care Nurs Clin North Am* 1993;5:661–670. [PubMed: 8297555]
- (33). Demers C, McKelvie RS, Negassa A, Yusuf S. Reliability, validity, and responsiveness of the six-minute walk test in patients with heart failure. *Am Heart J* 2001;142:698–703. [PubMed: 11579362]
- (34). Hamilton DM, Haennel RG. Validity and reliability of the 6-minute walk test in a cardiac rehabilitation population. *J Cardiopulm Rehabil* 2000;20:156–164. [PubMed: 10860197]

- (35). Bittner V, Weiner DH, Yusuf S, et al. SOLVD Investigators. Prediction of mortality and morbidity with a 6-minute walk test in patients with left ventricular dysfunction. *JAMA* 1993;270:1702–1707. [PubMed: 8411500]
- (36). Ingle L, Rigby AS, Carroll S, et al. Prognostic value of the 6 min walk test and self-perceived symptom severity in older patients with chronic heart failure. *Eur Heart J* 2007;28:560–568. [PubMed: 17314108]
- (37). Roul G, Germain P, Bareiss P. Does the 6-minute walk test predict the prognosis in patients with NYHA class II or III chronic heart failure? *Am Heart J* 1998;136:449–457. [PubMed: 9736136]
- (38). Yesavage JA, Brink TL, Rose TL, et al. Development and validation of a geriatric depression screening scale: a preliminary report. *J Psychiatr Res* 1982;17:37–49. [PubMed: 7183759]
- (39). Lyness JM, Noel TK, Cox C, King DA, Conwell Y, Caine ED. Screening for depression in elderly primary care patients. A comparison of the Center for Epidemiologic Studies-Depression Scale and the Geriatric Depression Scale. *Arch Intern Med* 1997;157:449–454. [PubMed: 9046897]
- (40). Sherbourne CD, Stewart AL. The MOS social support survey. *Soc Sci Med* 1991;32:705–714. [PubMed: 2035047]
- (41). SAS Institute. SAS Online Doc® 9.1.3. SAS Institute Inc; Cary, NC: 2004.
- (42). Bennett SJ, Perkins SM, Lane KA, Deer M, Brater DC, Murray MD. Social support and health-related quality of life in chronic heart failure patients. *Qual Life Res* 2001;10:671–682. [PubMed: 11871588]
- (43). Clark DO, Tu W, Weiner M, Murray MD. Correlates of health-related quality of life among lower-income, urban adults with congestive heart failure. *Heart Lung* 2003;32:391–401. [PubMed: 14652531]
- (44). Westlake C, Dracup K, Creaser J, et al. Correlates of health-related quality of life in patients with heart failure. *Heart Lung* 2002;31:85–93. [PubMed: 11910383]
- (45). Browne GB, Arpin K, Corey P, Fitch M, Gafni A. Individual correlates of health service utilization and the cost of poor adjustment to chronic illness. *Med Care* 1990;28:43–58. [PubMed: 2136926]
- (46). Ho PM, Masoudi FA, Peterson PN, et al. Health-related quality of life predicts mortality in older but not younger patients following cardiac surgery. *Am J Geriatr Cardiol* 2005;14:176–182. [PubMed: 16015058]
- (47). Passantino A, Lagioia R, Mastropasqua F, Scrutinio D. Short-term change in distance walked in 6 min is an indicator of outcome in patients with chronic heart failure in clinical practice. *J Am Coll Cardiol* 2006;48:99–105. [PubMed: 16814655]
- (48). Spertus JA, Jones P, McDonell M, Fan V, Fihn SD. Health status predicts long-term outcome in outpatients with coronary disease. *Circulation* 2002;106:43–49. [PubMed: 12093768]
- (49). Luther SA, McCullough PA, Havranek EP, et al. The relationship between B-type natriuretic peptide and health status in patients with heart failure. *J Card Fail* 2005;11:414–421. [PubMed: 16105631]

TABLE 1
CHARACTERISTICS OF HF PATIENTS INCLUDED IN THE ANALYSIS (N=695)

		Quality of Life Index (S-QOL)	MOS Physical Functioning (PF-QOL)
Sociodemographic characteristics	Mean (SD)/N (%)	Mean (SD)	Mean (SD)
Age (yrs)	63.3 (13.1)		
< 60		4.16 (1.0)	53.1 (26.1)
60 - 69		4.51 (1.0)	49.1 (23.2)
≥ 70		4.64 (0.8)	45.4 (24.1)
Sex			
Female	327 (47%)	4.42 (1.0)	44.9 (24.5)
Male	368 (53%)	4.44 (0.9)	53.1 (24.4)
Race/ethnicity			
Black	227 (33%)	4.42 (0.9)	43.1 (24.0)
Other	468 (67%)	4.44 (1.0)	52.3 (24.6)
Marital status			
Married	384 (55%)	4.45 (0.9)	51.1 (24.8)
Non-married	311 (45%)	4.41 (1.0)	46.9 (24.6)
Education			
Less than high school diploma	105 (15%)	4.55 (0.9)	39.8 (23.6)
High school diploma	194 (28%)	4.31 (1.1)	44.8 (25.6)
Some college	219 (32%)	4.44 (1.0)	51.8 (23.9)
College degree or more	177 (25%)	4.48 (1.0)	56.6 (23.0)
Clinical and functional characteristics			
New York Heart Association			
Class	495 (71%)	4.53 (1.0)	55.3 (23.9)
II	200 (29%)	4.18 (1.0)	34.4 (20.5)
III			
Heart failure			
Systolic	531 (76%)	4.43 (1.0)	50.1 (25.2)
Diastolic	164 (24%)	4.43 (1.0)	45.2 (23.2)
Number of medications	7.0 (3.0)		
≤ 5		4.54 (0.9)	54.4 (24.8)
6 - 8		4.38 (1.0)	47.7 (24.4)
≥ 9		4.37 (1.0)	44.8 (24.3)

		Quality of Life Index (S-QOL)	MOS Physical Functioning (PF-QOL)
Sociodemographic characteristics	Mean (SD)/N (%)	Mean (SD)	Mean (SD)
Number of co-morbidities	3.2 (1.6)		
≤ 2		4.61 (0.9)	57.9 (25.2)
3 - 4		4.33 (1.0)	47.5 (22.8)
≥ 5		4.32 (1.0)	37.7 (22.4)
Heart Failure Symptom Checklist score (HFSC)	0.52 (0.41)		
≤ 0.25		4.95 (0.8)	61.7 (22.9)
0.26 - 0.64		4.46 (0.9)	50.3 (22.7)
≥ 0.65		3.86 (1.0)	35.0 (21.2)
Six-minute walk test (ft)	844 (453)		
≤ 650		4.26 (1.0)	33.3 (21.0)
651 - 1049		4.45 (1.0)	51.2 (22.0)
≥ 1050		4.60 (0.9)	63.7 (21.5)
Psychosocial characteristics			
Geriatric Depression Scale score	7.5 (5.9)		
< 5		5.08 (0.6)	59.5 (24.3)
5 - 8		4.42 (0.8)	47.3 (23.6)
≥ 9		3.69 (0.9)	39.2 (21.8)
MOS SF-36 Social Support Scale score	76.3 (20.6)		
< 70		3.95 (1.0)	45.9 (24.1)
70 - 89		4.48 (0.9)	49.2 (24.3)
≥ 90		4.85 (0.8)	52.7 (25.6)
Quality of Life (QOL) outcomes			
Quality of Life Index (QLI)	4.40 (1.0)		
MOS SF-36 Physical Functioning (PF)	49.3 (24.8)		

Abbreviations: MOS SF-36, Medical Outcomes Study.

Heart Failure Symptom Checklist: higher score=increased symptom frequency (range=0-1).

Geriatric Depression Scale: higher score=more severe depressive symptoms (range=0-30).

MOS SF-36 Social Support Scale: higher score=increased perceived availability of support (range=0-100) .

Quality of Life Index (QLI): higher score=increased satisfaction with QOL (range=1-6). MOS SF-36 Physical Functioning (PF): higher score=less limitation in daily activities by health (range=0-100).

TABLE 2
SOCIODEMOGRAPHIC, CLINICAL AND PSYCHOSOCIAL CORRELATES OF QUALITY OF LIFE INDEX (QLI) SCORES (N=695)

	Regression coefficient (se)	Regression coefficient (se)
Intercept	4.360 *** (.101)	4.427 *** (.082)
Sociodemographic characteristics		
Age	0.018 *** (.003)	0.011 *** (.002)
Sex, female	0.071 (.069)	0.060 (.056)
Education	-0.026 (.028)	-0.049 * (.022)
Race/ethnicity, black	0.311 *** (.079)	0.137 * (.064)
Marital status, married	0.048 (.069)	-0.085 (.058)
Clinical and functional characteristics		
Systolic failure	0.022 (.080)	0.093 (.064)
Number of medications	0.010 (.011)	-0.002 (.009)
Number of co-morbidities	-0.028 (.022)	0.008 (.018)
New York Heart Association Class III	-0.126 (.076)	-0.090 (.061)
Heart Failure Symptom Checklist (HFSC)	-0.059 *** (.005)	-0.023 *** (.005)
Six-minute walk test (ft, sq. root)	0.013 *** (.003)	0.009 ** (.003)
Psychosocial characteristics		
Geriatric Depression Scale score		-0.082 *** (.005)
Medical Outcomes Study SF-36 Social Support Scale score		0.009 *** (.001)
Model fit characteristics		
R ²	0.25	0.51
Change in R ²	0.19 ¹	0.26 ²

*
P<.05

**
P<.01

P<.001

¹ Change in R² compared with model with sociodemographic variables only (not shown)

² Change in R² compared with model with sociodemographic and clinical/functional variables

TABLE 3
SOCIODEMOGRAPHIC, CLINICAL AND PSYCHOSOCIAL CORRELATES OF THE SF-36 PHYSICAL FUNCTIONING SCORES (N=695)

	Regression Coefficient ¹ (se)	Regression coefficient (se)
Intercept	53.767 *** (2.249)	54.065 *** (2.239)
Sociodemographic characteristics		
Age	-0.236 *** (.064)	-0.276 *** (.064)
Sex, female	-2.325 (1.547)	-2.315 (1.538)
Education	1.441 * (.616)	1.286 * (.610)
Race/ethnicity, black	-5.564 ** (1.756)	-6.677 *** (1.754)
Marital status, married	0.552 (1.543)	-0.095 (1.588)
Clinical and functional characteristics		
Systolic failure	1.042 (1.783)	1.477 (1.764)
Number of medications	-0.128 (.247)	-0.201 (.244)
Number of co-morbidities	-1.709 *** (.484)	-1.471 ** (.482)
New York Heart Association Class III	-10.672 *** (1.702)	-10.420 *** (1.682)
Heart Failure Symptom Checklist (HFSC)	-1.128 *** (0.122)	-1.059 *** (.132)
Six-minute walk test (x 100 ft)	0.667 *** (.078)	0.640 *** (.077)
Psychosocial characteristics		
Geriatric Depression Scale score		-0.550 *** (.148)
Medical Outcomes Study SF-36 Social Support Scale score		0.043 (.038)
Model fit characteristics		
Adjusted R ²	0.42	0.43
Change in adjusted R ²	0.33 ²	0.01 ³

se, standard error

* $P < .05$

** $P < .01$

*** $P < .001$

¹ Higher SF 36 Physical Functioning Scores represent fewer limitations

² Change in R² compared with model with sociodemographic variables only (not shown)

³ Change in R² compared with model with sociodemographic and clinical/functional variables