Clinical Investigations

Health Literacy Predicts Morbidity and Mortality in Rural Patients With Heart Failure

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ABSTRACT

Background: Patients hospitalized with heart failure are often readmitted. Health literacy may play a substantial role in the high rate of readmissions. The purpose of this study was to examine the association of health literacy with the composite end point of heart failure readmission rates and all-cause mortality in patients with heart failure living in rural areas.

Methods and Results: Rural adults (n = 575), hospitalized for heart failure within the past 6 months, completed the Short Test of Functional Health Literacy in Adults (STOFHLA) to measure health literacy and were followed for ≥2 years. The percentage of patients with the end point of heart failure readmission or all-cause death was different (*P* = .001) among the 3 STOFHLA score levels. Unadjusted analysis revealed that patients with inadequate and marginal health literacy were 1.94 (95% confidence interval [CI] 1.43−2.63; *P* < .001) times, and 1.91 (95% CI 1.36−2.67; *P* < .001) times, respectively, more likely to experience the outcome. After adjustment for covariates, health literacy remained a predictor of outcomes. Of the other covariates, worse functional class, higher comorbidity burden, and higher depression score predicted worse outcomes.

Conclusions: Inadequate or marginal health literacy is a risk factor for heart failure rehospitalization or all-cause mortality among rural patients with heart failure. (*J Cardiac Fail 2015;21:612−618*)

Key Words: Health literacy, heart failure, rural.

Patients with heart failure have 30-day hospital readmission rates of ∼25%, which are higher than those seen in other chronic conditions in Medicare-age individuals[1−3] and account for the majority of the cost associated with heart failure care. Risk models or scores to predict risk of readmission among patients with heart failure usually are limited to factors predominantly linked to patient demographics and clinical characteristics.[4] For example, demographic characteristics such as age, sex, and race are associated with heart failure readmission.[1,5−10] Clinical factors associated with heart failure readmission include comorbidity burden.[5,10−12] There are, however, potentially other important, modifiable predictors of rehospitalization.

Because heart failure management is complex, it requires a high level of patient participation.[13,14] Having adequate heart failure knowledge and the requisite skills to engage in appropriate self-care are fundamental to avoiding preventable hospitalizations. Although few investigators have evaluated the impact of health literacy on heart failure readmission and mortality rates, general medical patients with poor health literacy were more likely to be hospitalized in one study of the Medicare population.[15] Specifically among patients with heart failure poor health literacy is associated with higher all-cause mortality in an integrated managed care organization.[16]

Health literacy is "the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions."[17] As such, although it is related to literacy, it is a construct distinct from literacy. Many literate people have low levels of health literacy, thus it is not sufficient to assume that if one is literate then one will have adequate health literacy.

In the rural setting, where patients typically have lower socioeconomic resources, the impact of health literacy on heart failure admission is unknown. Moreover, previous investigators have not controlled for variables in analyses, such as depression[15,16,18] which is known to be common among patients with heart failure and is associated with outcomes in such patients, and that therefore could affect the association of health literacy with outcomes. Some analyses were limited to Medicare populations[15] or managed care organizations.[16] We therefore performed an analysis in a multicenter rural sample enrolled in a randomized clinical trial of an education intervention designed to reduce heart failure−related hospitalization.[19] We specifically examined the association of health literacy measured with the use of the Short Test of Functional Health Literacy in Adults (STOFHLA) with heart failure readmission rates and all-cause mortality, controlling for demographic, clinical, and psychologic covariates potentially related to the outcome or to health literacy.

Study Design and Sample

The study was conducted within the context of the randomized controlled trial Rural Education to Improve Outcomes in Heart Failure (REMOTE-HF).[19] In brief, we tested an education and counseling intervention among rural patients with heart failure with limited access to treatment to improve self-care abilities and decrease preventable readmissions. Patients were randomly assigned to one of the following 3 groups: 1) usual care; 2) Fluid Watchers LITE, which included the education program with minimal follow-up; and 3) Fluid Watchers PLUS, which included the education program with attention to individualization and biweekly follow-up.

We obtained appropriate Institutional Review Board approvals from all sites. Informed signed consent to participate was received from each patient. Patients living in rural California, Nevada, and Kentucky were recruited. Patients were recruited from outpatient clinics and hospitals after referral to the study by health care providers working at the sites. Inclusion criteria included the following: 1) age ≥18 years with stable heart failure at the time of enrollment; 2) heart failure hospitalization in the past 12 months; 3) ability to read and write English; and 4) living independently (ie, not institutionalized). Exclusion criteria included the following: 1) serious life-limiting comorbidity (ie, disease or illness predicted to cause death within the next 12 months); 2) diagnosed major psychiatric illness, such as schizophrenia; 3) impaired cognition; and 4) concurrent participation in a heart failure disease management program. Cognitive screening with the use of the Mini-Cog, which is a global measure of cognitive status,[20] was performed on patients who met other inclusion criteria to identify cognitive dysfunction that would preclude

participation. Patients with a word recall score of <3 or an abnormal clock drawing score were excluded.

After consent and before randomization, patients completed questionnaires and trained research associates reviewed their medical records. Data on sociodemographic (ie, age, sex, race, marital status, employment status, and education level), clinical (ie, comorbidity burden, B-type natriuretic peptide, New York Heart Association [NYHA] functional class, and left ventricular ejection fraction [LVEF]), and psychologic variables (ie, depression), as well as health literacy were collected at this time. All patients were followed for the composite end point of heart failure rehospitalization or all-cause death for ≥2 years.

Measures

Outcome. The combined end point was heart failure rehospitalization or all-cause death. Patients were followed for ≥2 years to collect these data, which were determined by means of patient and family interview, medical record and hospital administrative database review, health care provider contact, and review of death records. Patients were telephoned monthly to decrease the likelihood that we would miss an event and to increase retention.

Covariates. Health literacy was measured at baseline and before randomization by means of the STOFHLA, which has 36 items. Patients are scored on the number of items they get correct in 7 minutes. The STOFHLA measures the patient's ability to read and understand health-related passages with the use of a section on preparation for an x-ray procedure and a Medicaid application. The STOFHLA uses the Cloze procedure, in which an omitted word in a sentence must be chosen by the patient from a multiple choice list. Results are categorized into the following 3 levels: 1) inadequate (0−16 correct answers), 2) marginal (17−22 correct answers), and 3) adequate health literacy (23−36 correct answers). Adequate reliability and validity have been demonstrated for the STOFHLA, and it has been widely used in research in a variety of patient populations.[21] The Cronbach alpha in our study was 0.762.

Comorbidity burden was assessed with the use of the Charlson comorbidity index (CCI).[22] The CCI has well established reliability and validity for the prediction of cumulative mortality attributable to comorbid disease.[22] The CCI is weighted for severity of comorbidity and is computed as a total score. A higher CCI score implies higher comorbidity burden.

Depression was measured with the use of the Patient Health Questionnaire 9.[23,24] This instrument is composed of 9 items that reflect each of the 9 symptoms for diagnosing major depressive disorder based on Diagnostic and Statistical Manual of Mental Disorders criteria. Responding with the use of a 4-point Likert scale, patients consider how commonly they have experienced the symptoms referred to in the items in the past 2 weeks. Score are totaled and can range from 0 to 27, with higher scores reflecting more severe depressive symptoms. This instrument is brief, reliable, valid, and sensitive.[23−25] Cronbach alpha assessing the reliability of the instrument in this study was 0.873.

New York Heart Association functional classification was assigned by trained cardiovascular research nurses based on careful interview done at the time of enrollment. B-Type natriuretic peptide was measured at the time of enrollment with the use of point-of-care testing equipment that was calibrated before each use. Left ventricular ejection fraction was retrieved from the medical record, and the measure made closest to the enrollment date was used. A standardized form was used to collect demographic information. These data were age, sex, marital status, education, and employment.