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The association between cognitive function and self-care in patients with chronic heart failure

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ABSTRACT

Background: Self-care requires that patients learn to care for themselves. Cognitive impairment and depression can decrease the ability and interest in performing self-care. The objectives were to explore the association between cognitive function and self-care in heart failure patients, and to examine if this association was moderated by symptoms of depression.
Methods: This cross-sectional study included 105 heart failure patients in NYHA II-IV, median age 72 years. Self-care was measured with the European Heart Failure Self-Care Behavior Scale, cognitive function with a neuropsychological battery, and depressive symptoms were measured with the Patient Health Questionnaire. The associations between the study variables were examined with multiple regression analyses.
Results: Psychomotor speed was the only cognitive dimension significantly associated with self-care. The association between psychomotor speed and self-care was not moderated by symptoms of depression.
Conclusions: Deficits in psychomotor speed have implications for how patients should be educated and supported to perform self-care.

Introduction

Approximately 15 million people in Europe and more than 5 million in the United States [1,2] suffer from heart failure (HF). It is a syndrome that is common in aging, with a prevalence of 10–20% among those above 80 years of age. Younger individuals also suffer from HF, although less commonly than elders. Mortality rates are lower, and comorbidities such as hypertension, myocardial infarction, and atrial fibrillation are less common in this group.[3] Both prevalence and incidence of HF are increasing worldwide, even in developing countries.[4] Despite advances in management, HF is associated with high rates of hospitalization, poor quality of life and early death.[2,5] Self-care can improve HF outcomes.[6,7] Specifically, better self-care has been shown to be related to improved self-reported health status,[8] increased quality of life (QOL),[9] fewer hospitalizations, and decreased mortality.[10–12] Educating patients can improve their ability to engage in self-care.[2,13]

Self-care has been defined as a naturalistic decision-making process of maintenance, monitoring, and management.[14] HF-related self-care involves behaviors intended to maintain healthy functioning, as well as decision-making about actions taken in response to symptoms and evaluation of the outcomes of those actions.[14] More specifically, HF self-care entails adhering to medication and diet recommendations, exercising, smoking cessation, limiting alcohol intake, keeping immunizations up to date, monitoring signs and symptoms, recognizing and responding to symptoms, and navigating the health care system in order to receive assistance when symptoms occur.[7,15,16] Engaging in self-care makes patients learn about the condition and become active participants in the management of their illness. However, this engagement

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requires the cognitive ability to learn, perceive, interpret and respond.[13] Cognitive impairment may jeopardize patients' ability to perform self-care.

Patients with HF are at increased risk of cognitive impairment. Between 25% and 50% of HF patients have some degree of cognitive impairment.[17,18] Longitudinal studies of cognitive performance in HF patients have shown a decline in cognition over time.[19] Neurodegenerative changes within the brain, caused by cerebral hypoperfusion, microembolism, and a decrease in mammillary body volume are common in HF.[20,21] Patients with HF have a reduced cerebral blood flow, including reduced grey matter volume and white matter lesions.[22,23] To some extent, these pathophysiological factors explain the specific cognitive issues seen in patients with HF, compared to age-matched individuals without HF. These issues include problems with attention, executive function, learning and memory, psychomotor speed, visual-spatial skills, language, and perceptual skills.[17,19]

Cognitive testing focuses on four major classes of cognitive function: input, storage, processing, and output. Perception is crucial in cognitive function and involves the ability to select, acquire, classify, and integrate information.[24] Various cognitive tests measure different elements that affect perception, including orientation, concentration, sequencing, visual-spatial abilities, verbal learning and memory, reading aloud, understanding, and verbal repetition.[25] Another important area in cognitive functioning is attentional capacity, which concerns the recognition of stimuli and the execution of responses to those stimuli.[26]

Previous research on the association between self-care and cognition has yielded inconclusive findings. In one previous study,[27] cognition was not found to be a significant predictor of self-care. Contradictory results were subsequently found by these authors and others, when self-care was shown to be significantly poorer in patients with mild cognitive impairment (MCI).[28–32] Furthermore, in a mixed methods study, Dickson et al[33] rather surprisingly found that poorer cognitive function was related to better self-care. Others have reported an association between MCI and medical adherence and generic self-care activities.[28–32] A recent systematic review[34] summarized that there is still limited evidence regarding the association between cognitive functioning and difficulties performing self-care. Thus, there is a need for further research in this area.

An important factor influencing both self-care[7,35] and cognition[36,37] is depression. Depression is common in people with HF, with a mean prevalence of 21.5% (range, 9%–60%).[38] Depression is known to be a strong predictor of treatment adherence, one element of self-care.[39,40] Self-care is poor even in patients with extensive knowledge of HF when they experience symptoms of depression.[41] A recent study showed that cognitive function was associated with the nonsomatic symptoms of depression in HF.[42] Alosco et al[43] described how depressive symptoms that occurred with a decrease in cerebral bloodflow were associated with deficits in attention and executive functions.

It is known that patients with HF have problems with self-care, and cognitive function appears to have a role in patients' ability to perform self-care. However, it is not fully understood how cognitive function influences self-care, what dimensions of cognition are important for self-care, and how symptoms of depression influence the relationship between cognition and self-care.

Aims

The objectives of this study were to test the association between cognitive function and self-care in patients with HF, explore which areas of cognition were most influential (psychomotor speed, executive function, visual-spatial perception, episodic and semantic memory, and/or spatial performance), and to examine if the association between cognition and self-care is moderated by symptoms of depression. We hypothesized that there would be an association between cognitive function and self-care. Furthermore, we anticipated that there would be a moderating effect of depression affecting the strength and/or direction of the association between cognitive function and self-care in patients with HF.

Methods

Using a descriptive cross-sectional design, we enrolled a sample of stable patients with HF living in the community. Study patients were recruited from outpatient clinics at one university hospital and two county hospitals in the south of Sweden. Data were collected between September 2009 and December 2011. Inclusion criteria were age 18 years or older, diagnosed with HF as defined in the European Society of Cardiology guidelines,[2] and being in New York Heart Association (NYHA) class II–IV. Exclusion criteria were severe psychiatric illness, history of a neurological disorder, drug abuse, and difficulty understanding or reading the Swedish language. A priori power analysis showed that a sample size of 116 patients would be sufficient to detect a medium effect size ($R^2 = 0.15, \alpha = 0.05, 1 - \beta = 0.90$) in an analysis with 5 independent variables.

Permission to carry out the study was granted by the Regional Ethical Review Board in Linköping, Sweden (study code M222-08/T81-09). The study was conducted in accordance with the Declaration of Helsinki. All patients received both verbal and written information about the study and were asked to sign an informed consent document prior to participation.

Procedure

Data collection was performed by specially trained study nurses. They were educated in HF and had clinical experience of providing care for HF patients. All were highly skilled in assessing functional status and HF symptoms. The nurses were trained in neuropsychological testing by a neuropsychologist. Testing was done in a standardized way to ensure interater reliability among the nurses. Furthermore, the nurses received detailed ethical guidelines specifying when to terminate testing in patients with significant cognitive decline.

The enrollment began with an initial study visit at the HF clinic, where participants underwent a clinical examination of cardiac function. Medications, laboratory data, and functional status (NYHA class and 6-min walk test) were assessed. Demographic and clinical variables such as age, gender, marital status, and comorbid conditions were collected from medical records. If needed, patients provided additional data.

The Charlson Co-morbidity Index was used to classify co-morbidity.[44] Myocardial stress was measured with B-type natriuretic peptide (BNP), which was analyzed in an accredited laboratory. At the end of the clinic visit, study participants received surveys on self-care and symptoms of depression to complete at home.

One week after enrollment, the same study nurse visited the patient at home. Cognitive testing was performed and surveys were collected. The study nurse checked for missing data and verified that the patients had filled out the questionnaires on their own.

Measurements

The European Heart Failure Self-care Behavior Scale

Heart failure-related self-care was measured using the European Heart Failure Self-care Behavior Scale (EHFScB-9), a 9-item