

# Cognitive Intervention to Improve Memory in Heart Failure Patients

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## Abstract:

This application is in response to NIH FOA PA-15-017 investigating interventions to attenuate cognitive decline in individuals with cognitive impairment. It is consistent with the NINR priority of improving management of symptoms of chronic illness to improve quality of life. From 23% to 50% of the 5.1 million Americans with chronic heart failure (HF) have comorbid cognitive dysfunction including the debilitating problem of memory loss. We found that memory loss in HF was an independent predictor of 12-month all-cause mortality (n=166). We tested the computerized cognitive training intervention using BrainHQ in two small studies (n=40; n=27) and found that compared with HF patients who completed the active control health education intervention, HF patients who completed BrainHQ had significantly improved memory (delayed recall) (effect size [ES]=0.75), serum brain-derived neurotrophic factor (BDNF) levels (ES=1.21), and working memory (ES=0.64). We propose a three-arm randomized controlled trial of 264 HF patients within four equal sized blocks on baseline cognitive function (normal/low) and gender. Specific aims are to: 1) evaluate the efficacy of computerized cognitive training intervention using BrainHQ to improve memory and serum BDNF levels (primary outcomes), working memory, instrumental activities of daily living, and health-related quality of life among HF patients; 2) evaluate the incremental cost-effectiveness of BrainHQ among HF patients; and 3) examine depressive symptoms, BDNF genotype of the Val66Met polymorphism, and apolipoprotein-ε4 allele as moderators of BrainHQ effect on primary and secondary outcomes. A sample of 264 HF patients will be randomly assigned to: 1) BrainHQ; 2) active control computer-based general cognitive stimulation intervention using crossword puzzles; and 3) usual care control with no specific computerized cognitive intervention. BrainHQ is an easily disseminated, scientifically based intervention designed to improve memory by increasing speed and accuracy of information processing. It is an 8 week, 40-hour program that is individualized to each patient's performance. The active control intervention (computer-based crossword puzzles) will serve as a comparison for computer use and performance of a cognitive activity that may provide general stimulation. The usual care control group will serve as a comparison with patients who are not receiving computer-based cognitive interventions. Data collection will be completed at baseline and at 10 weeks, 4 months and 8 months after baseline. Descriptive statistics, mixed model analyses, and cost-utility analysis using intent-to-treat approach will be computed. This research will provide new knowledge about efficacy of BrainHQ to improve memory and increase serum BDNF levels in HF. If efficacious, the intervention will provide a new therapeutic approach that is easy to disseminate to treat a serious comorbid condition of HF. If cost-effective, insurers will be more likely to provide coverage for the intervention and therefore health systems will be more likely to offer it as a treatment option.