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A Novel Approach Using Remote Speech Analysis in Chronic Ambulatory Heart Failure Patients Allows Early Detection of Clinical Decompensation Leading to Hospitalization

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Introduction

Prevention of acute decompensated heart failure (ADHF) hospitalizations has both medical and economic implications, yet remains an unmet need. Increases in pulmonary and perhaps upper airway fluid content may be detectable remotely by voice analysis. The Cordio HearO™ system is a mobile application with cloud-based computing, designed to identify distinct speech measures (SM) in standard audio recordings which may be indicative of HF clinical status and provide early warning of impending decompensation.

Hypothesis

Cordio HearO™ speech analysis can identify clinical worsening of heart failure (HF) patients prior to hospitalization.

Methods

In this ongoing multicenter, observational study, we recruited 173 New York Heart Association Class II-III, stable stage C chronic heart failure patients. The patients recorded five sentences (2-5 sec each) each day in their native language (English, Hebrew, Arabic or Russian), using Cordio HearO™ operating on standard smartphone devices. Patients have been followed for 3 to 23 months. The current analysis explored the association between different SM parameters and episodes of HF decompensation requiring hospitalization.

Results

A total of 196,610 recordings, collected over 47,376 patient days of follow up were analyzed during which 13 patients required hospitalization for ADHF. 10 (76.9%) (95% CI: 54.02% - 99.83%) of these episodes were detected by Cordio HearO™ software an average of 12.2 (range 8 to 17 days) days prior to admission. The estimated false-positive event rate per year was 1.47 (95% CI: 1.28 - 1.68).

Conclusions

Cordio HearO™ novel speech analysis technology may be a useful tool in remote monitoring of HF patients, providing an early warning of impending episodes of decompensation, thus having the potential to reduce ADHF hospitalizations and improve patient quality of life and economic outcomes. Ongoing and future studies will continue to define the role of speech measures in the management of heart failure patients.

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