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Transthoracic Bioimpedance Monitoring Predicts Heart Failure Decompensation and Early Readmission after Heart Failure Hospitalization: Preliminary Data from SENTINEL-HF

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Background: Patients, providers, and health systems are focused on reducing readmissions for patients with acute decompensated heart failure (ADHF). Readmission after hospitalization is common and often secondary to HF decompensation, but it remains challenging to identify patients at-risk. Bioimpedance is a validated marker of thoracic fluid accumulation. We examined whether transthoracic bioimpedance, measured using a Fluid Accumulation Vest (FAV), predicted HF decompensation in

advance of a clinical event in patients discharged after ADHF.

Methods: Participants included 42 patients hospitalized for ADHF. Participants were trained on the use of a FAV-smartphone dyad to obtain and transmit a 5-minute bioimpedance measurement once daily for 45-days after discharge. Readmission and diuretic dosing adjustments were identified using participant report and causes adjudicated using medical records. Receiver operating characteristic (ROC) curves and C-statistics were calculated to describe the characteristics of a bioimpedance based algorithm as a predictor of HF decompensation 3 or 7-days in advance of the clinical event.

Results: Participants (mean age 69 ± 12 years, 43% female, 88% white, 11% cognitively impaired, 12% depressed) had a mean ejection fraction of 50 ± 18%. HF-related rehospitalization occurred in 10% (n=4) and 10% (n=4) reported diuretic up-titration during the 45-day follow-up. An algorithm analyzing bioimpedance up to 3 or 7 days prior to an event was related to HF readmission (C statistics for 3 and 7 days = 0.83, 0.94, respectively) and the combined outcome of HF hospitalization or diuretic up-titration (C statistics for 3 and 7 days = 0.76, 0.80, respectively).

Conclusions: Early readmission after hospitalization for ADHF was common and predicted up to 7 days in advance by an algorithm analyzing transthoracic bioimpedance. Despite their advanced age and high burden of comorbid diseases, study participants with ADHF were able to make daily bioimpedance measurements using a FAV and transmit them using a smartphone. Transthoracic bioimpedance monitoring may offer possibilities for reducing HF readmissions by enabling identification and treatment of outpatients with early HF decompensation.