Cardiology- 2018-Future Strategies for Managing Congestion in Heart Failure Patients Using Cardiac Biomarker-Guided Self-Testing- Joseph T. Smith- Biodesign Institute at Arizona State University, USA

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Chronic heart failure (HF) is a leading cause of morbidity and mortality worldwide, with 5.8 million afflLcted in the United States [2], and the American Heart Association predicts that over 8 million Americans will have heart failure by 2030. Nearly 1 million hospitalizations occur annually in the United States for patients previously diagnosed with HF, resulting in an estimated $34 billion spent each year on HF patient care in just the United States, with ~70% of the annual cost attributed to acute in-hospital care [2-4]. Of the 1 million patients hospitalized annually for HF, approximately 25% are also readmitted within 30 days aier discharge, resulting in an additional $2.7 billion per year of hospitalization costs . He primary cause for both the initial hospitalization and readmission of patients previously diagnosed with HF is acute decompensation caused by clinical congestion, as opposed to diminished cardiac output. He onset of clinical congestion requiring hospitalization can be subtle, with subclinical congestion preceding clinical congestion by days or weeks before acute decompensation occurs, oien suddenly. HLs observation suggests that improved early management of subclinical congestion before it becomes acute has the potential to reduce both the initial hospitalization as well as rehospitalization rates for many of these HF patients [7,8]. He current standard of care for management of congestion in HF patients includes at-home, serial self-monitoring of weight, careful regulation of oral water volume intake, prescribed medications that improve long-term outcomes in HF, combined with in-person office visits. Unfortunately, this oien results in the delay of therapeutic care adjustments until aier patients become symptomatic. Once symptomatic, HF patients are more likely to be admitted and/or readmitted for clinical congestion [2]. There is a rapidly growing recognition of the potential for circulating cardiac biomarkers to aid in the pre-symptomatic assessment and proactive management of congestion in HF patients [9,10]. Independent of the initial cause of congestive HF, impairment of the myocardium results in a series of biomarker-associated compensatory mechanisms that can reflect the congestive state [1,10]. The most established of these clinically proven cardiac biomarkers are B-type natriuretic peptide (BNP) and the closely related N-terminal fragment of its prohormone, NT-proBNP, which are released by stretching of the ventricular wall, inducing vasodilation and inhibiting the renin-angiotensin system [10] There have been multiple clinical trials demonstrating the diagnostic utility of monitoring BNP in HF patients [1]. In the "Breathing Not Properly" study, BNP levels targeted at a 100 pg/ml threshold had a sensitivity of 90% and specLficLt\ of 73% for diagnosing HF in patients presenting to the ER with acute dyspnea, with the measured BNP level shown to be the single most accurate predictor to identify and dL´ʒerentLate congestive heart failure from other causes of acute dyspnea [11]. In other hospital-focused work, BNP levels >300 pg/mL prior to patient discharge were prognostic of adverse events [12,13], and were also shown to be prognostic when used in outpatient settings [14]. In an outpatient monitoring study, both routine and repeated measurements of BNP using a target threshold of ~125 pg/mL were also shown to lower HF patient risk for readmission [15]. However, one suggested weakness of these studies is that the natriuretic peptide (NP) cardiac biomarker levels may have been measured too infrequently [10]. Additionally, the angiotensin IIreceptor neprilysin inhibitor sacubitril-valsartan (Entresto), which is now becoming commonly prescribed for heart failure [16], leads to prolonged levels of BNP in the patient's bloodstream, while NTproBNP is una´ʒected by sacubitril-valsartan. Finally, in an increasingly aging population, redistributing limited healthcare resources to enable more frequent home monitoring of chronic patients may ultimately provide better outcomes for dollars spent. HLs has the potential to transform healthcare from today's reactive and hospital-centered approach into one much more focused on proactive and person-centered care, thanks to recent advances in

molecular diagnostic technology, combined with rapidly advancing low-cost and highly-sophisticated consumer electronics technologies.