EDITORIAL COMMENT

Tackling Early Heart Failure Deaths and Readmissions by Estimating Congestion*

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Patients who are discharged after a hospital admission for heart failure enter a vulnerable phase with a very high risk for early death or heart failure readmission (1). This is a major problem for patients, doctors, and society. The underlying cause for high readmission rates is still incompletely understood, although incomplete decongestion at discharge is frequently suggested to play an important role. Heart failure guidelines recommend a detailed and careful assessment of congestion pre-discharge (2,3). This includes assessing signs and symptoms and performing a chest radiograph, but the sensitivity and specificity of these methods to accurately estimate congestion are limited (4). Unfortunately, standardized metrics or (de)congestion scores are currently lacking. Several papers were recently published on multiple surrogates used to assess decongestion during hospitalization for acute heart failure. A frequently described surrogate is a rise in hemoglobin during a heart failure admission, indicated as hemoconcentration. Three large studies showed that hemoconcentration was associated with greater weight and fluid loss, greater reductions in filling pressures, and less residual congestion (5–7). A consistent finding among these 3 trials was a clear association between a greater hemoconcentration and a reduction in early post-discharge events and heart failure readmission in particular. Diuretic response during hospitalization was recently proposed as another surrogate for decongestion (8–10). A good diuretic response was associated with greater weight and fluid loss and less use of inotropes during hospitalization. Moreover, diuretic response was strongly and independently associated with a reduction in early post-discharge events and lower rates of heart failure rehospitalization. These 2 examples illustrate that an indirect metric to establish decongestion might be of great value during hospitalization, either to guide therapy or for its prognostic value. However, these metrics were applied during the in-hospital phase, but data on assessment or measures of congestion post-discharge are scarce. In this issue of JACC: Heart Failure, Duarte et al. (11) examine the prognostic value of plasma volume estimation shortly after discharge for a hospitalization for acute heart failure. The authors performed a retrospective analysis on the EPESUS (Eplerenone Post-Acute Myocardial Infarction Heart Failure Efficacy and Survival Study). EPESUS included patients with systolic heart failure after an acute myocardial infarction.

Plasma volume variation between discharge and after 1 month was established by the Strauss formula (estimated plasma volume variation [ΔePVS]), which incorporates both hemoglobin and hematocrit ratios. An estimation of plasma volume at 1 month (ePVS) was also studied. A decrease in estimated plasma volume (ΔePVS) 1 month after discharge was independently associated with a decreased risk of early cardiovascular events, defined as cardiovascular death, hospitalization for heart failure, or both. A lower estimated plasma volume at 1 month (ePVS) was similarly associated with fewer events and provided greater significant prognostic gain than ΔePVS. On the basis of these findings, the authors concluded that the use of a simple estimation of plasma volume as a parameter of congestion status provides important prognostic information beyond usual clinical variables and may have clinical implications for patient management (i.e., taking serial hemoglobin/hematocrit measurements after discharge).

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In clinical practice, we are all confronted with the heart failure patients indicated as “frequent flyers.” These patients are hospitalized for acute decompensated heart failure, discharged, and rehospitalized within days to weeks after discharge. It remains difficult to accurately predict which patients are at risk, because the reasons for this are multifactorial. The social situation, treatment adherence, disease progression, and many other factors play a role. Therefore, the prediction of heart failure rehospitalization is notoriously more difficult than the prediction of cardiovascular mortality. The present study indicates that residual congestion status, calculated from weight and hematocrit, has a reasonable correlation with measured plasma volume in healthy volunteers (p = 0.68; p < 0.001) and in outpatients with chronic heart failure (p = 0.51; p < 0.001) (12). This study also found that higher relative plasma volume status was associated with the occurrence of death and heart failure hospitalization in stable chronic heart failure patients. To the best of our knowledge, this study is the first to study the use of estimated plasma volume shortly after admission. This proposed metric is a readily applicable and easy accessible tool to assess congestion status and could be used after discharge. Interestingly, the simple estimation of plasma volume 1 month post-discharge provided greater prognostic value than the change in plasma volume from discharge to 1 month afterward, which suggests that it is not the change per se but post-discharge plasma volume status that is sufficient. These patients may have been discharged with residual congestion; therefore, assessment of decongestion during hospitalization either by hemoconcentration or diuretic response should be considered, because in patients with limited decongestion, discharge could be postponed. Furthermore, at and after discharge, congestion status could be monitored with estimated plasma volume by assessing hemoglobin and hematocrit. Adequate, close monitoring of congestion status post-discharge might consequently be actionable and lead to patient-tailored therapy. More aggressive up-titration of angiotensin-converting enzyme blockers, angiotensin receptor blockers, or loop diuretic agents or the addition of an aldosterone antagonist might be indicated. In fact, a recent study showed that patients with higher rates of post-discharge recongestion were less likely to be taking an angiotensin-converting enzyme inhibitor, angiotensin receptor blocker, or aldosterone antagonist (13). Future studies should validate whether estimated plasma volume can be used to assess (de)congestion both during and after hospitalization in other acute heart failure populations, because this study only included heart failure patients after myocardial infarction. In addition, prospective studies examining the use of estimated plasma volume to guide therapy might enable the clinician to more accurately treat the post-discharge acute heart failure patient and hopefully decrease the “frequent flyer” phenomenon.

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