Heart failure prognosis and the options to improve

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The impact of anthropometric measures of obesity on heart failure outcomes in Asia
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On behalf of: ASIAN-HF Investigators

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Background: The inverse association between obesity, traditionally classified by body mass index (BMI), and mortality among patients with heart failure (HF) is well-reported in Western nations but confined to a few small single-centre studies across Asia. Given the reservations against using BMI to measure obesity and the predisposition of Asian patients to a lean HF phenotype we assessed whether this obesity paradox exists in this region when different anthropometric measures are used.

Purpose: To examine (a) the associations of BMI with clinical characteristics (b) the relationships of BMI, waist circumference (WC) and waist-to-height ratio to outcomes among Asian patients with HF.

Methods: Using the prospective multinational Asian Sudden Cardiac Death in HF (ASIAN-HF) Registry, the relationship between BMI (WHO-recommended Asian cut-offs < 18.5, 18.5-23.0, 23.0-27.5, ≥ 27.5 kg/m2 for underweight, normal, overweight and obese respectively) with clinical characteristics and outcomes was assessed. In a subset of patients with available measurements of WC, the associations of BMI, WC, waist-to-height ratio with 1-year all-cause mortality and composite outcomes (HF hospitalisation or 1-year mortality) were examined.

Results: Among 5954 subjects (mean age 61.7 years, 26.3% women) 6.1, 30.3, 37.5 and 26.2% were underweight, normal, overweight and obese respectively. Positive correlations were observed between increasing BMI and blood pressure, WC, prevalence of hypertension, diabetes, myocardial infarction, and peripheral oedema (p-trend < 0.001).

A linear inverse trend in crude all-cause mortality at 1-year was observed across BMI subgroups (16.5%, 11.5%, 9.5%, 6.9%, p < 0.001), with the lowest rates in obese patients. Compared to obese patients, underweight patients had the highest hazards of 1-year all-cause mortality (adjusted hazards ratio [aHR] = 2.38; 95% CI 1.64-3.44) and composite outcomes (aHR = 1.53; 95% CI 1.16-2.00), followed by patients in normal and overweight categories.

Among subjects with available WC measures (n = 2051), every 1kg/m2 increase in BMI was associated with reduced crude and adjusted risk of mortality (5% and 8% respectively, p < 0.003). WC and waist-to-height ratio did not affect the crude hazards of death. Interestingly, BMI (per 1kg/m2) and waist-to-height ratio (per 0.1 increment) was respectively associated with 6% lower and 55% higher adjusted risk of composite outcomes (p < 0.01).

Conclusion: Among Asian patients with HF, those with high BMI had more prevalent comorbidities yet better outcomes, compared to low BMI. This obesity paradox was observed, only when obesity was defined by BMI and not WC or waist-to-height ratio. A direct correlation was observed between central obesity and poor composite outcomes in HF. These findings carry implications for the clinical application of anthropometric parameters in risk stratification of patients with HF.

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S2PLIT Score: a simple risk score predicting post-discharge 1-year mortality in patients with acutely decompensated heart failure
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Background: The acutely decompensated heart failure (ADHF) is a condition associated with poor outcomes, especially during the first year after hospitalization.

Purpose: To assess the performance of the S2PLIT scoring model in predicting a 1-year all-cause mortality in ADHF patients.

Methods: Clinical and laboratory data of 340 patients admitted for ADHF at a single-center ICCU were retrospectively examined. Variables that were significantly associated with 1-year mortality in multivariate regression analysis adjusted for age, sex, NYHA class, post-discharge medications, and comorbidities were included in the risk stratification model. Hosmer-Lemeshow test and C-statistic were used to determine the validity and predictive power of the model. Kaplan-Meier survival analysis was used to assess survival among risk groups.

Results: The average age of the studied population was 74 ± 9.8 years and 50.6% were women. Seventy-eight patients (22.9%) were NYHA II, 162 (47.8%) were NYHA III while 100 patients (29.5%) belonged to NYHA IV functional class. The average left-ventricular ejection fraction (LVEF) was 42.2 ± 9.5% while average systolic blood pressure (SBP) was 137.4 ± 27.4 mm Hg. Serum creatinine, uric acid, and sodium levels averaged 142.3 ± 96.2 μmol/L, 489 ± 172.9 μmol/L, and 138.2 ± 4.4 mmol/L, respectively. Significant independent predictors for 1-year all-cause mortality in our sample were LVEF, SBP, prior history of ADHF hospitalization(s) and serum creatinine, uric acid, and sodium levels. According to calculated S2PLIT score (Table 1), 153, 78 and 109 patients were stratified into a low-, intermediate- and high-risk groups with the observed mortality rates of 9.8% (15/153), 33.3% (26/78) and 91.7% (100/109), respectively. The obtained area under the curve (AUC) for the proposed score model was 0.905 (95% CI 0.864-0.937, SE 0.019, p < 0.001) (Figure 1A) with clear separation among respective risk groups in terms of cumulative survival (Figure 1B).

Conclusions: The S2PLIT scoring model performed well and demonstrated high predictive power for all-cause mortality in ADHF patients during the 1-year period following discharge.

Table 1

<table>
<thead>
<tr>
<th>Variable collected at admission</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left-ventricular ejection fraction &lt; 45%</td>
<td>1</td>
</tr>
<tr>
<td>Serum creatinine of 125-160 μmol/L (1 point) or &gt; 160 μmol/L (2 points)</td>
<td>1 OR 2</td>
</tr>
<tr>
<td>Serum sodium ≤ 135 mmol/L</td>
<td>1</td>
</tr>
<tr>
<td>Serum uric acid &gt; 440 μmol/L</td>
<td>1</td>
</tr>
<tr>
<td>Systolic blood pressure &lt; 130 mm Hg</td>
<td>1</td>
</tr>
<tr>
<td>History of prior hospitalization(s) due to exacerbation of the heart failure</td>
<td>1</td>
</tr>
</tbody>
</table>

Clinical and laboratory parameters incorporated into the S2PLIT score.
Heart failure prognosis and the options to improve

Increased all-cause mortality in newly diagnosed patients with heart failure between 2006 and 2012: a retrospective, population-based study in Sweden

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Background and Purpose: Recent analyses have shown decreasing incidence and increasing prevalence of heart failure (HF) in Sweden over time, suggesting a slowly changing composition of patients’ characteristics. Factors influencing these trends in patient characteristics and mortality were studied in newly diagnosed patients.

Methods: Patients with HF were identified using secondary care data from the National Patient Register (NPR) linked via unique identifiers to data from the Cause of Death Register. Patients aged = 18 years with ≥ 2 diagnoses of HF between 2006 and 2012, and an International Statistical Classification of Diseases and Related Health Problems, Tenth Edition (ICD-10) diagnostic code of I50 (inclusive of all granular codes), I42.0, I42.6, I42.7, I42.9, 110.0, I13.0 or I13.2 in any position were included. Date of first diagnosis was the index date. ICD-10 codes also identified comorbidities occurring in the 5 years before index. A 10-year look-back was used to exclude prevalent HF cases. Hazard ratios (HRs; adjusted for age, sex and year of diagnosis) and 95% confidence intervals (CIs) for all-cause mortality were estimated using a Cox proportional hazards model at 1 year post-index for years 2006-2012.

Results: Overall 141,607 patients were identified as newly diagnosed with HF in the NPR between 2006-2012 (median age: 80 years; 47% women; 80% first diagnosed in an inpatient setting). Patients’ mean age was constant at 77 years, their Charlson comorbidity index increased significantly from 1.4 to 1.6 (P < 0.0001) and the proportion of patients with a previous myocardial infarction decreased significantly from 14% to 12% (P < 0.0001) during the study period. One-year all-cause mortality (95% CI) increased from 18% (17%, 18%) in 2006 to 23% (22%, 24%) in 2012; similar trends were seen for 3-year mortality (Figure). The risk of all-cause mortality 1 year post-index increased from 2006 to 2012 (HR [95% CI] relative to 2006: 2007, 1.06 [1.01, 1.10]; 2008, 1.04 [1.00, 1.08]; 2009, 1.07 [1.02, 1.11]; 2010, 1.08 [1.03, 1.13]; 2011, 1.18 [1.13, 1.23]; and 2012, 1.34 [1.29, 1.40]); this was significant (P < 0.0001) for the year 2007 and years 2009-2012 versus 2006.

Conclusions: These results suggest a shift in the clinical profile and HF aetiology of newly diagnosed patients with HF over time. The increasing comorbidity burden might explain the increasing mortality over time in patients with newly onset HF, and indicates the need for intense evaluation and care of these patients.

One year follow-up of heart failure patients: role of the new tmr-like classification

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Introduction: NYHA is the most used classification for heart failure (HF), but it does not include some clinical features. We proposed a new staging system for HF, named HLM (AACC 2014;20:63;19:1895-69), which refers to heart (H), lung (L), and malfunction (M) of peripheral organs analogous to the TNM classification used in oncology. Each parameter is allocated in four levels of severity (H1-H4, L0-L3, M0-M3).

Purpose: The aim of our study is to validate HLM as nosology for HF patients, comparing it with the classic NYHA to achieve the most accurate prognosis of these patients, in terms of rehospitalization for MACCE and mortality at 6 and 12 months follow up.

Methods: We enrolled 1,064 consecutive patients with the diagnosis of, or at risk for, HF. According to HLM classification, all parameters for heart, lungs and peripheral organs function were collected and each patient was classified according to NYHA and HLM. At 6 and 12 months patients were followed up.

Results: At 6 and 12 months follow-up, comparing to NYHA, HLM showed a greater area under the ROC curve (AUC) for rehospitalization as well as for cardiac death. MACCE and cardiac death rates have been assessed for each combination of H, L and M parameters. At 1 year follow up, comparing to NYHA, each stage of HLM identifies different risk profile ranging from the initial stage of H1L0M0 with a probability of 5.25% (95% CI 3.53-7.72) of MACCE and a probability of 0.60% (95% CI 0.25-1.43) of cardiac death up to the end stage H4L3M3 that showed a probability of 67.05% (95% CI 56.67-76.0) of MACCE and a probability 35.36% (95% CI 23.37-49.53) of cardiac death. On the other hand, at 1 year follow up NYHA classes recognizes a "narrower" window of probability of events, ranging from a probability of 2.11 (95% CI 0.53 - 8.03) of MACCE and a probability of 9.47 (95% CI 5.00 - 17.21) of cardiac death for patients in class I, up to a probability of 34.54% (95% CI 28.18-41.49) of MACCE and a probability of 11.34% (95% CI 7.58-16.62) of cardiac death for subject in class IV.

Conclusions: According to these preliminary data, HLM nosology seems to be more accurate than NYHA classification to stratify risk of rehospitalization for MACCE and of cardiac death in HF patients, since the area under the ROC curve is greater for HLM in terms of rehospitalization and mortality. Moreover, within any NYHA class, HLM classification is able to better determine the prognosis at 1 year, because it evaluates both heart, lung, renal, hepatic, cerebral and hematopoietic involvement. This means that a wider and systemic approach should be used in HF patients, changing the "cardiocentric" methodology of NYHA.