LO02
Development of the HEARTRISK6 Scale for emergency department patients with acute heart failure
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Introduction: We previously derived (N = 559) and validated (N = 1,100) the 10-item Ottawa Heart Failure Risk Scale (OHFRS), to assist with disposition decisions for patients with acute heart failure (AHF) in the emergency department (ED). In the current study we sought to use a larger dataset to develop a more concise and more accurate risk scale. Methods: We analyzed data from the prior two studies and from a new cohort. For all 3 groups we conducted prospective cohort studies that enrolled patients who required treatment for AHF at 8 tertiary care hospital EDs. Patients were followed for 30 days. The primary outcome was short-term serious outcome (SSO), defined as death within 30 days, intubation or non-invasive ventilation (NIV) after admission, myocardial infarction, or relapse resulting in hospital admission within 14 days. The fully pre-specified logistic regression model with 13 predictors (where age, pCO2, and SaO2 were modeled using spline functions) was fitted to 10 multiple imputation datasets. Harrell’s fast stepdown procedure reduced the number of variables. We calculated the potential impact on sensitivity (95% CI) for SSO and hospital admissions, and estimated a sample size of 2,000 patients. Results: The 1,986 patients had mean age 77.3 years, male 54.1%, EMS arrival 41.2%, IV NTG 33.3%, ED NIV 5.4%, admission on initial visit 49.5%. Overall there were 236 (11.9%) SSOs including 61 deaths (3.1%), meaning that current admission practice sensitivity for SSO was only 59.7%. The final HEARTRISK6 scale is comprised of 6 variables (points) (C-statistic 0.68): Valvular heart disease (2) Antarrhythmic medication (2) ED non-invasive ventilation (3) Creatinine 80–150 (1); ≥150 (3) Troponin ≥3x URL (2) Walk test failed (1). The probability of SSO ranged from 4.8% for a total score of 0 to 62.4% for a score of 10, showing good calibration. Choosing a HEARTRISK6 total point admission threshold of ≥ 3 would yield sensitivity of 70.8% (95% CI 64.5–76.3) for SSO with a slight decrease in admissions to 47.9%. Choosing a threshold of ≥ 2 would yield a sensitivity of 84.3% (95% CI 79.0–88.7) but require 66.6% admissions. Conclusion: Using a large prospectively collected dataset, we created a more concise and more sensitive risk scale to assist with admission decisions for patients with AHF in the ED. Implementation of the HEARTRISK6 scale should lead to safer and more efficient disposition decisions, with more high-risk patients being admitted and more low-risk patients being discharged.

Keywords: kidney disease, myocardial infarction, troponin