

Predicting mortality among patients hospitalized for heart failure: derivation and validation of a clinical model.

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CONTEXT: A predictive model of mortality in heart failure may be useful for clinicians to improve communication with and care of hospitalized patients. **OBJECTIVES:** To identify predictors of mortality and to develop and to validate a model using information available at hospital presentation. **DESIGN, SETTING, AND PARTICIPANTS:** Retrospective study of 4031 community-based patients presenting with heart failure at multiple hospitals in Ontario, Canada (2624 patients in the derivation cohort from 1999-2001 and 1407 patients in the validation cohort from 1997-1999), who had been identified as part of the Enhanced Feedback for Effective Cardiac Treatment (EFFECT) study. **MAIN OUTCOME MEASURES:** All-cause 30-day and 1-year mortality. **RESULTS:** The mortality rates for the derivation cohort and validation cohort, respectively, were 8.9% and 8.2% in hospital, 10.7% and 10.4% at 30 days, and 32.9% and 30.5% at 1 year. Multivariable predictors of mortality at both 30 days and 1 year included older age, lower systolic blood pressure, higher respiratory rate, higher urea nitrogen level (all $P < .001$), and hyponatremia ($P < .01$). Comorbid conditions associated with mortality included cerebrovascular disease (30-day mortality odds ratio [OR], 1.43; 95% confidence interval [CI], 1.03-1.98; $P = .03$), chronic obstructive pulmonary disease (OR, 1.66; 95% CI, 1.22-2.27; $P = .002$), hepatic cirrhosis (OR, 3.22; 95% CI, 1.08-9.65; $P = .04$), dementia (OR, 2.54; 95% CI, 1.77-3.65; $P < .001$), and cancer (OR, 1.86; 95% CI, 1.28-2.70; $P = .001$). A risk index stratified the risk of death and identified low- and high-risk individuals. Patients with very low-risk scores (≤ 60) had a mortality rate of 0.4% at 30 days and 7.8% at 1 year. Patients with very high-risk scores (> 150) had a mortality rate of 59.0% at 30 days and 78.8% at 1 year. Patients with higher 1-year risk scores had reduced survival at all times up to 1 year (log-rank, $P < .001$). For the derivation cohort, the area under the receiver operating characteristic curve for the model was 0.80 for 30-day mortality and 0.77 for 1-year mortality. Predicted mortality rates in the validation cohort closely matched observed rates across the entire spectrum of risk. **CONCLUSIONS:** Among community-based heart failure patients, factors identifiable within hours of hospital presentation predicted mortality risk at 30 days and 1 year. The externally validated predictive index may assist clinicians in estimating heart failure mortality risk and in providing quantitative guidance for decision making in heart failure care.

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