Prediction of mortality using quantification of renal function in acute heart failure


BACKGROUND
Renal function, as quantified by the estimated glomerular filtration rate (eGFR), is a predictor of death in acute heart failure (AHF). It is unknown whether one of the clinically-available serum creatinine-based formulas to calculate eGFR is superior to the others for predicting mortality.

METHODS AND RESULTS
We quantified renal function using five different formulas (Cockcroft-Gault, MDRD-4, MDRD-6, CKD-EPI in patients<70years, and BIS-1 in patients≥70years) in 1104 unselected AHF patients presenting to the emergency department and enrolled in a multicenter study. Two independent cardiologists adjudicated the diagnosis of AHF. The primary endpoint was the accuracy of the five eGFR equations to predict death as quantified by the time-dependent area under the receiver-operating characteristics curve (AUC). The secondary endpoint was the accuracy to predict all-cause readmissions and readmissions due to AHF. In a median follow-up of 374 days (IQR: 221 to 687 days), 445 patients (40.3%) died. eGFR as calculated by all equations was an independent predictor of mortality. The Cockcroft-Gault formula showed the highest prognostic accuracy (AUC 0.70 versus 0.65 for MDRD-4, 0.55 for MDRD-6, and 0.67 for the combined formula CKD-EPI/BIS-1, p<0.05). These findings were confirmed in patients with varying degrees of renal function and in three vulnerable subgroups: women, patients with severe left ventricular dysfunction, and the elderly. The prognostic accuracy for readmission was poor for all equations, with an AUC around 0.5.

CONCLUSIONS
Calculating eGFR using the Cockcroft-Gault formula assesses the risk of mortality in patients with AHF more accurately than other commonly used formulas.
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