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RED CELL DISTRIBUTION WIDTH IS BETTER FOR PREDICTING SHORT-TERM AND LONG-TERM OUTCOMES THAN HAEMOGLOBIN IN ACUTE ONSET OF CONGESTIVE HEART FAILURE

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Objectives The goal of this study was to determine the short-term and long-term prognostic value of red cell distribution width

(RDW) in congestive heart failure (CHF) patients hospitalised in cardiac care unit and to compare the value of haemoglobin (Hgb) levels.

Methods In a cross-sectional study, patients with acute onset of CHF and admitted to cardiac care unit in Juntendo University Hospital were enrolled from Jan 2007 to Dec 2009 and were followed for a median of 24 months (range 6–42 months). We measured red blood cell distribution width, haemoglobin and other biomarkers when admission. The results were statistically analysed by software JMP 8.0 and SPSS 18.0.

Results A total of 521 patients were enrolled, with a median (IQR) age of 72 (64, 80) years old (66.6% male). Multivariate analysis showed that Hgb, B-type natriuretic peptide (BNP), estimated glomerular filtration rate (eGFR) and high density lipoprotein cholesterol (HDL-C) were independent predictors of RDW. The mean level of Hgb in in-hospital-dead group was 11.0 ±1.8 g/dl and 11.8±2.6 g/dl in in-hospital alive group ($p>0.05$), and the median (IQR) value of RDW was 16.2% (15.1%, 17.6%) and 14.4% (13.5%, 15.8%), respectively ($p<0.0001$). Through a median of 24 months follow up, the mean level of Hgb in no-endpoint-group was 12.5±2.4 g/dl and 11.4±2.5 g/dl in endpoint-group ($p<0.0001$), and the median (IQR) value of RDW was 13.8% (13.3%, 14.4%) and 14.9% (13.9%, 16.5%), respectively ($p<0.0001$). Logistic regression analysis showed in-hospital mortality was significantly related with RDW ($p=0.044$), NYHA IV ($p=0.0037$), eGFR ($p=0.042$) and C response protein ($p=0.0044$), not with Hgb ($p=0.10$). In the final multivariate cox proportional hazard models, RDW (per SD increase, HR 2.19, 95% CI 1.92 to 2.50, $p<0.0001$), left ventricular ejection fraction (per SD increase, HR 0.81, 95% CI 0.71 to 0.92, $p=0.0016$), age (10 years increase, HR 1.19, 95% CI 1.07 to 1.34, $p=0.0017$) and NYHA III/IV (HR 1.52, 95% CI 1.15 to 2.03, $p=0.0029$) remained independent predictors of long-term outcomes after adjustment, while Hgb did not add prediction value (per SD increase, HR 1.01, 95% CI 0.96 to 1.13, $p=0.86$).

Conclusions Higher red cell distribution width values at admission in congestive heart failure patients were associated with worse short-term and long-term outcomes, with more prognostic value than haemoglobin. RDW is inexpensive and contained in routine test. It should be included in multi-markers prognostic models to predict short-term and long-term outcomes in patients with acute exacerbation of heart failure.