

Barthel Index score predicts mortality in elderly heart failure: a goal of comprehensive cardiac rehabilitation

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Background: Accurate prediction of mortality in heart failure (HF) patients is crucial for decision-making regarding HF therapies, but a strategy for the prediction of mortality in elderly HF patients has not been established. In addition, although favorable effects of comprehensive cardiac rehabilitation (CR) on clinical outcomes and functional status in HF patients have been demonstrated, a goal of comprehensive CR during hospitalization for reducing mortality remains unclear.

Aims: We examined whether assessment of basic activities of daily living (ADL) by the Barthel Index (BI), the most widely used tool for assessment of basic ADL, is useful for predicting all-cause mortality in elderly HF patients who received comprehensive CR.

Methods: This study was a single-center, retrospective and observational study. We retrospectively examined 413 HF patients aged ≥65 years (mean age, 78±7 years; 50% female) who were admitted to our institute for management of HF and received comprehensive CR during hospitalization. Functional status for performing basic ADL ability was assessed by the BI within 3 days before discharge. The clinical endpoint was all-cause death during the follow-up period.

Results: Of 413 HF patients, 116 patients (28%) died during a follow-up period of median 1.90-years (interquartile range, 1.20–3.23 years). Results of an adjusted dose-dependent association analysis showed that the haz-

ard ratio (HR) of mortality increases in an almost linear fashion as the BI score decreases and that the BI score corresponding the hazard ratio of 1.0 is 85 (Figure A). To minimize the differences in potential confounding factors between patient with low BI (<85) and patients with high BI (≥85), inverse probability treatment weighting (IPTW) was calculated using propensity score. Kaplan-Meier survival curves, in which selection bias was minimized by use of IPTW for confounders, showed that patients with low BI (<85) had a higher mortality rate than did patients with high BI (≥85) (Figure B). In multivariate Cox regression analyses, low BI was independently associated with higher mortality after adjustment for predictors including brain natriuretic peptide and prior HF hospitalization (IPTW-adjusted HR, 1.75 [95% confidence interval, 1.03–2.98], p<0.001). Inclusion of the BI into the adjustment model improved the accuracy of prediction of mortality (continuous net reclassification improvement, 0.292, p=0.008; integrated discrimination improvement, 0.017, p=0.022).

Conclusion: A BI score of <85 at the time of discharge is associated with increased mortality independently of known prognostic markers, and achievement of functional status of a BI score ≥85 by comprehensive CR during hospitalization may contribute to a favorable outcome in elderly HF patients.

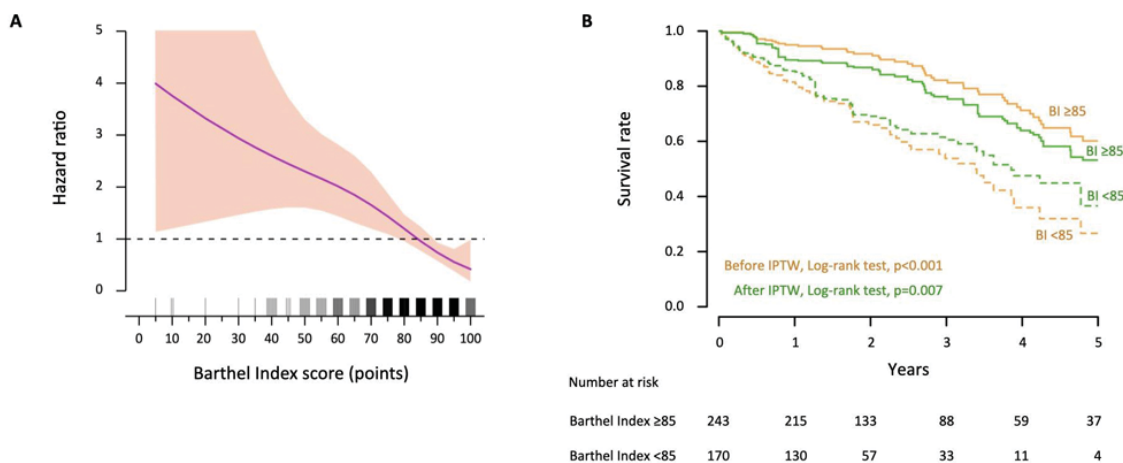


Figure. Adjusted dose-dependent association between BI score and all-cause mortality (A) and Kaplan-Meier survival curves before and after inverse probability of treatment weighting showing impact of BI score on the all-cause mortality (B) in elderly HF patients.

All analyses were adjusted for age, sex, history of HF hospitalization, cachexia, log BNP, eGFRcre, hemoglobin, Charlson Comorbidity Index, use of ACEI or ARB and beta-blocker.