

### **33. Modified Reverse Shock Index Predicts Early Outcomes of Heart Failure With Reduced Ejection Fraction**

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#### **Body**

**Background:** Increased blood pressure (BP) and decreased heart rate (HR) are signs of stabilization in patients admitted for acute HF. Changes in BP and HR during admission and their correlation with outcomes were assessed in hospitalized patients with heart failure (HF) with reduced ejection fraction (HFrEF).

**Methods:** A novel modified reverse shock index (mRSI), defined as the ratio between changes in systolic BP and HR during admission, was devised and its prognostic value in the early outcomes of acute HF was assessed using the Korean Acute HF registry.

**Results:** Patients with mRSI  $\geq 1.25$  at discharge were significantly younger and were more likely to have de novo HF. An mRSI  $\geq 1.25$  was associated with a significantly lower incidence of 60- and 180-day all-cause mortality (hazard ratio [HR] 0.49, 95% confidence interval [CI] 0.31–0.77; HR 0.62, 95% CI 0.45–0.85, respectively), compared to  $1 \leq \text{mRSI} < 1.25$  (all  $p < 0.001$ ). Conversely, an mRSI  $< 0.75$  was associated with a significantly higher incidence of 60- and 180-day all-cause mortality (adjusted HR 2.08, 95% CI 1.19–3.62; HR 2.24, 95% CI 1.53–3.27; all  $p < 0.001$ ). The mRSI was better correlated with outcomes in men, nondiabetics and elderly patients. The mRSI showed consistent results regardless of admission SBP, presence of atrial fibrillation, or use of beta-blockers at discharge.

**Conclusion:** In patients hospitalized for HFrEF, the mRSI was a significant predictor of early outcomes. The mRSI could be used as a tool to assess patient status and guide physicians in treating patients with HFrEF.

All-cause mortality	Person-years	Events (%)	HR (95% CI) <sup>a</sup>	HR (95% CI) <sup>b</sup>	<i>p</i> -value <sup>c</sup>
<b>60-days</b>					<.001
mRSI ≥1.25	122.6	37 (4.9)	0.48 (0.31-0.77)	0.49 (0.31-0.77)	
1 ≤ mRSI <1.25	134.4	57 (6.8)	1.00	1.00	
0.75 ≤ mRSI <1	134.3	61 (7.3)	1.29 (0.89-1.88)	1.39 (0.96-2.04)	
mRSI <0.75	43.3	21 (7.8)	1.96 (1.13-3.39)	2.08 (1.19-3.62)	
<b>180-days</b>					<.001
mRSI ≥1.25	346.6	87 (11.4)	0.62 (0.45-0.85)	0.62 (0.45-0.85)	
1 ≤ mRSI <1.25	375.7	110 (13.2)	1.00	1.00	
0.75 ≤ mRSI <1	375.3	109 (13.1)	1.15 (0.88-1.51)	1.21 (0.92-1.59)	
mRSI <0.75	121.6	47 (17.4)	2.10 (1.44-3.05)	2.24 (1.53-3.27)	

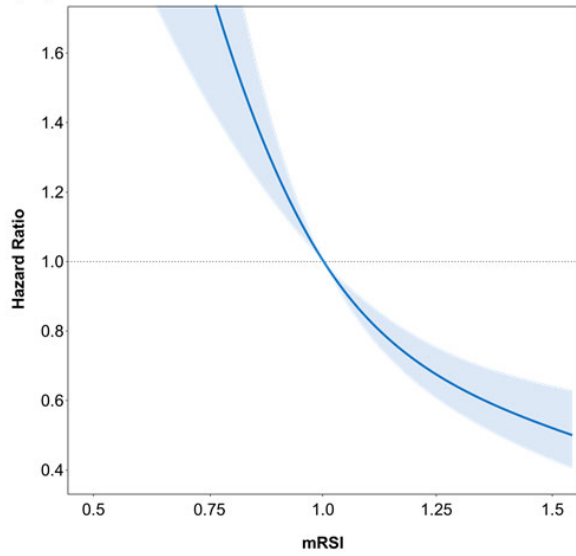
mRSI = modified reverse shock index; KorAHF = Korean Acute Heart Failure registry; HR = hazard ratio; CI = confidence interval.

<sup>a</sup>Adjusted for age, sex, and baseline SBP and HR.

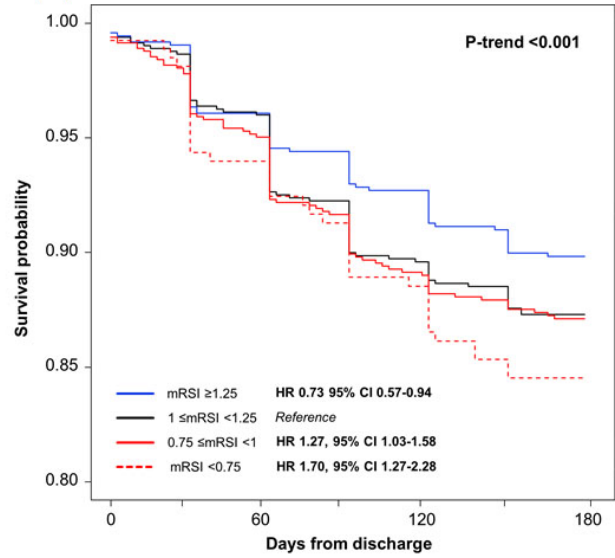
<sup>b</sup>Adjusted for age, sex, and baseline SBP and HR, body mass index, heart failure etiology (ischemic vs. non-ischemic), serum creatinine (<2.0 vs. ≥2.0 mg/dL), left ventricular ejection fraction, atrial fibrillation, and use of beta blockers.

<sup>c</sup>*p*-trend in Cox proportional hazard models.

(A)



(B)



**Clinical Implications:** My study will help enable cardiovascular clinicians to tailor therapy for patients with heart failure with reduced ejection fraction, using a novel marker of modified reverse shock index (mRSI).