

DECREASED HEART RATE VARIABILITY IN CHILDREN WITH ACUTE DECOMPENSATED HEART FAILURE IS ASSOCIATED WITH POOR OUTCOMES

Patrick S Connell¹, Jack F Price, MD², Craig G Rusin, PhD², Taylor S Howard, MD², Joseph A Spinner, MD², Santiago O Valdes, MD², Tam Dan N Pham, MD², Christina Y Miyake, MD², Jeffrey J Kim, MD²

¹ Baylor College of Medicine, Department of Pediatrics, Cardiology

² Baylor College of Medicine, Pediatrics, Cardiology

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Background: Heart rate variability (HRV) has been used as a noninvasive indicator of the health of neurocardiac interactions of the autonomic nervous system. In adults, decreased HRV correlates with increased cardiovascular mortality. However, the relationship between HRV and outcomes in children with acute decompensated heart failure (ADHF) has not been described. We hypothesize that children in ADHF who progress to death, heart transplant, or mechanical circulatory support (MCS) have decreased HRV.

Materials/Methods: Patients, age < 21 years, who presented to the hospital in ADHF from 2013-2018 were included. Primary outcome was defined as death, heart transplant, or MCS. Patients with congenital heart disease, pacemaker, ADHF due to tachycardia induced cardiomyopathy, previous heart transplant, those who met the primary outcome within 24 hours of admission, those who did not present in sinus rhythm, and those without telemetry data were excluded. Telemetry data from the first 24 hours of admission were obtained in a continuous, beat-to-beat manner using the Sickbay Platform. The standard deviation of the R-to-R interval in 5-minute intervals (SDNN) was calculated. The median SDNN was compared between those who met the primary outcome and those who did not. Results are reported as mean with 95% confidence interval. Statistics were performed using Mann-Whitney U test with a significance level of $\alpha = 0.05$.

Results: Of 47 included patients (median age 8.1 years; 55% male), 21 met the primary outcome (death = 3; transplant = 4; MCS = 17). The most common primary diagnosis in the cohort was dilated cardiomyopathy (DCM; n = 36). Patients who met the primary outcome had significantly lower median SDNN (22 [13, 34]) compared to those who did not (52 [32, 71]; $p = 0.006$; Fig 1). A ROC curve demonstrated an area under the curve of 0.74 ($p = 0.005$) for all patients in ADHF and 0.77 ($p = 0.006$) for patients with DCM. A median SDNN of 20 resulted in a sensitivity of 72% and specificity of 62% for the primary outcome in all patients in ADHF and a sensitivity of 71% and specificity of 74% for patients with DCM.

Conclusions: Patients in ADHF who died, were transplanted, or required MCS had significantly decreased HRV at presentation. This supports the use of HRV as a noninvasive tool to help significantly improve prognostication in children in ADHF.

Images / Graph / Table

