BLOOD PRESSURE VARIABILITY AND CARDIOVASCULAR OUTCOMES IN HEART FAILURE WITH PRESERVED EJECTION FRACTION

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BACKGROUND

- High Blood Pressure Variability (BPV) is associated with increased risk of cardiovascular events in patients with hypertension or chronic kidney disease.
- The management of Heart Failure with preserved Ejection Fraction (HFpEF) often includes aggressive blood pressure control.
- However, the association of BPV with cardiovascular outcomes in patients with HFpEF is unclear.
- Examining this potential association is key since the effect of BPV on outcomes may be independent of achieved mean blood pressure.
- Consequently, we leveraged data from a randomized trial enrolling patients with HFpEF.

METHODS

STUDY POPULATION

- POST HOC analysis of the Treatment of Preserved Cardiac Function Heart Failure with an Aldosterone Antagonist (TOPCAT) trial.
- TOPCAT enrolled patients ≥50 years old with symptoms of heart failure and an ejection fraction ≥ 50% (HFpEF), and tested the efficacy of spironolactone vs placebo on clinical outcomes. Only patients enrolled in the Americas were included in this analysis.

BLOOD PRESSURE VARIABILITY

- BPV was assessed for each participant as the standard deviation of all available systolic blood pressure measurements (SD-SBP) during follow up.

OUTCOMES OF INTEREST

- Composite of cardiovascular (CV) death or heart failure (HF) hospitalizations
- All cause death

STATISTICAL ANALYSIS

- Cox regression models adjusting for demographic, comorbidities, blood pressure medication and blood pressure measurement characteristics were constructed for each outcome.
- SD-SBP was modeled with a spline function with the median SD-SBP chosen as reference, and as quartiles with the highest quartile (Q4) as reference
- A p-value of <0.05 was considered statistically significant.

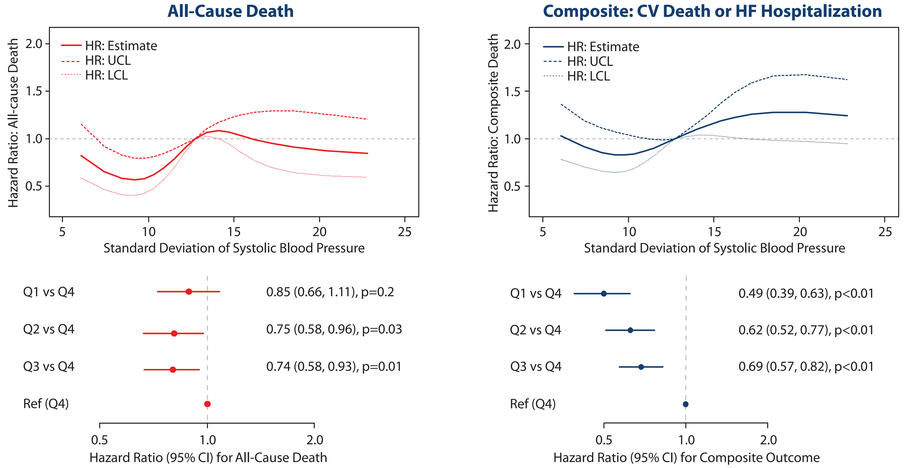
RESULTS

Table 1: Baseline Characteristics

	SD-SBP QUARTILES					
	Q1 (n = 432)	Q2 (n = 432)	Q3 (n = 432)	Q4 (n = 432)	Total (n = 1767)	P-Value
Age	66.13 ± 8.86	68.01 ± 9.25	69.67 ± 9.77	70.38 ± 9.84	68.56 ± 9.59	< 0.001
Male	47.7%	49.5%	50.8%	46.1%	48.5%	0.238
Female	52.3%	50.5%	49.2%	53.9%	51.5%	
White	95.6%	94.5%	89.6%	76.9%	88.9%	< 0.001
Mean SBP	126.77 ± 8.43	126.57 ± 9.58	126.78 ± 11.88	131.63 ± 13.47	127.97 ± 11.42	< 0.001
SD-SBP	5.15 ± 1.40	8.45 ± 0.86	11.74 ± 1.12	18.14 ± 4.44	10.87 ± 5.38	< 0.001
Depression	20.8%	21.6%	26.1%	30.6%	26.7%	0.018
Hypertension	90.6%	90.8%	91.9%	92.6%	91.4%	0.409
Diabetes	20.5%	28.5%	33.9%	46.5%	32.5%	< 0.001
Atrial Fibrillation	24.3%	34.9%	43.0%	39.3%	35.3%	< 0.001
Myocardial Infarction	28.5%	26.1%	24.2%	25.5%	25.9%	0.241
Stroke	5.4%	4.8%	9.6%	11.0%	7.7%	< 0.001
Peripheral Artery Disease	7.2%	7.0%	9.0%	14.4%	9.3%	< 0.001
Prior PCI	9.7%	12.8%	15.6%	19.9%	14.5%	< 0.001
Current Smoker	7.0%	4.9%	6.5%	6.9%	6.6%	0.523
eGFR	71.84 ± 19.71	67.61 ± 17.92	66.34 ± 19.94	64.72 ± 20.75	67.67 ± 20.15	< 0.001
ACE-I or ARB	87.1%	85.8%	81.6%	83.0%	84.3%	0.005
Beta-blocker	77.0%	75.9%	77.7%	80.6%	77.7%	0.11
Calcium channel blocker	35.2%	36.6%	37.1%	41.8%	37.6%	0.03

Values are % or mean± SD. Continuous variables compared using one-way analysis of variance. Categorical variables compared using chi-square or Fisher's exact test. eGFR: estimated glomerular filtration rate; ACE-I/ARB: angiotensin converting enzyme inhibitor/angiotensin receptor blocker

Figure: Spline Curves and Forest Plots Illustrating Association of SD of SBP and Outcomes



Cox models adjusted for: age, gender, race, BMI, GFR, diabetes, MI, coronary or peripheral artery disease, stroke, atrial fibrillation, antihypertensive drug classes, number of blood pressure measurements, duration between measurements and mean SBP during follow up. HR = Hazard Ratio; LCL = Lower Confidence Limit; UCL = Upper Confidence Limit.

RESULTS

- Higher SD-SBP quartiles was a associated with a higher prevalence of comorbidities.
- Over a median follow up of 3.4 years, SD-SBP was associated with the risk of all-cause death and composite of CV death or HF hospitalization.
- There was suggestion of a nonlinear association between SD-SBP and death.

LIMITATIONS

- This is a post-hoc analysis. Findings are to be considered hypothesis generating.
- Cannot exclude residual confounding.

CONCLUSION

- SBP variability is associated with CV outcomes in HFpEF independent of mean systolic blood pressure.
- Whether BPV is a potential therapeutic target in HFpEF requires further study.

DISCLOSURES

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