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INNOVATION IN CARDIOVASCULAR INTERVENTIONS

7-9 DECEMBER 2025
TEL AVIV, ISRAEL

A Simple Hemodynamic Congestion Index Predicts 90-Day Non-Elective Hospitalization

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Disclosures

CEO and Founder of Acorai

Background

Residual congestion at discharge is a major driver of readmissions. We developed a Hemodynamic Congestion Index (HCI) that integrates standardized PCWP and RAP into a single 0–100 scale to track hemodynamic congestion.

Investigational Device. Limited by Federal (or United States) Law to Investigational Use

SAVE Sensor System

Objective

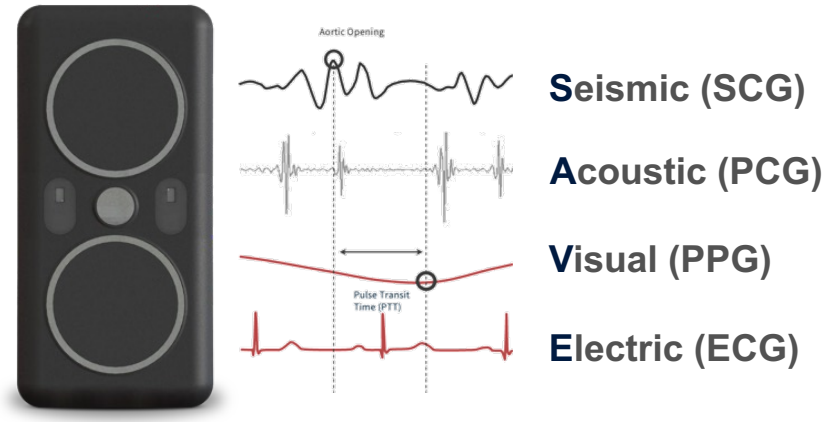
To evaluate:

1. agreement between site-reported and core-lab adjudicated measures of PCWP, RAP, and HCI and
2. the ability of HCI and a hospitalization risk model to predict 90-day non-elective hospitalization.

CAPTURE-HF: Study Design & Methods

Summary: A multi-site observational clinical investigation to collect non-invasive sensor data during a right heart catheterization (RHC), to train machine learning models to estimate intracardiac hemodynamic parameters

Data acquisition: 5-minute recordings within minutes of RHC using multi-sensor platform



Acorai 1st generation device & the SAVE Sensor System

Design: Observational study; N=1,240 adults undergoing RHC across 14 hospitals, in 6 countries (core-lab adjudicated RHC data)

Enrollment and ML-model development
(October 2023 to July 2025)

Phase-1 (14 sites, n = 1,240) in US/EU/UK) → **90-day patient non-elective hospitalizations**

Adults scheduled for RHC → ***5-min device recording*** → ***Core-lab adjudication of RHCs*** → ***ML-models train and test***

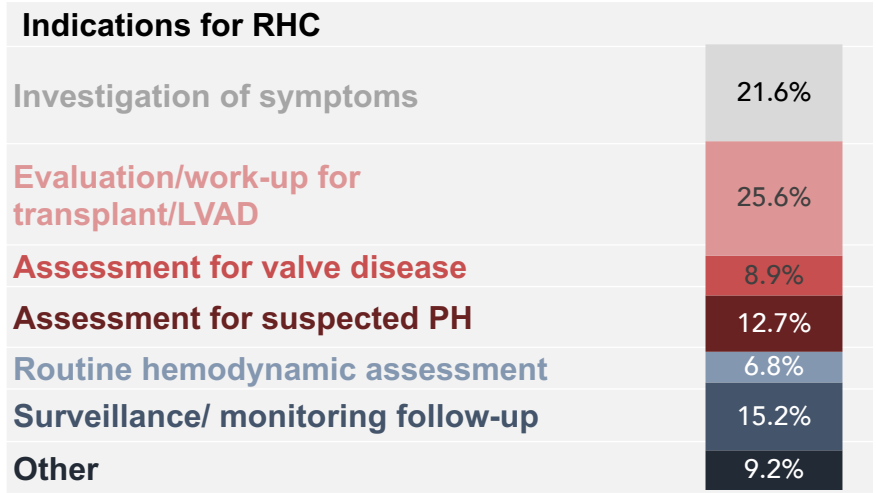
Phase 1 ML-model training & testing: *Ensemble-based modelling approach, using 5-fold nested cross-validation.*

CAPTURE-HF Full Patient Cohort Overview

Overview	
Enrollment	1240
US patients %	50.7%
Mean age (SD)	63.27 (14.41)
Male%	63.2%
White%	80.9%

Prevalence	
RAP > 10	29.8%
PCWP > 15	42%

Discordance	
PCWP > 15 vs. RAP > 10 classes different	299 (24.1%)



Methods

- In CAPTURE-HF, patients referred for right-heart catheterization (RHC) had PCWP and RAP measured by sites and adjudicated by a core lab.
- HCI was computed as the 50:50 average of standardized PCWP and RAP, rescaled to 0–100. Agreement used Bland–Altman analyses.
- Prognostic performance compared the highest vs lowest HCI quintiles (Q5 vs Q1) for 90-day non-elective hospitalization using Kaplan–Meier estimates and risk ratios.

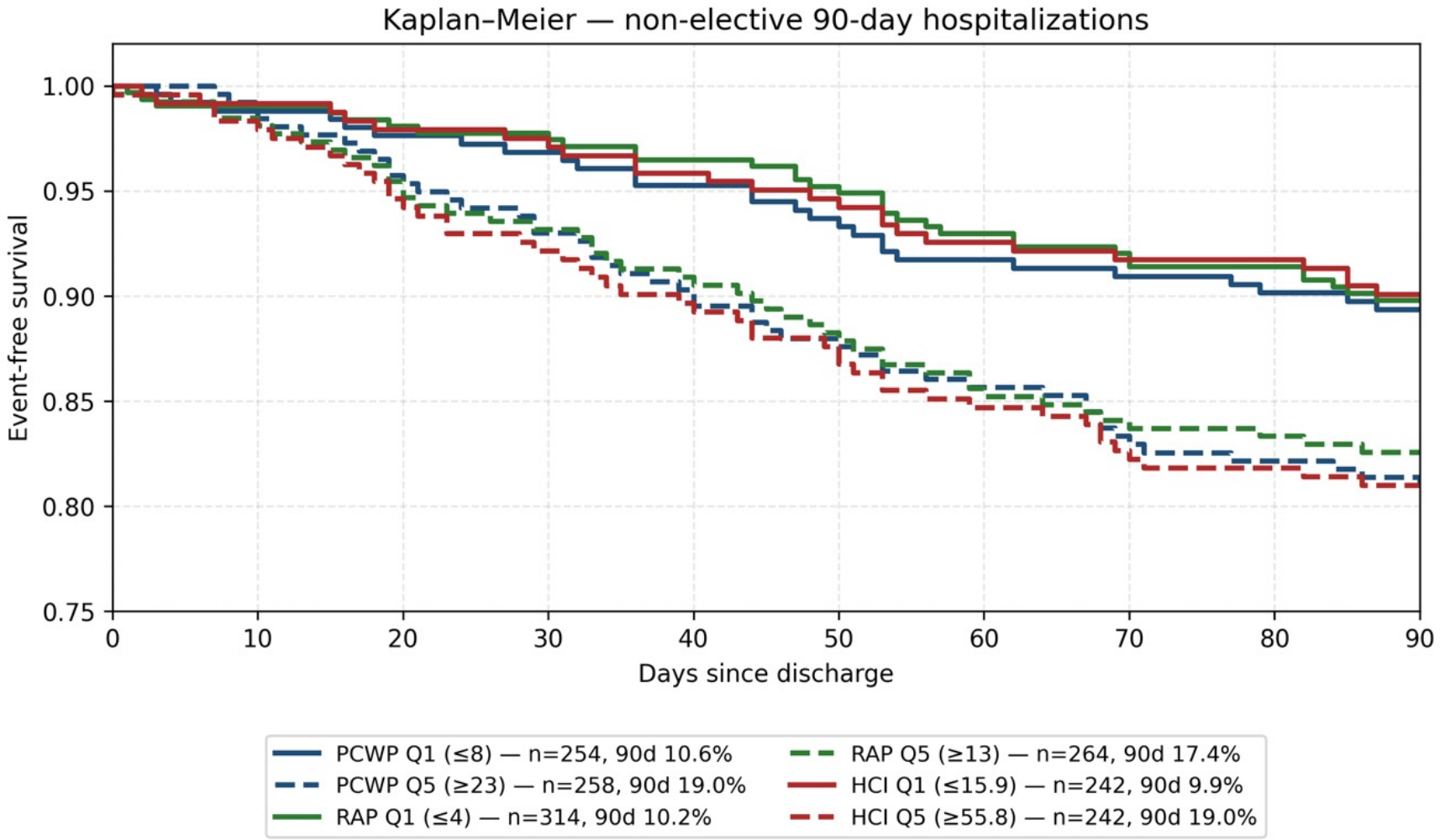
Results

Among 1,219 patients with 90-day follow-up, 178 (14.6%) experienced a non-elective hospitalization.

- Agreement between site and core-lab measurements remained tight for PCWP, RAP, and HCI; when mapped back to mmHg, the HCI limits (±3.9 mmHg mapped to PCWP; ±2.6 mmHg mapped to RAP) matched the RHC.
- **High congestion carried higher 90-day risk:**
  - **HCI quintile 5 vs 1 yielded 19 % vs 10 % event rates (RR 1.92), mirroring PCWP and RAP.**
  - **A hospitalization risk model** built on data from the Acorai SAVE Sensor System multisensory platform showed an **RR of 4.43.**

Results

Figure 2 — Prognostic value (Kaplan–Meier – non-elective 90-day hospitalizations)



Results

Figure 3 – Bland-Altman Summary Statistics

measure	bias	sd	loa_lower	loa_upper
HCI mapped to PCWP	-0.001	**3.86**	-7.57	7.57
HCI mapped to RAP	0.001	**2.63**	-5.15	5.15
PCWP	-0.717	**3.90**	-8.36	6.92
RAP	-0.408	**2.78**	-5.85	5.03

Results

Figure 4 — Risk gradient summary – Non-elective 90d hospitalization (Q1 vs Q5)

Split	1st Quintile (Q1)	5th Quintile (Q5)	90d risk Q1 %	90d risk Q5 %	Absolute diff (pts)	Relative risk (Top/Bottom)	Log-rank p
RAP Q1 vs Q5	314	264	10.2	17.4	7.2	**1.71**	0.0089
PCWP Q1 vs Q5	254	258	10.6	19.0	8.4	**1.79**	0.0076
HCI Q1 vs Q5	242	242	9.9	19.0	9.1	**1.92**	0.0039
Hospitalization Risk Model	247	246	6.88	30.49	23.61	**4.43**	3.82×10^{-11}

Conclusion

- A simple 50:50 Hemodynamic Congestion Index (HCI) **retains PCWP/RAP-like properties and meaningful 90-day risk discrimination**, while **a broader hospitalization risk model provided higher risk discrimination.**
- The HCI and hospitalization risk model can potentially be useful for **tracking congestion and guiding medical therapy in heart failure patients**, and ensuring adequate decongestion prior to hospital discharge
- Prospective validation of the index in external cohorts (e.g. upcoming 1000-patient HOSP-HF decongestion study in hospitalized heart failure patients) is warranted.