Your window
to the heart.

Product
Overview

NICaS®
By NIMEDICAL

Non-invasive
hemodynamic
& fluid management

www.ni-medical.com

Innovative Regional (Whole-body) Impedance Cardiography:

- Direct measurement of changes in electrical resistance (volume) of the arterial system in the heart rate.
- Stroke volume is calculated by a proprietary algorithm.

NICaS® is a non-invasive, easy to use and cost-effective hemodynamics and fluids management system.

Our solution is composed of a module, a set of cables, sensors, and our proprietary software.
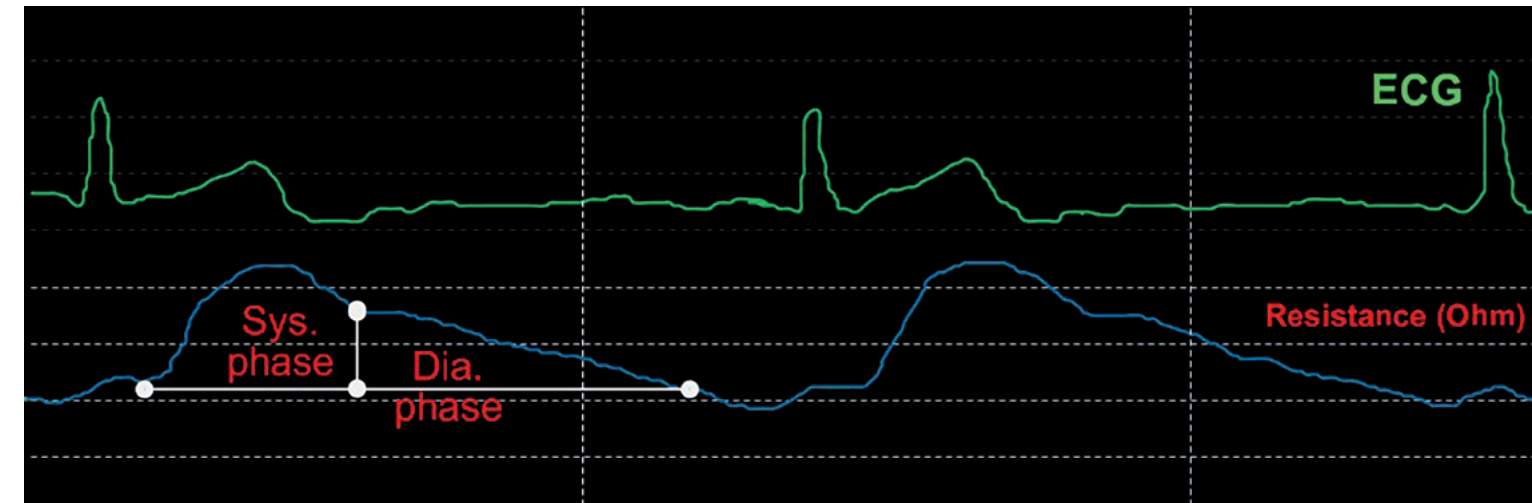
Treat your cardiovascular patients according to their specific hemodynamic profiles.

You need not resort to guessing your patient's volume, peripheral resistance and perfusion. NICaS Hemodynamic NAVIGATOR is the optimal tool for making better informed decisions regarding the need for more aggressive diuresis or increased vasodilation.

- 100% non-invasive
- Easy to use - Can be operated by any medical professional (MA, RN, MT, etc.). Provides a quick learning curve.
- Quick - The exam takes 4-6 minutes.
- Patient friendly - Requires only 2 sensors with no need to shave or undress the patient.
- Remote patient management - Capable of analyzing several patients at the same time when used by a single, remote medical professional (cloud ready).
- Accuracy & reproducibility - Provides accurate assessment of the smallest hemodynamic change.
- Immediate - Instant results.
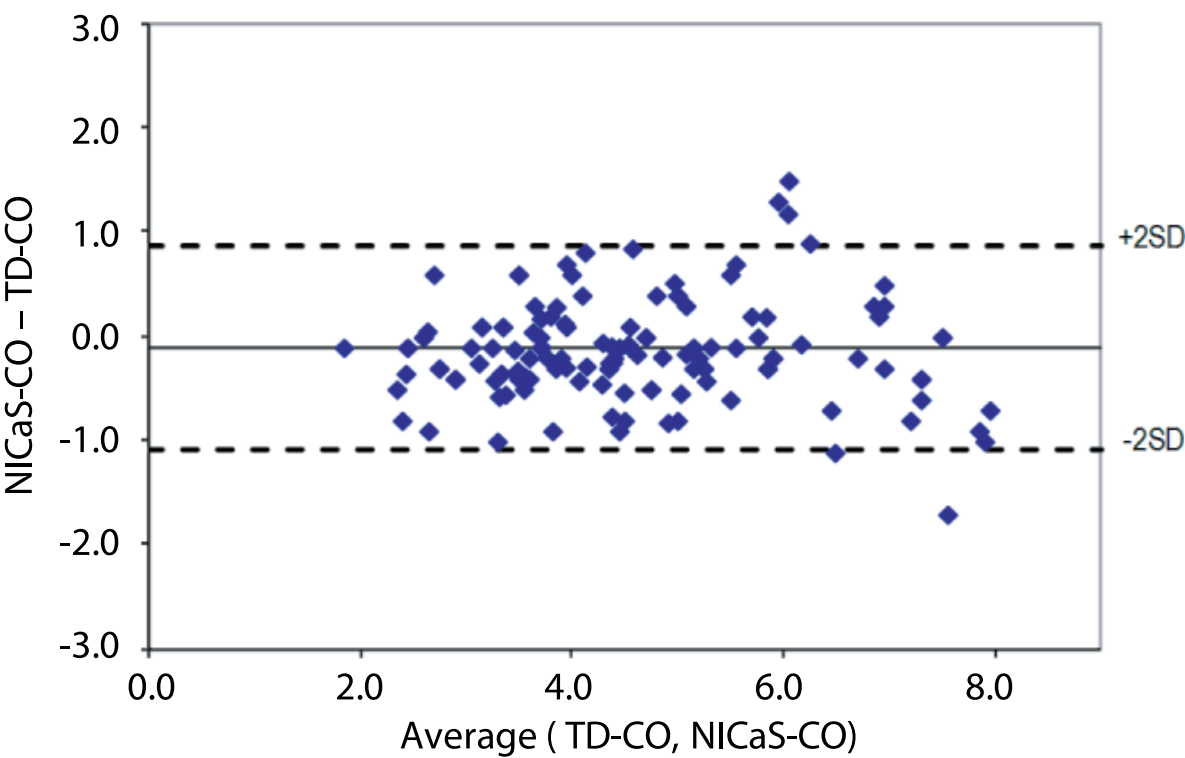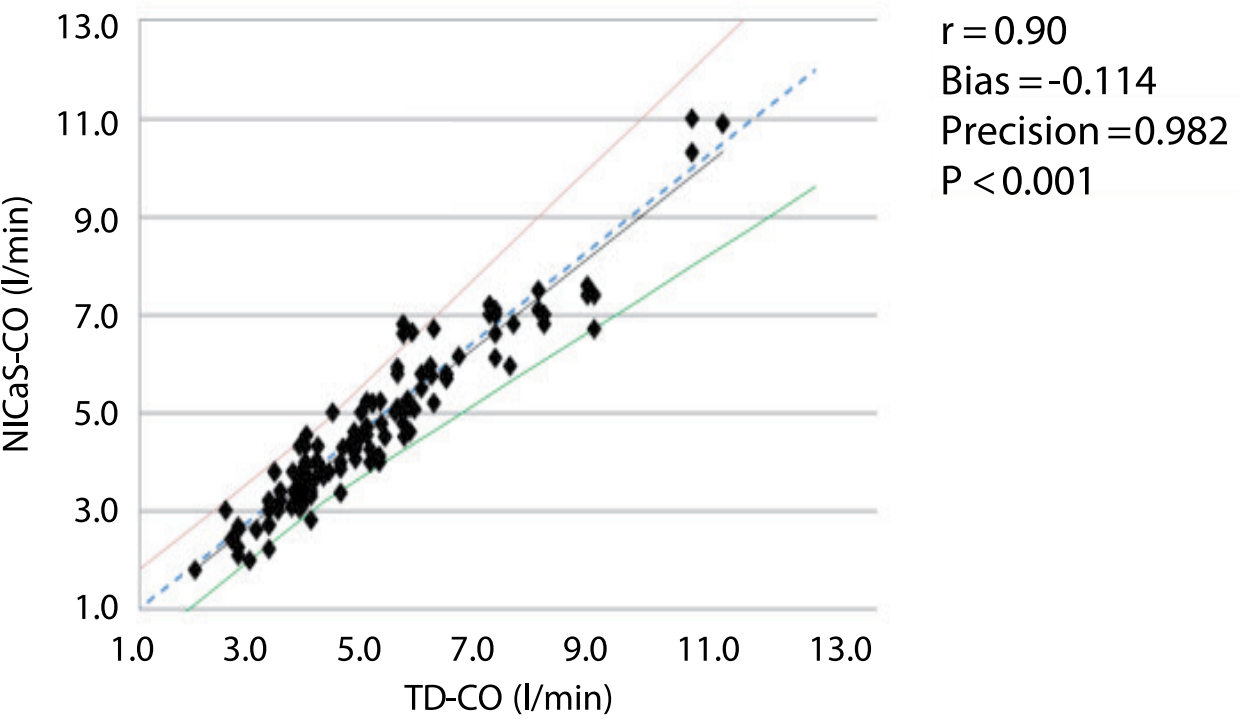- Highly effective - NICaS NAVIGATOR provides you with the cause of the instability - not only the symptom.

NICaS Sensors connect to patients' wrist and contralateral ankle | NICaS System Medical Tablet Configuration

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Summary of over 1200 correlations to Thermodilution:

r = 0.90
Bias = -0.114
Precision = 0.982
P < 0.001

Validation by research:

"The differences of the hemodynamic responses to vasodilation therapy may be better depicted by the NICaS when compared with thermodilution." [1]

"The results of the present study suggest that NICaS might be more accurate then thermodilution for CO determination due to the tendency of thermodilution to under estimate CO when high and over estimate it when low." [2]
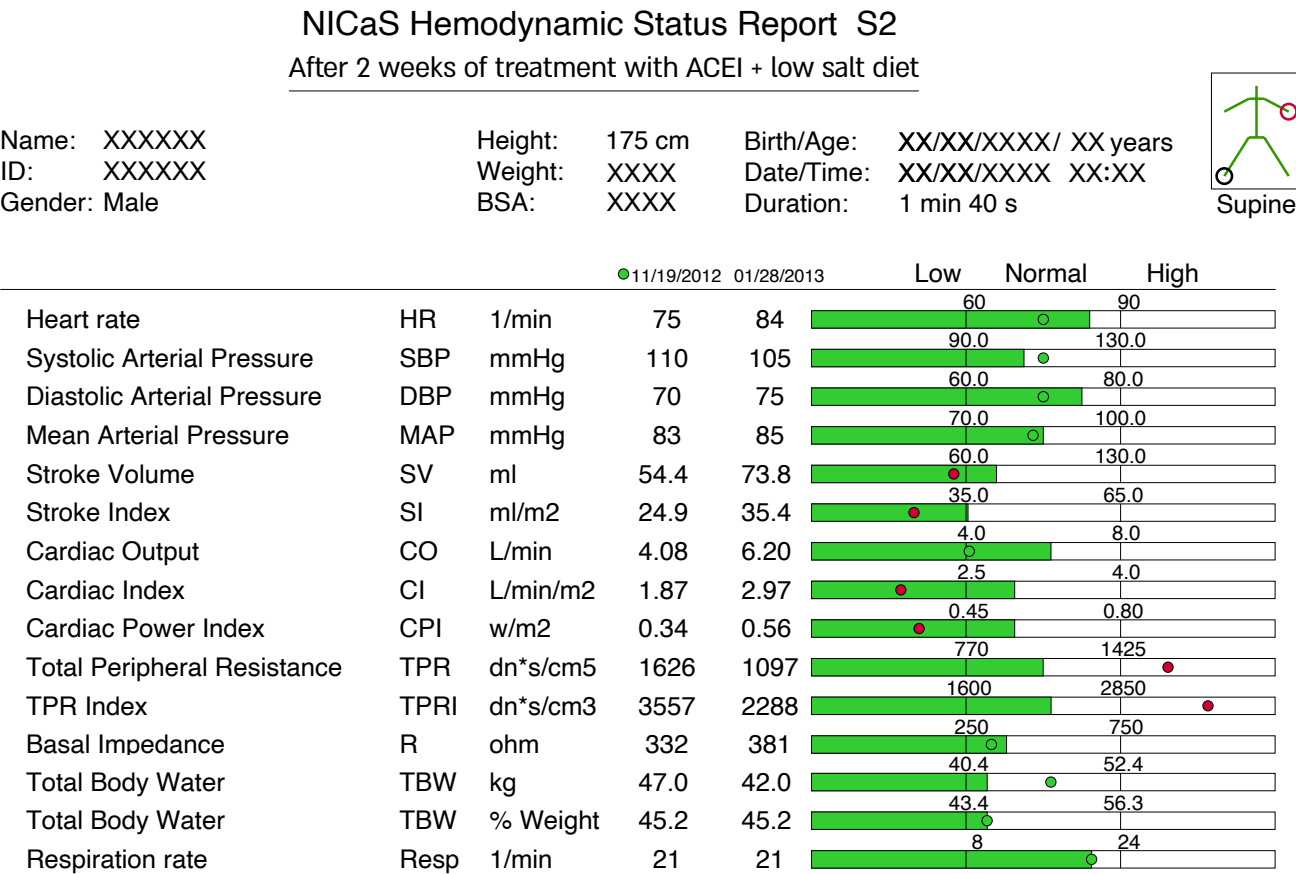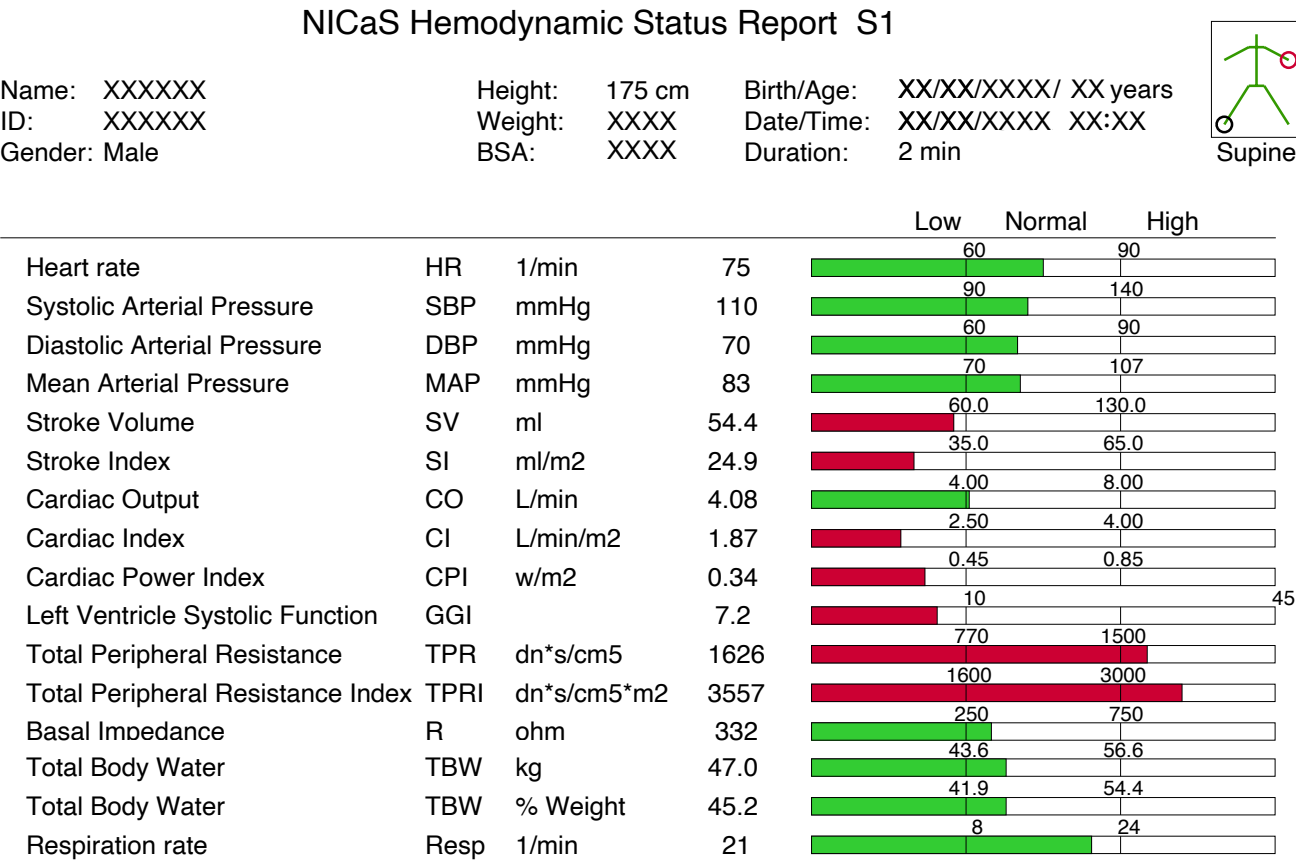
"Agreement between NICaS CO and thermodilution CO is within the boundaries of the FDA guidelines of bio-equivalence." [3]

"In cardiac conditions, the Regional impedance technology, utilized by NICaS is x2 as accurate as Thoracic impedance." [4]

| Author / Journal	Title	Validation Conclusions
G. Cotter et al. Chest 2004 (1)	Accurate, Noninvasive Continuous Monitoring of Cardiac Output by Whole-body Electrical Bioimpedance	The result of the study indicates that wholebody bioimpedance CO measurements obtained by the NICaS are accurate in a wide range of cardiac clinical situations. n=122, r=0.886, bias=-0.001±0.68
Guillermo Torre-Amiot et at. European J. of Heart Failure 2004 (2)	Whole-Body Impedance is accurate in NI Determination of CO: A TD controlled, Prospective, Double Blinded Evaluation	NICaS is a novel accurate NI method for CO determination. n=93, r=0.81, bias=0.01±0.63
Oscar L. Paredes et al Circulation J. 2006 (3)	Impedance Cardiography for CO Estimation, Reliability of Wrist-to-Ankle Electrical Configuration	NI-CO is applicable for NI assessment of cardiac function/ n=50, r=0.91, bias=0.18±0.87
G. Cotter et al. Physiol. Meas. 2006 (4)	Impedance cardiography revisited	The advantage of the Regional impedance is the use of peripheral rather thoracic impedance signals. n=43, r=0.97, bias=-0.070±1.02

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Example of NICaS-based management of CHF patient in the community:

NICaS Hemodynamic Status Report S1

Name: XXXXXX Height: 175 cm Birth/Age: XX/XX/XXXX / XX years
ID: XXXXXX Weight: XXXX Date/Time: XX/XX/XXXX XX:XX
Gender: Male BSA: XXXX Duration: 2 min

Supine

				Low	Normal	High
Heart rate	HR	1/min	75	60	90	
Systolic Arterial Pressure	SBP	mmHg	110	90	140	
Diastolic Arterial Pressure	DBP	mmHg	70	60	90	
Mean Arterial Pressure	MAP	mmHg	83	70	107	
Stroke Volume	SV	ml	54.4	60.0	130.0	
Stroke Index	SI	ml/m2	24.9	35.0	65.0	
Cardiac Output	CO	L/min	4.08	4.00	8.00	
Cardiac Index	CI	L/min/m2	1.87	2.50	4.00	
Cardiac Power Index	CPI	w/m2	0.34	0.45	0.85	
Left Ventricle Systolic Function	GGI		7.2	10		45
Total Peripheral Resistance	TPR	dn*s/cm5	1626	770	1500	
Total Peripheral Resistance Index	TPRI	dn*s/cm5*m2	3557	1600	3000	
Basal Impedance	R	ohm	332	250	750	

NICaS Hemodynamic Status Report S2

After 2 weeks of treatment with ACEI + low salt diet

Name: XXXXXX Height: 175 cm Birth/Age: XX/XX/XXXX / XX years
ID: XXXXXX Weight: XXXX Date/Time: XX/XX/XXXX XX:XX
Gender: Male BSA: XXXX Duration: 1 min 40 s

Supine

						Low	Normal	High
Heart rate	HR	1/min		84	60	90	
Systolic Arterial Pressure	SBP	mmHg	110	105	90	130.0	
Diastolic Arterial Pressure	DBP	mmHg	70	75	60.0	80.0	
Mean Arterial Pressure	MAP	mmHg	83	85	70.0	100.0	
Stroke Volume	SV	ml	54.4	73.8	60.0	130.0	
Stroke Index	SI	ml/m2			35.0	65.0	
Cardiac Output	CO	L/min	4.08	6.20	4.0		
Cardiac Index	CI	L/min/m2	1.87	2.97	2.5	4.0	
Cardiac Power Index	CPI	w/m2	0.34	0.56	0.45	0.80	
Total Peripheral Resistance	TPR	dn*s/cm5	1626	1097	770	1425	
TPR Index	TPRI	dn*s/cm3	3557	2288	1600	2850	
Basal Impedance	R	ohm	332	381	250	750	

Intuitive & comprehensive user interface

- A multi-dimensional graphic display of patient's fluids, hemodynamic status and cardiac function.

- Efficient determining of patient's preload, contractility or afterload which can lead to effective management of fluids, catecholamines and inotropes.
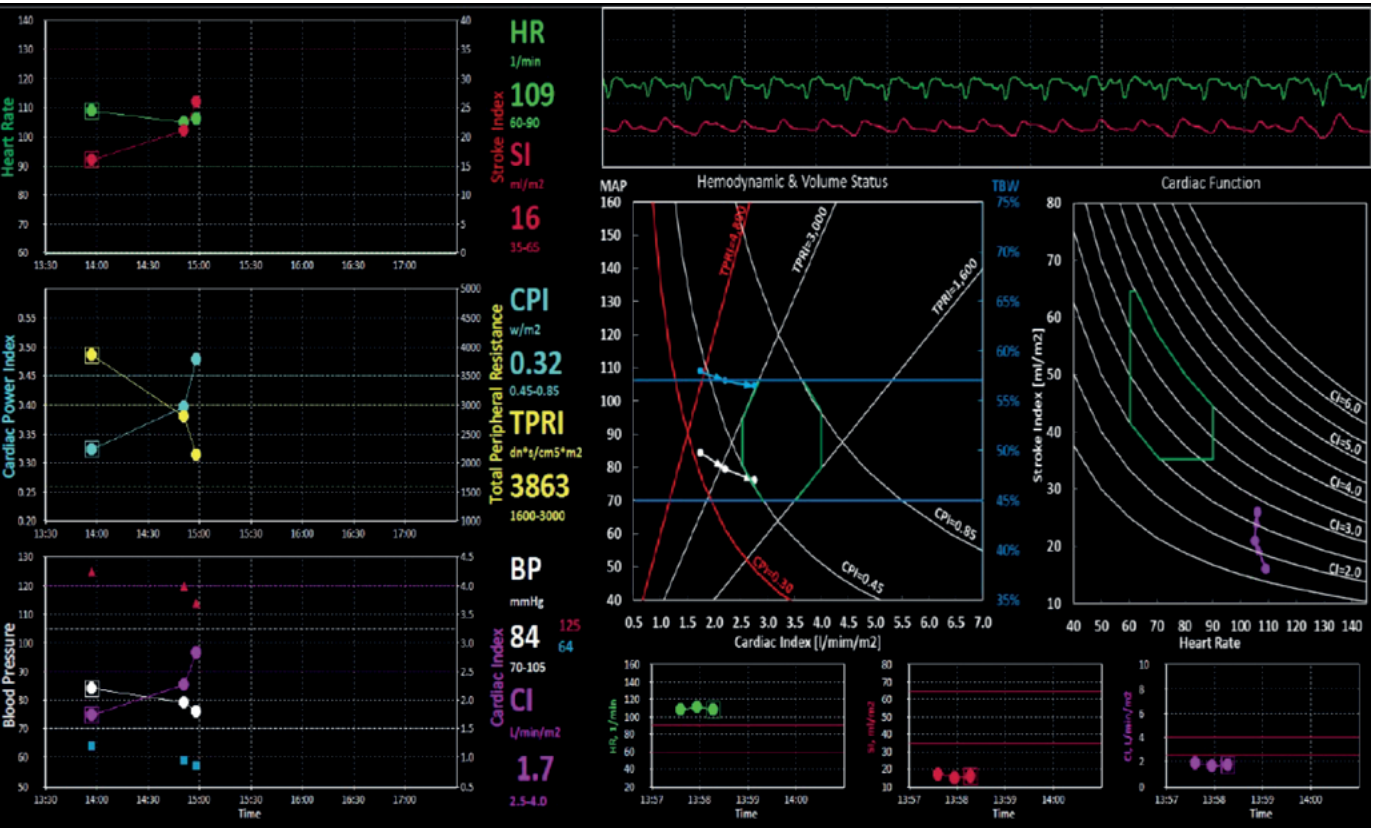
A good response to vasodilation therapy + diuretics, as seen on NICaS Cardiac screen
A typical afterload problem
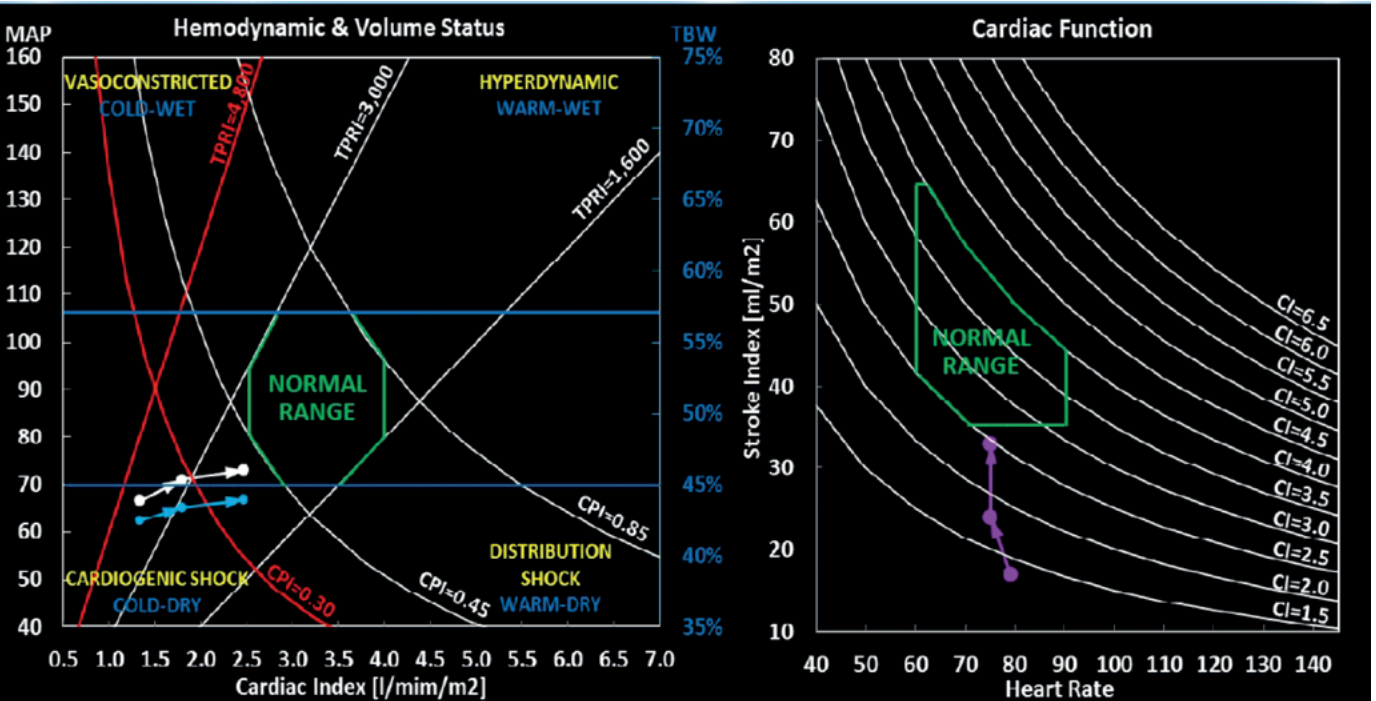
A good response to fluids challenge, as seen on the hemodynamic navigator
A typical preload problem

NICaS®

Technical Specifications.

- NICaS Dimensions: (L)12.8 x (W)13.1 x (H)1.3 cm (5.0 x 5.2 x 0.5 inch)
- Weight: 150 gm (5 oz)
- Power: USB: 5v/150mA DC

ICG		ECG	
Method	regional impedance	**Lead mode**	3 lead (RA,LA,LL)
Lead mode	1 lead (I, V+, V-, I_GND)	**Waveform**	single channel
Waveform	single channel	**Gain**	x1,x2,x4
Sweep speed	25 mm/s	**Sweep speed**	25mm/s
Impedance range	150-800 Ω	**Heart Rate range**	30-240bpm
ΔR Range	to 1Ω	**HR Accuracy**	±1bpm
ΔR Signal Bandwidth	0.3Hz to 12 Hz		
Accuracy	±5%		
Sample Rate	200 Hz		
Injection Current	1.35 +/- 0.1mA RMS at 32.5 +/-0.5kHz		

Parameters					
Label	**Parameter**	**Range/Units**	**Label**	**Parameter**	**Range/Units**
HR	Heart Rate	30-240bpm	**Resp**	Respiratory rate	0-30 bpm
SV	Stroke Volume	0-200ml	**CPI**	Cardiac Power Index	0-1.5 w/m^2
SI	Stroke Index	0-150ml/m^2	**TBW**	Total Body Water	0-100%
CO	Cardiac Output	1-20 L/min	**TPR**	Total Peripheral Resistance	0-5000dn·s/cm^5
CI	Cardiac Index	1-15 L/min/m^2	**TPRI**	Total Peripheral Resistance Index	0-7000 dn·s/cm^5·m^2
GGI	LV function	1-20			

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