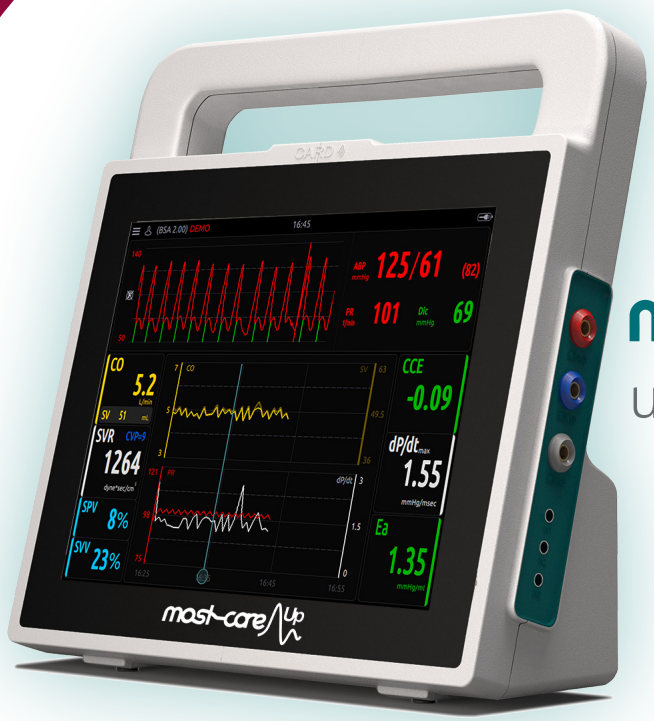
MEDICAL EQUIPMENT

Haemodynamic monitoring



most-care Up

up to the beat

VYGON

Value Life

MostCare[Up] is the only monitor able to follow, in real time and from beat to beat, even the slightest haemodynamic variations in the patient.
The patented algorithm based on the **PRAM method** (Pressure Recording Analytical Method) evaluates the cardiac output and many other haemodynamic parameters without any prior calibration.
An immediate, customisable interface can display a broad set of information regarding the preload, afterload, cardiac contractility and efficiency, which have become vitally important elements in optimising the treatment of high-risk patients and in defining the best haemodynamic settings for patients with alterations in their cardiovascular systems.

Advantages

Simple

- No calibreation needed.
- Intuitive, customisable interface.
- No change in protocols in use.

Quick

- Constant monitoring with immediate results.
- Rapid connection and set up.

Versatile

- Any peripheral or femoral artery.
- Applicable to the widest range of patients.
- Easily transferred from one patient to another.

Innovative

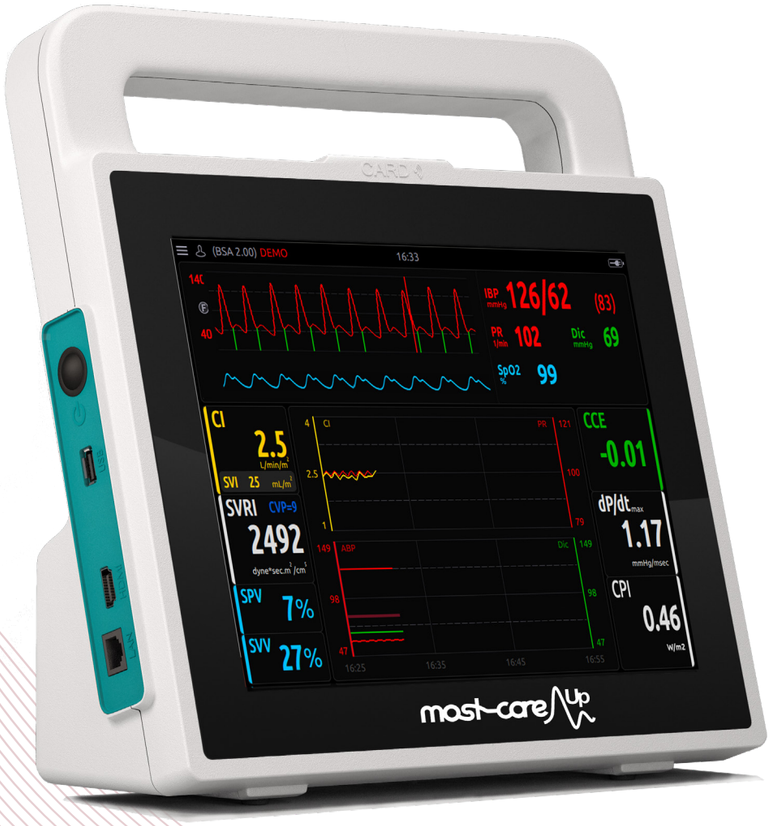
- Exclusive variables (CCE, dicrotic pressure, Ea).
- Patented dynamic filter to guarantee the quality of the pressure signal.
- Modern connectivity and data transfer systems.

Reliable

- Patented and validated algorithm.
- Immediate response to even the smallest haemodynamic variations.
- A wide range of clinical papers available.

Convenient

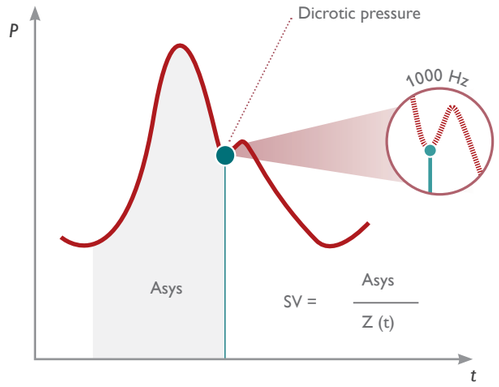
- Can be used on numerous patients without disposable nor added elements.
- *On Demand* system adaptable to all uses.



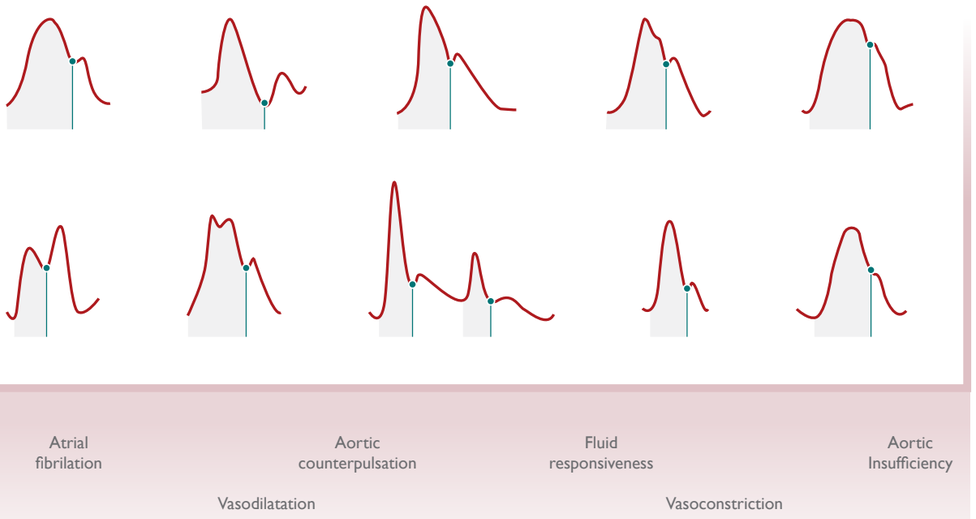
MostCare[UP] is a reliable and efficient system that adapts to a wide range of patient types and clinical conditions.
Thanks to its rapid set-up, information can be obtained in real time and saved, reviewed and transferred for subsequent analysis.
The *Endless* and *On Demand* versions allow the operator to choose the method of use which best suits the specific needs, thereby guaranteeing an effective control on costs.

PRAM method
A patented algorithm

PRAM (Pressure Recording Analytical Method) is an innovative method to analyse the pressure wave used in MostCare^{Up} [1]. It allows for constant and sensitive monitoring in real time of the slightest haemodynamic variations because it is based, heart beat by heart beat, only on the morphology of the arterial pressure wave.



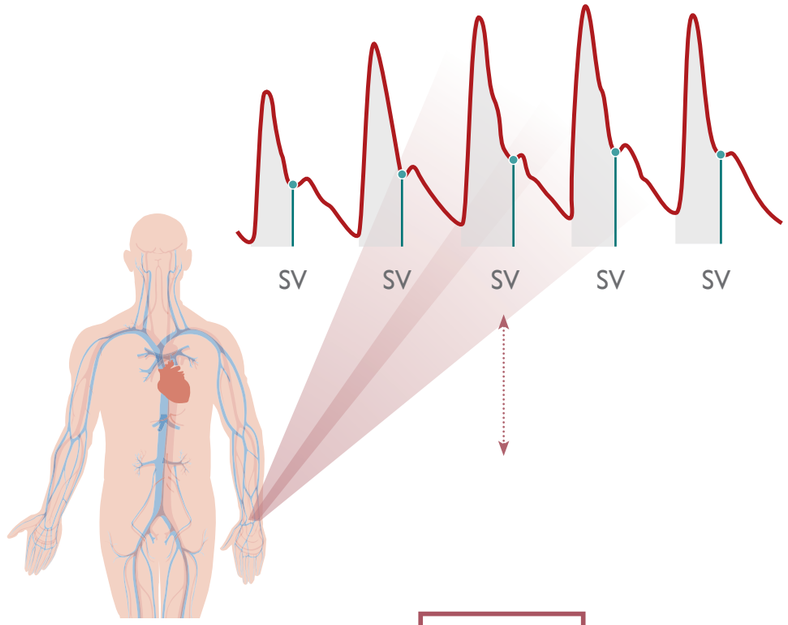
- Sampling at 1000 Hz
- Beat by beat analysis of the wave form
- Does not depend on pre-estimates
- No external calibration required

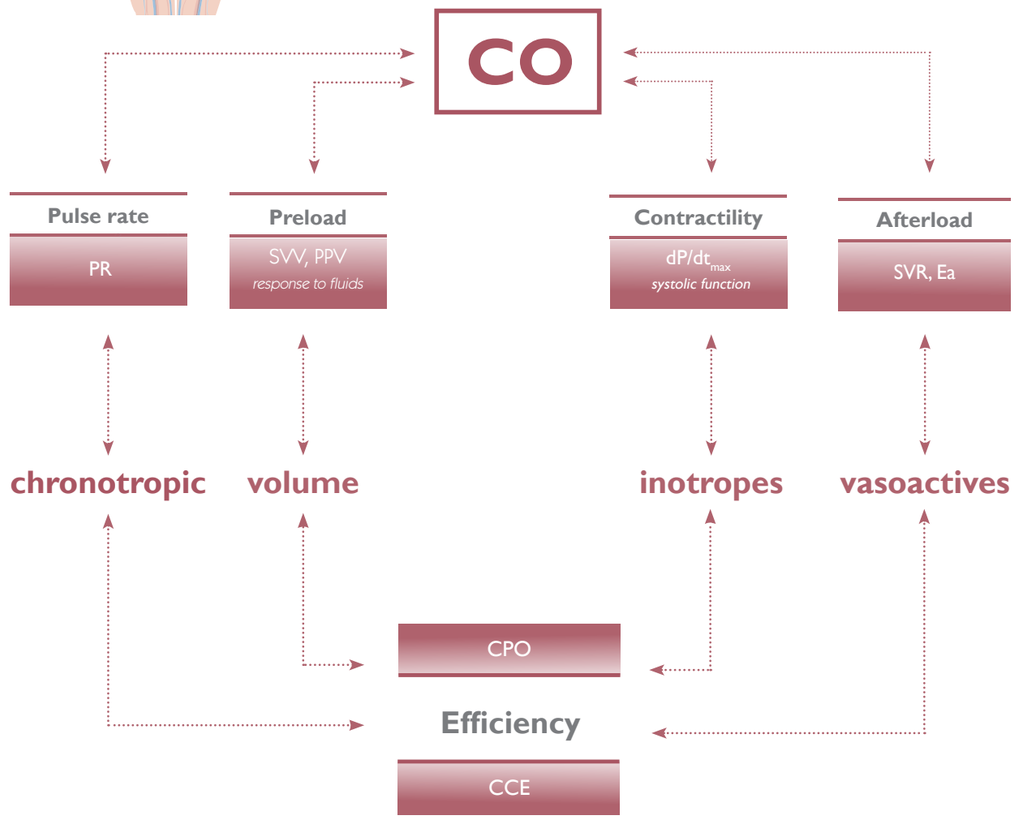


Each patient is unique and his haemodynamic condition can evolve rapidly. The shape of the arterial pressure wave is the result of a complex balance which depends on both the coupling of the cardiac function with the vascular system and their interaction with the respiratory system.

The precise analysis of the shape of the wave obviates the need for calibration and preestimated data about the patient. It also identifies the dicrotic pressure and the Z(t) impedance of the cardiovascular system, even in cases of unusual pressure wave forms.

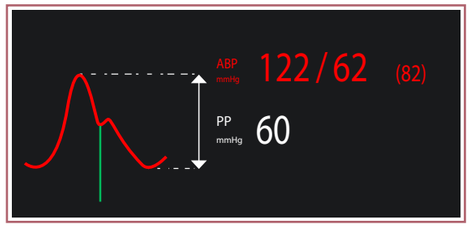
[1] Romano SM, Pistolesi M, Crit Care Med, 2002





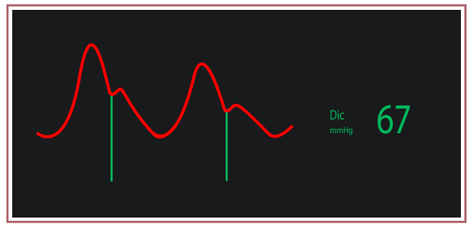
Haemodynamic variables

Pressure



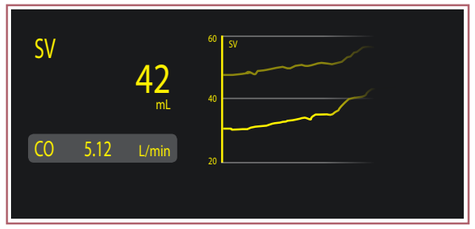
Systolic, diastolic, mean and pulse pressure (PP) are measured with every heartbeat.

Dicrotic pressure



The value of the dicrotic pressure, gauged with precision at 1000Hz, provides information about the vascular condition and the ventricle-arterial coupling.

Cardiac output

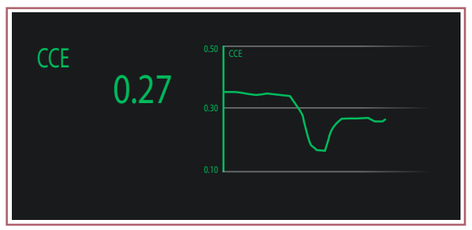


The stroke volume (SV) is measured beat-by-beat and allows for the cardiac output (CO) to be calculated.

Derived variables

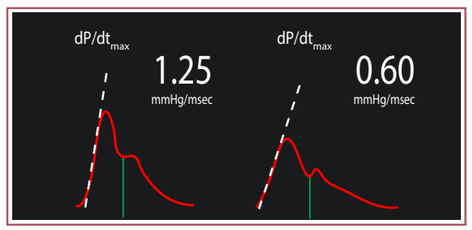
Systemic vascular resistance (SVR), cardiac power output (CPO) and oxygen delivery (DO_2) are examples of the derived variables provided by MostCare^{Up}.

CCE



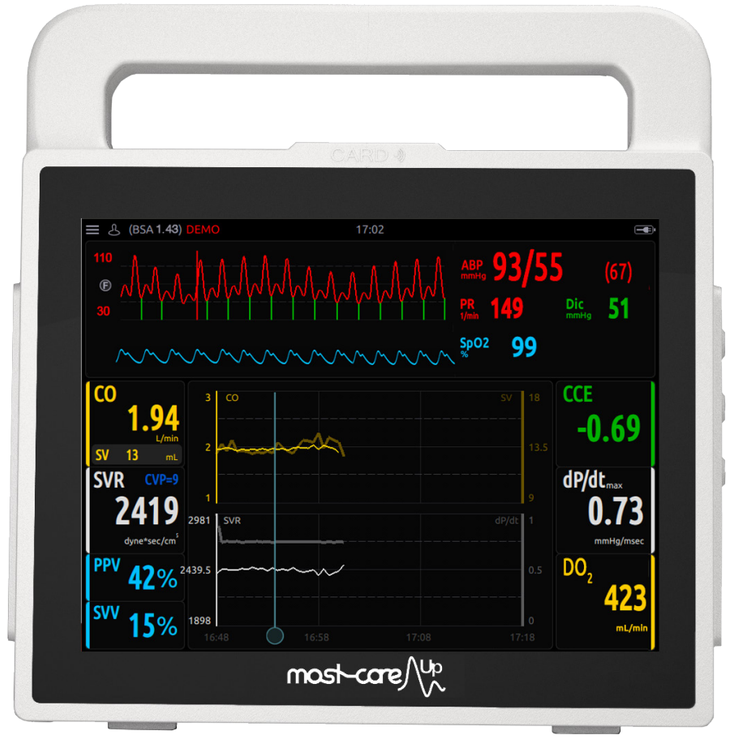
Cardiac cycle efficiency (CCE) is an exclusive variable which describes haemodynamic performance in terms of energy expenditure in the patient being monitored[2].

dP/dt_{max}

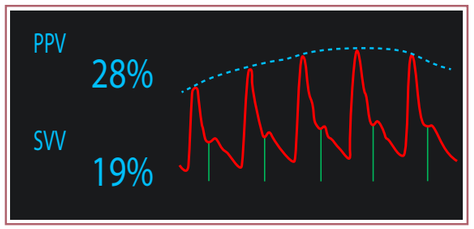


The maximum pressure variation compared to time (dP/dt_{max}) is linked to the heart's contractility and also to the condition of the vascular system.

[2] Romano SM, Int J Cardiol, 2012
[3] Romagnoli S *et al.*, Crit Care, 2014



Dynamic variables



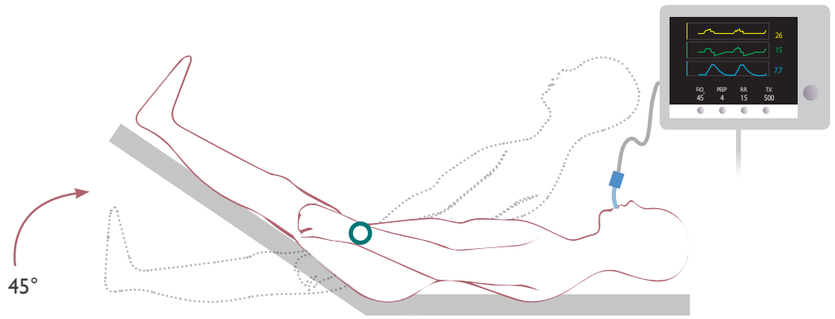
Pulse pressure variation (PPV) and stroke volume variation (SVV) during the respiratory cycle can be viewed simultaneously.

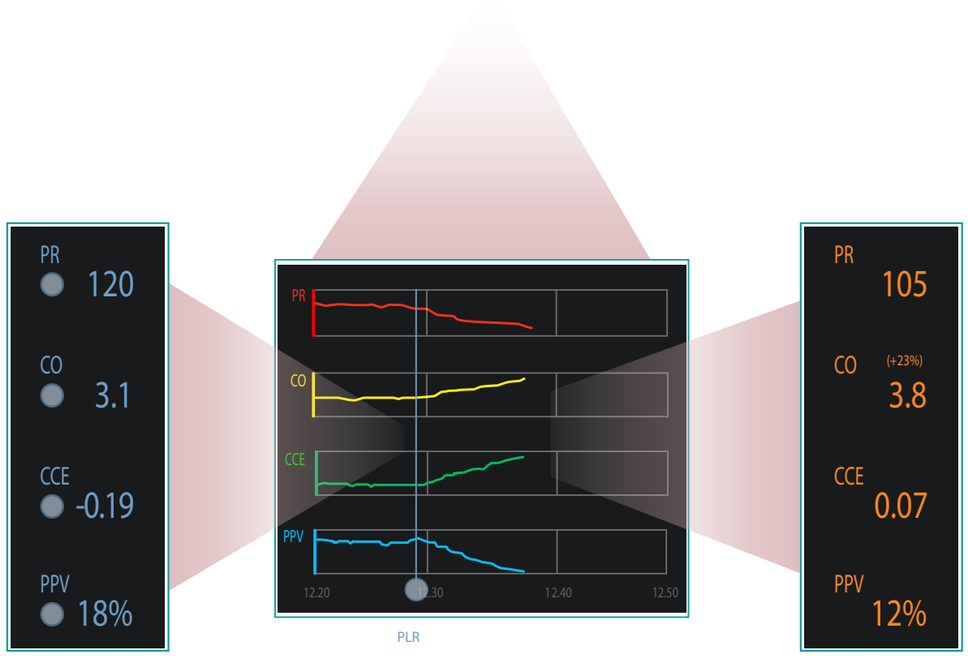
Dynamic filter

The shape of the pressure curve can be affected by resonance phenomena. The exclusive, dynamic filter in MostCare^{Up} has been designed to automatically optimise the quality of the wave and to reduce these phenomena[3].

Markers and trends
Do & check function

MostCare[Up] can display trends for many haemodynamic variables simultaneously. It is also possible to insert personalised markers during specific events (e.g. start treatment).
The **do&check function** was designed specifically to help the clinic when monitoring haemodynamic variations following specific treatments (e.g. fluid challenge).





Connectivity and data management

MostCare[Up] supports the most advanced communication and data transmission standards. The patient's parameters and freezer-frames can be saved to the machine's memory or exported via the USB port. The data can also be transferred to the hospital's platform using the HL7 protocol. The image on the display can be shared for monitoring or educational purposes via HDMI.

Flexibility of use
Endless-On Demand

MostCare[Up] guarantees the maximum flexibility and cost efficiency thanks to the various ways in which it can be used. The *On Demand* version of the monitor can be activated for a single use or for periods of time to meet specific application needs.
The *Endless* version allows an unlimited use of the system without additional cost.

Applications

The PRAM method requires no external calibration or anthropometric normalisation.
MostCare^{Up} can therefore be easily used on any patient who requires constant or occasional haemodynamic monitoring.
More specifically, during haemodynamic instability or in the presence of acute clinical variations in high risk patients.

Goal directed therapy

Perioperative

Fluid optimisation in high risk surgery patients has significantly reduced postoperative complications, length of hospital stay and improved the outcome of the patients, thus resulting in substantially lower costs.

[4] Pearse R *et al.*, Crit Care, 2005
[5] Lopes MR *et al.*, Crit Care, 2007
[6] Vincent JL *et al.*, Crit Care, 2015

Intensive care and critical patients

Thanks to beat by beat analysis, the PRAM method is able to reliably recognise and monitor the haemodynamic changes resulting from the administration of vasoactive drugs and fluids, in real time and even in septic or trauma patients.

[7] Vincent JL *et al.*, Crit Care, 2011
[8] Franchi F *et al.*, BJA, 2011
[9] Guarracino F *et al.*, Crit Care, 2014
[10] Donati A *et al.*, J Crit Care, 2014

Evaluation of the ventricular function

Critical patient

The echocardiography is a gold standard technique to evaluate ventricular function. Some of the variables provided by MostCare^{Up} (dP/dt_{max} and CCE) supply a constant stream of information about the cardiac function in the critical patient.

[11] Scolletta S *et al.*, Intensive Care Med, 2013

Cardiac insufficiency

The beat by beat monitoring of haemodynamic variables like dicrotic pressure, dP/dt_{max} and CCE guarantees a rapid and immediate evaluation of any clinical variations in the patient so that immediate action can be taken.

[12] Giglioli C *et al.*, Eur J Heart Fail, 2011
[13] Pavoni V *et al.*, J Anesth Clin Res, 2012
[14] Barile L *et al.*, J. Cardiothorac Vasc Anesth, 2013

Specific applications

• Paediatric patient

[15] Calamandrei M *et al.*, Pediatr Crit Care Med, 2008

[16] Ricci Z *et al.*, Crit Care, 2014

[17] Garisto C *et al.*, Paediatr Anaest, 2014

• Ventilation

[18] McBride WT *et al.*, J Cardiothorac Vasc Anesth, 2012

• Obese patient

[19] Balderi T *et al.*, Obes Surg, 2008

• Aortic counterpulsation

[20] Zangrillo A *et al.*, J Cardiothorac Vasc Anesth, 2010

[21] Gelsomino S *et al.*, Eur J Cardiothorac Surg, 2012

[22] Onorati F *et al.*, J Thorac Cardovasc Surg, 2012

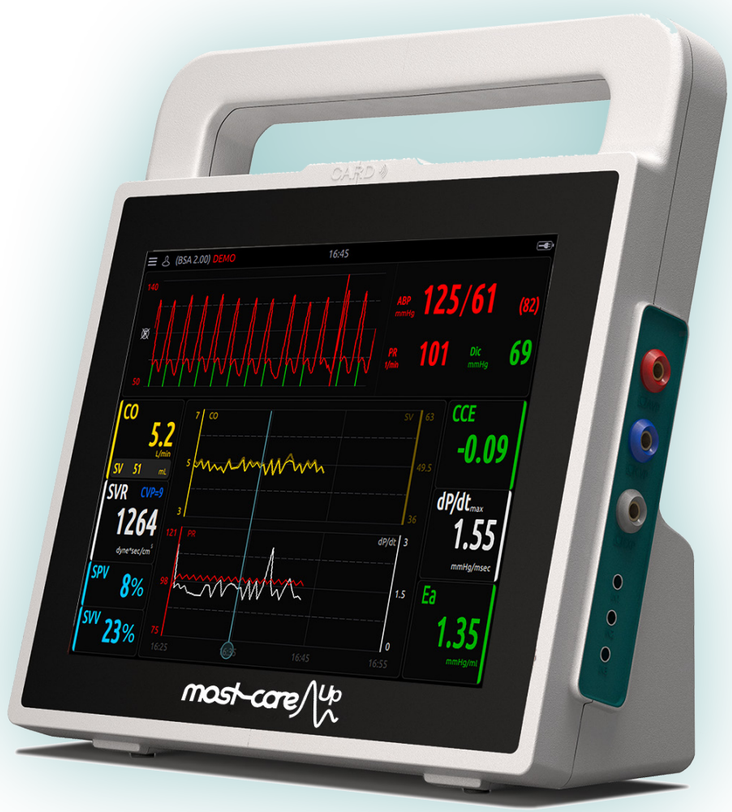
• Interventional cardiology

[23] Romagnoli S *et al.*, J Cardiothorac Vasc Anesth, 2010

[24] Giglioli C *et al.*, World J Cardiovasc Dis, 2013

• Hypothermia therapy

[25] Lazzeri C *et al.*, Acute Card Care, 2014



Variables of MostCare^{Up}

Haemodynamic variables		Formulas	Physiological range ***	Units
Pressures				
Sys	Systolic pressure			mmHg
Dia	Diastolic pressure			mmHg
MAP	Mean arterial pressure			mmHg
Dic	Dicrotic pressure		70 - 105	mmHg
PP	Pulse pressure	Psys-Pdia	30 - 50	mmHg
MAP-Dic	Mean and dicrotic pressure difference	MAP-Dic	-10 - +10	mmHg
CVP*	Central venous pressure			mmHg
Cardiac output				
SV	Stroke volume		60 - 100	mL
SVI	Stroke volume index		35 - 45	mL/m^2
SV_{kg}	Weighted stroke volume	SV/weight		mL/kg
CO	Cardiac output		4.0 - 8.0	L/min
CI	Cardiac output index		2.6 - 3.8	L (min · m^2)
SVR	Systemic vascular resistance	(MAP-CVP)/CO · 80	800 - 1400	dyne · sec/cm^5
SVRI	Systemic vascular resistance index	(MAP-CVP)/CI · 80	1600 - 2400	dyne · sec · m^2/cm^5
Oxygen delivery				
SpO_2*	Arterial oxygen saturation		96 - 100	%
DO_2*	Oxygen delivery	$DO_2 = CO \cdot CaO_2$ con $CaO_2 = Hb \cdot 1{,}34 \cdot SaO_2$	900 - 1000	mL/min
DO_2I *	Oxygen delivery index	$DO_2I = DO_2/BSA$	500 - 600	mL/min/m^2
Efficiency and cardiac function				
dP/dt_{max}	Maximal slope of the systolic upstroke		0.9 - 1.3	mmHg/msec
CCE	Cardiac cycle efficiency		-0.2 - 0.3	units
CPO	Cardiac power	MAP · CO/451	0.80 - 1.20	W
CPI	Cardiac power index	MAP · CI/451	0.50 - 0.70	W/m^2
Vascular function				
Ea	Arterial elastance	Dic/SV	1.10 - 1.40	mmHg/mL
PPV/SVV	Dynamic elastance	PPV/SVV		units
Z_{tot}	Cardiovascular impedance			mmHg · sec/mL
Dynamic variables				
PPV	Pulse pressure variation		< 15**	%
SVV	Stroke volume variation		< 15**	%
SPV	Systolic pressure variation			%
DPV	Dicrotic pressure variation			%
Other specific variables				
PR	Pulse rate			1/min
Dia_{pk}	Diastolic peak			mmHg

* When added probes are used. DO_2 and DO_2I calculated with fixed Hb value.
** Approximate values reported in the literature in the patient receiving controlled mechanical ventilation.
*** Normal values in the adult patient. The values depend on the patient in relation to the clinical conditions.
BSA = body surface area, calculated by the standard formulas of DuBois & DuBois, using the values of weight and height.

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Product codes

Monitors	
VMB08MC0202E0V	MostCare^{Up} monitor – On-Demand version - Standard
VMB08MC0255E0V	MostCare^{Up} monitor – Endless version - Standard
VMB08MC0202E1V	MostCare^{Up} monitor – On-Demand version - Turkey
VMB08MC0255E1V	MostCare^{Up} monitor – Endless version - Turkey
VMB08MC0202E2V	MostCare^{Up} monitor – On-Demand version - UK
VMB08MC0255E2V	MostCare^{Up} monitor – Endless version - UK
VMB08MC0202E3V	MostCare^{Up} monitor – On-Demand version - AUS/NZ/VN
VMB08MC0255E3V	MostCare^{Up} monitor – Endless version - AUS/NZ/VN

Cards	
VMB04MCU1D02	MostCare^{Up} card – 24 hours (1 day)
VMB04MCU1M02	MostCare^{Up} card – 30 days (1 month)
VMB04MCU1Y02	MostCare^{Up} card – 365 days (1 year)
VMB04MCU01U02	MostCare^{Up} card – 1 use
VMB04MCU10U02	MostCare^{Up} card – 10 uses
VMB04MCU50U02	MostCare^{Up} card – 50 uses

Cables	
Direct Cables	
VMC03MUBBR	MostCare^{Up} direct BP cable – B.BRAUN type
VMC03MUBD	MostCare^{Up} direct BP cable – BD type
VMC03MUBIO	MostCare^{Up} direct BP cable – BIOSENSOR/UTAH type
VMC03MUDPT	MostCare^{Up} direct BP cable – CODAN BDPT type
VMC03MUEDW	MostCare^{Up} direct BP cable – EDWARDS type
VMC03MUMED	MostCare^{Up} direct BP cable – MEDEX LOGICAL type
VMC03MUMED2	MostCare^{Up} direct BP cable – MEDEX TRANSTAR type
Y cables	
VMC03MUYBBR	MostCare^{Up} Y BP cable – B.BRAUN type
VMC03MUYBD	MostCare^{Up} Y BP cable – BD type
VMC03MUYBIO	MostCare^{Up} Y BP cable – BIOSENSOR/UTAH type
VMC03MUYDPT	MostCare^{Up} Y BP cable – CODAN BDPT type
VMC03MUYEDW	MostCare^{Up} Y BP cable – EDWARDS type
VMC03MUYMED2	MostCare^{Up} Y BP cable – MEDEX TRANSTAR type
Analog Cables	
VTCMUHEMO018	Input/Output Analog Cable Jack 3,5
VTCMUHEMO024	Input/Output Analog Cable DS
VTCMUHEMO031	Input/Output Analog Cable 7 Pin
VTCMUHEMO033	Input/Output Analog Cable PDM
VTCMUHEMO035	Input/Output Analog Cable Jack 6

CRITICAL CARE

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