Microcirculación y Gasto Cardiaco.

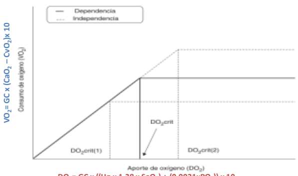
M. Idalia Sepúlveda

Consensus on circulatory shock and hemodynamic monitoring. Task force of the European Society of Intensive Care Medicine

"Falla circulatoria aguda, asociada a una mala utilización de oxigeno por las células. Situación en que hay una inadecuada DO_2/VO_2, lo que conlleva a disfunción celular y pérdida de la compensación entre aporte y demanda de oxigeno, asociado a elevación de lactato".

PREMISA
HIPOTENSIÓN ≠ HIPOXIA
HIPOTENSIÓN ≠ SHOCK

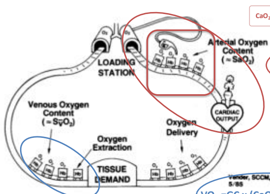
VO_2= GC x (CaO_2 – CvO_2)x 10



DO_2= GC x ((Hg x 1,38 x SaO_2) + (0,0031xPO_2)) x 10

Consensus on circulatory shock and hemodynamic monitoring. Task force of the European Society of Intensive Care Medicine.

CaO_2 = (1,34 x Hb x SaO_2) + (0,0031 x PaO_2)



DO_2 =GC x CaO_2 x10

600 ml/min/m²

VO_2 =GC x (CaO_2 –CvO_2) x 10

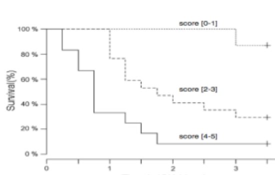
CvO_2 = (1,34 x Hb x SvO_2) + (0,0031 x PvO_2)

120 ml/min/m²

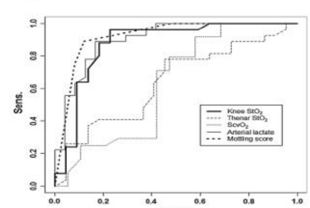
MONITOREO CLÍNICO DE PERFUSIÓN TISULAR.

MÉTODO	VARIABLE	VENTAJA	LIMITACIONES
EVALUACIÓN CLÍNICA	Frialdad, llene capilar	Sólo depende del examinador.	Interpretación difícil en shock distributivo.
GRADIENTE DE Tº CORPORAL	dTc-p dTp-a	Método validado para estimar variaciones dinámicas en el flujo sanguíneo de la piel.	Se requieren, al menos 2 sondas de tº.
NIRS	StO_2	Puede aplicarse para medir el flujo sanguíneo regional y el consumo de oxigeno.	Requiere software especifico para mostrar las variables.
OXIMETRÍA TRANSCUTÁNEA	$PtcO_2/PtcCO_2$	Medición directa no invasiva de la pCO_2 tisular.	Necesidad de cambiar frecuentemente la posición del sensor.

H. Ait-Oufella. Mottling score predicts survival in septic shock. Intensive Care Med (2011) 37:801–807



H. Ait-Oufella. Mottling score predicts survival in septic shock. Intensive Care Med (2011) 37:801–807



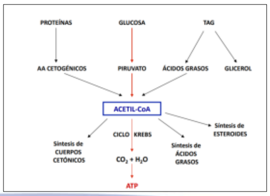
Knee StO_2	87% (75-95)
Thenar StO_2	64% (47-79)
$ScvO_2$	63% (44-80)
Lactate	90% (82-98)
Mottling score	92% (85-100)

Ait-Oufella et al. Knee area StO2 predicts mortality in septic shock. Intensive Care Med 2012;38:976-983

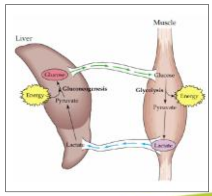
Monitoreo Marcadores Bioquímicos.

LACTATO

Ciclo de Krebs

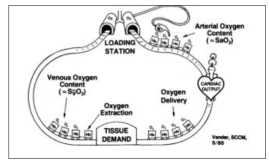


Ciclo de Cori



Monitoreo Marcadores Bioquímicos.

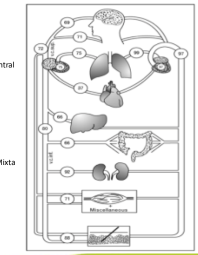
SATURACIÓN VENOSA



Sat. Venosa Central
$ScvO_2$

v/s

Sat. Venosa Mixta
SvO_2

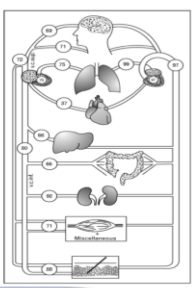


Curr Opin Crit Care 12:263–268. 8 2006

Sat. Venosa Central
$ScvO_2$

v/s

Sat. Venosa Mixta
SvO_2



Curr Opin Crit Care 12:263–268. 8 2006

Lactate Clearance vs Central Venous Oxygen Saturation as Goals of Early Sepsis Therapy
A Randomized Clinical Trial

Table 4. Administered Treatments and Resuscitation Goals

Intervention, h	No. (%) of Patients: Lactate Clearance Group (n = 150)	No. (%) of Patients: $Scvo_2$ Group (n = 150)	P Value[a]
Crystalloid volume, mean (SD), L			
0-<6	4.5 (2.36)	4.3 (2.21)	.55
6-72	12.4 (6.15)	11.8 (6.41)	.44
Vasopressor administration			
0-<6	108 (72)	113 (75)	.60
6-72	100 (67)	108 (72)	.45
Dobutamine administration			
0-<6	5 (3)	8 (5)	.57
6-72	10 (7)	13 (9)	.66
PRBC transfusion			
0-<6	11 (7)	5 (3)	.20
6-72	35 (23)	31 (21)	.78
Mechanical ventilation			
0-<6	40 (27)	39 (26)	.99
6-72	69 (46)	75 (50)	.56
Activated protein C			
0-<6	0	0	
6-72	3 (2)	2 (1)	.68
Parenteral corticosteroids			
0-<6	18 (12)	26 (17)	.25
6-72	59 (39)	51 (34)	.40

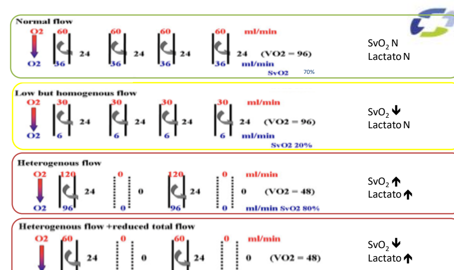
A. Jones et al. Lactate Clearance vs Central Venous Oxygen Saturation as Goals of Early Sepsis Therapy.
A Randomized Clinical Trial. JAMA, February 24, 2010—Vol 303, No. 8

Lactate Clearance vs Central Venous Oxygen Saturation as Goals of Early Sepsis Therapy
A Randomized Clinical Trial

Table 5. Hospital Mortality and Length of Stay

Variable	Lactate Clearance Group (n = 150)	$Scvo_2$ Group (n = 150)	Proportion Difference (95% Confidence Interval)	P Value[b]
In-hospital mortality, No. (%)[a]				
Intent to treat	25 (17)	34 (23)	6 (−3 to 15)	
Per protocol	25 (17)	33 (22)	5 (−3 to 14)	
Length of stay, mean (SD), d				
ICU	5.9 (8.46)	5.6 (7.39)		.75
Hospital	11.4 (10.89)	12.1 (11.68)		.60
Hospital complications				
Ventilator-free days, mean (SD)	9.3 (10.31)	9.9 (11.09)		.67
Multiple organ failure, No. (%)	37 (25)	33 (22)		.68
Care withdrawn, No. (%)	14 (9)	23 (15)		.15

A. Jones et al. Lactate Clearance vs Central Venous Oxygen Saturation as Goals of Early Sepsis Therapy.
A Randomized Clinical Trial. JAMA, February 24, 2010—Vol 303, No. 8



SvO_2 N
Lactato N

SvO_2 ↓
Lactato N

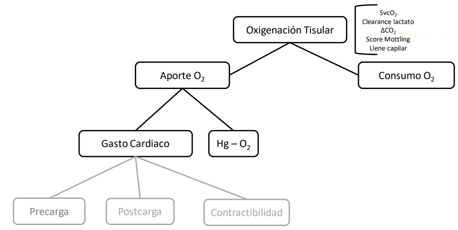
SvO_2 ↑
Lactato ↑

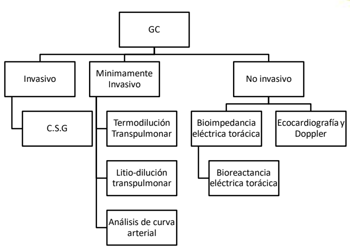
SvO_2 ↓
Lactato ↑

D. De Backer. Monitoring the microcirculation in the critically ill patient: current methods and future approaches .
Intensive Care Med (2010) 36:1813–1825

Medición del Gasto Cardiaco: Device

EU. Coordinadora Unidad de Estudios Clínicos, CLC
Project Manager ECMOed, Extracorporeal Life Support Organization
Secretaria, Directorio SOCHIMI





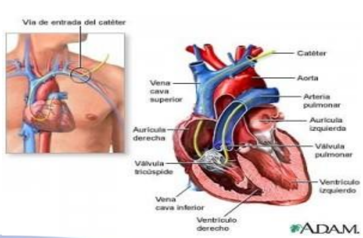
Gasto cardíaco

- Volumen de sangre eyectado por el corazón en un minuto

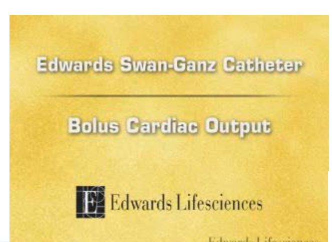
GC = FC x VS — 4 a 8 lpm

IC = GC/ASC — 2,5 a 4 l/min/m²

Catéter de arteria pulmonar



CSG de GC intermitente



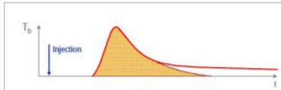
Puertos y funciones del CSG

Ubicación	Color	Función
Distal	Amarillo	Presiones de AP
Proximal	Azul	Presiones de AD, usado para la inyección de bolos
Válvula de compuerta de balón	Rojo	Jeringa usada para la instalación y medición de POAP
Conector del termistor	Amarillo	Mide la temperatura a 4 cm del extremo distal

Medición Gasto Cardiaco (GC):

Mediante el termistor situado en la AP(arteria pulmonar) logramos medir T° sanguínea y se obtiene una curva de dilución a partir de la cual se calcula GC.

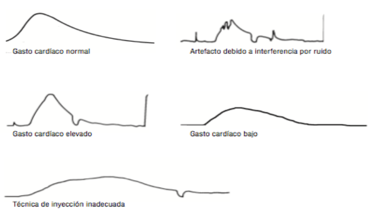
Ecuación modificada de Stewart-Hamilton



$$CO_{TD\,a} = \frac{(T_b - T_i) \times V_i \times K}{\int \Delta T_b \times dt}$$

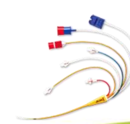
T_b = Blood temperature
T_i = Injectate temperature
V_i = Injectate volume
$\int \Delta T_b \cdot dt$ = Area under the thermodilution curve
K = Correction constant, made up of specific weight and specific heat of blood and injectate

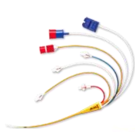
Curvas de termodilución

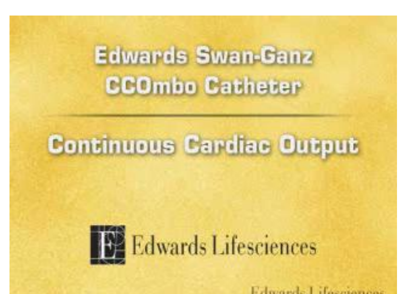


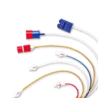
CSG de tecnología avanzada

- PAPD, PAPS, POAP
- SvmO2 continua
- GC continuo
- VTDVD
- RVS, IRVS
- FEVD, IVS, ITSVD
- Cálculo intermitente de DO2 y VO2









Perfiles hemodinámicos

	FC	PAM	PVC	POAP	RVS	GC
Shock Hipovolémico	↑	↓	↓	↓ o N	↑	N ↓
Shock cardiogénico	—	↓	↑	↑	↑ o ↓	↓
Shock Séptico	↑	↓	↓ o N	↓ o N	↓	↑
Shock anafiláctico	↑	↓	↓	N	↓	↑

EDITORIAL

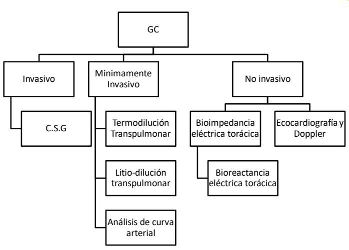
Is there still a place for the Swan–Ganz catheter? No

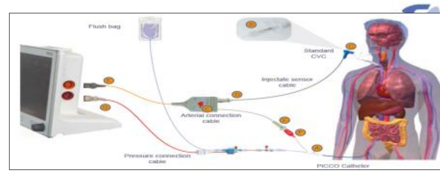
Jean-Louis Teboul[1,4*], Maurizio Cecconi[2] and Thomas W. L. Scheeren[3]

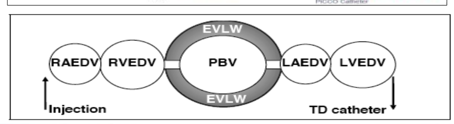
Table 1 Arguments for no longer using a pulmonary artery catheter

Clinical problems	PAC solutions	PAC shortcomings	Alternative methods
Assessment of cardiac output	Cardiac output measurement (thermodilution)	Invasiveness, no real-time cardiac output monitoring even with its continuous mode	Less or minimally invasive methods providing real-time cardiac output monitoring
Assessment of left heart function	Analysis of PAOP and cardiac output relationships	Invasiveness, other more accurate methods available	Echocardiography (LVEF, Sm)
Assessment of right heart function	Analysis of RAP and cardiac output relationships RAP/PAOP ratio	Invasiveness, other more accurate methods available	Echocardiography (RVEDA/LVEDA, TAPSE, Sa)
Assessment of pulmonary artery pressure	Direct measurement	Invasiveness, other accurate methods available	Echocardiography
Assessment of volume status and fluid responsiveness	Analysis of RAP, PAOP, and their changes with fluid administration	Invasiveness, more accurate other methods available	Less or non-invasive methods providing preload responsiveness indices (PPV, SVV, PLR)
Assessment of pulmonary edema and its mechanism	PAOP	Invasiveness, more accurate other methods available	Transpulmonary thermodilution (EVLW and PVPI)
Assessment of adequacy of perfusion	SvO_2, VO_2	Invasiveness	Capillary refill time, skin mottling, $ScvO_2$, $Pcv\text{-}aCO_2$, blood lactate

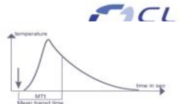
Teboul, Cecconi, Scheeren. ICM 2018; 44:957-959







Intra-Thoracic Thermal Volume
ITTV = CO x MTt



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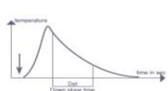
Pulmonary Thermal Volume
PTV = CO x DSt



PTV = Pulmonary Thermal Volume; Volume in the biggest mixing chamber, i.e. the lungs (includes blood and water)
ITTV = Intra-Thoracic Thermal Volume; The total volume in which the indicator can be distributed (chambers between point of injection and detection)
CO = Cardiac output

21

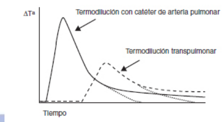
Intra-Thoracic Thermal Volume (ITTV)

– Intra-Thoracic Blood-Volume (ITBV)
ITBV = GEDV x 1.25

Valores entregados.

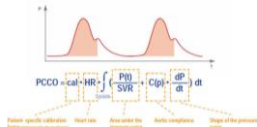
Termodilución Transpulmonar:

- Gasto Cardiaco Intermitente
- Volumen global de fin de diástole (GEDV)
- Volumen de agua extrapulmonar (ELWI)
- Fracción de eyección (GEF)
- Índice de permeabilidad



Monitoreo Continuo:

-Gasto Cardiaco Continuo
-Volumen Sistólico
-Variación de Volumen Sistólico



Chequeo previo:

1.- Test Snap

2.- Cero a la presión arterial

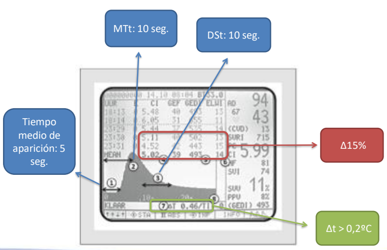
3.- Ingresar datos demográficos

4.- Preparación/administración del bolo correcto:

- Volumen: 0,2 ml/kg, máximo 20 ml
- Tº inyectado < 8ºC
- Inyección por lumen distal CVC
- Velocidad inyección >2,5 ml/seg

5.- Observar calidad curva TPTD

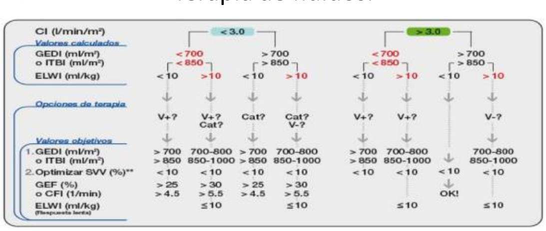
Correcta curva de TDTP.

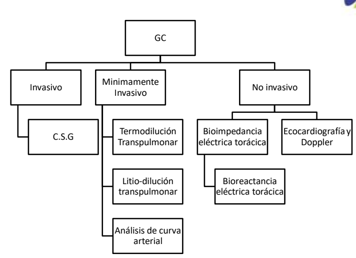


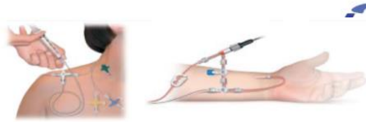
Limitaciones de la TDTP.

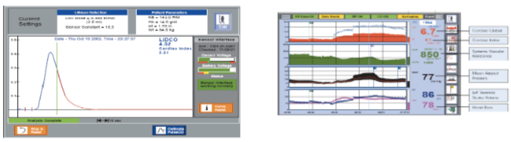
- Variaciones térmicas
- Tratamientos de depuración extracorpórea
- Shunt intracardiacos

Terapia de fluidos.

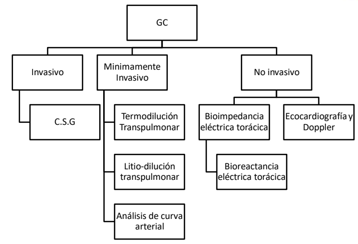








R. Pearse; K. Ikram. Equipment review: An appraisal of the LiDCOTMplus method of measuring cardiac output. *Critical Care* 2004, 8:190-195



Esquema de métodos de análisis de curva :

Sistema	FloTrac	PiCCO/Volume View	LiDDCO	PRAM
Análisis curva	2000 puntos de la curva	Porción sistólica de la curva	Método RMS	Área debajo de la curva
Parámetros	GC, VS, VVS	GC, VS, VVS, GEDV, ELWI		VVS, VPP
Ventajas	Fácil de usar	Más robusto en pctes inestables.		
Desventajas	No fiable en pctes con vasoplejía		Requiere litio	Poco validado

P. Marik. Noninvasive Cardiac Output Monitors: A State-of the-Art Review . J. Cardiothoracic and Vascular Anesthesia, 293:H583-H589, 2007

Vigileo/Sistema Flotrac

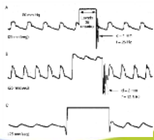
- Sistema de monitorización mínimamente invasiva
- La presión de pulso es proporcional al VS e inversamente proporcional a la distensibilidad aórtica
- Calcula el GC en base al análisis de la onda de pulso arterial

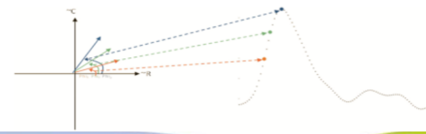
Parámetros hemodinámicos

Parámetro	Rango normal
VS	60-100 ml/latido
IVS	33-47 ml/m^2/latido
VVS	10-15%
RVS	800-1200 dina-s/cm^{-5}
ITSVI	8-10 g/m/m^2

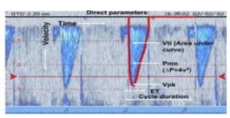
Limitaciones:

- Pacientes obesos
- Precisa validación en pacientes con RVS disminuidas
- No debe haber amortiguación en la onda y cero correcto
- No validados en pacientes con asistencia ventricular o BCIA
- Limitado en injurgitación aórtica



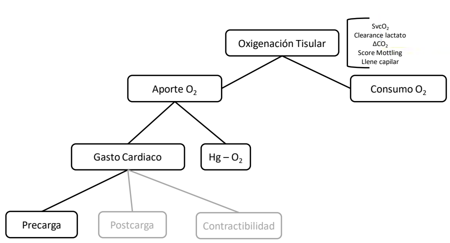


USCOM:ultrasound cardiac output monitor



Predictores dinamicos

M. Idalia Sepúlveda

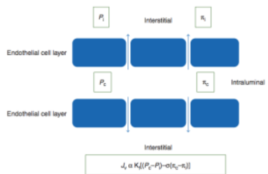


Terapia de fluidos.

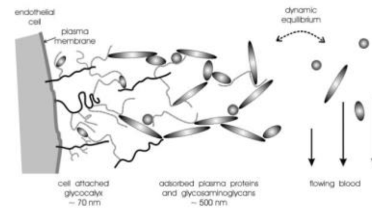
- El objetivo es la optimización de la precarga.
- El incremento de la precarga lleva a un incremento en el gasto cardíaco (GC), dentro de unos límites (Ley Frank-Starling).
- Sólo el 50% de los pacientes en UCI responden a expansión de volumen, con aumento del GC.

Michard. Chest 2002; 121: 2000–2008.

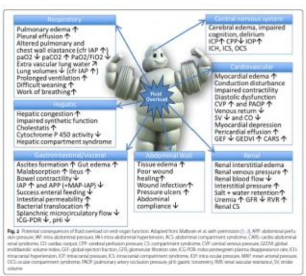
Desde el endotelio … ?



Pries, Secomb. The endothelial surface layer. Eur J Physiol (2000) 440:653-666.



Pries, Secomb. The endothelial surface layer. Eur J Physiol (2000) 440:653-666.



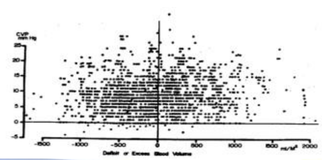
Malbrain *et al. Ann. Intensive Care* (2018) 8:66

CHEST — Special Feature

Does Central Venous Pressure Predict Fluid Responsiveness?*

A Systematic Review of the Literature and the Tale of Seven Mares

Paul E. Marik, MD, FCCP; Michael Baram, MD, FCCP; and Bobbak Vahid, MD



Society of Critical Care Anesthesiologists

Section Editor: Michael J. Murray

Perioperative Fluid Management Strategies in Major Surgery: A Stratified Meta-Analysis

Grupo con manejo liberal v/s guiado por metas.

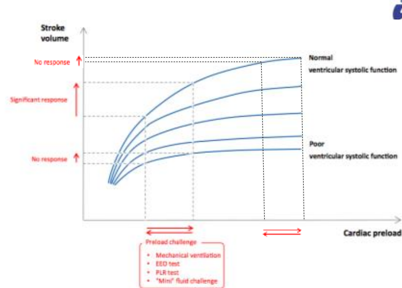
- Aumento días de hospitalización (MD 4 days, 95% CI 3.4 a 4.4)
- Aumento de pneumonia (RRR 3, 95% CI 1.8 a 4.8).
- Aumento en la mortalidad (RRR 2, 95% CI 0.6 to 6.5)
- Aumento falla renal (RRR 0.8, 95% CI 0.2 to 3.2).

Corcoran T, Rhodes JEJ, Clarke S, Myles PS, Ho KM. Perioperative Fluid Management Strategies in Major Surgery: A Stratified Meta-Analysis. Anesth Analg. 2012 Mar 1;114(3):640–51.

Parámetros Estáticos:
Presiones de Llenado: - Presión Venosa Central (PVC) - Presión Oclusión Arteria Pulmonar (POAP)
Volumétricos: - Volumen global de fin de diástole (GEDV) - Volumen telediástolico del Ventrículo derecho

Parámetros Dinámicos:
Variación de Presión de Pulso Variación de Volumen Sistólico Variación de Presión de Pulso en Test de oclusión Levantamiento pasivo de extremidades Variación de Presión de Pulso en Test de Valsalva

Carsetti A, Cecconi M, Rhodes A. Fluid bolus therapy: monitoring and predicting fluid responsiveness. Current Opinion in Critical Care. 2015 Oct;21(5):388–94.



Monnet et al. Ann. Intensive Care (2016) 6:111

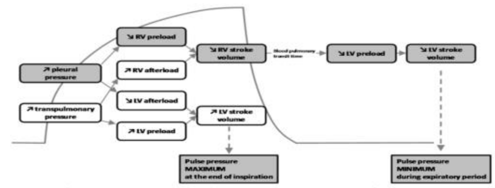
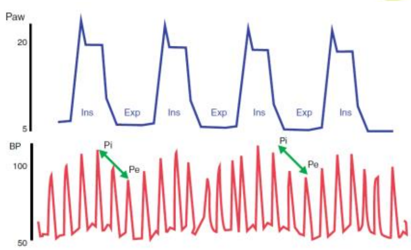
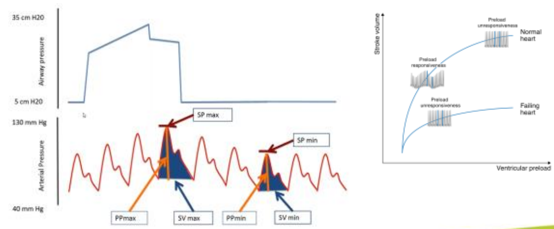


Figure 2 Heart-lung interactions. Hemodynamic effects of mechanical ventilation. The cyclic changes in left ventricular (LV) stroke volume are mainly related to the expiratory decrease in LV preload due to the inspiratory decrease in right ventricular (RV) filling. Reproduced with permission from Critical Care/Current Science Ltd [24].

Marik. Annals of Intensive Care. 2011;1(1):1.





Renner. Best Pract Res Clin Anaesthesiol. 2009:159–71.

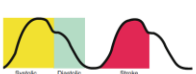


Fig. 7.2 Pulse waveform divided into the systolic and diastolic components. The stroke volume is the area under the curve of the systolic component

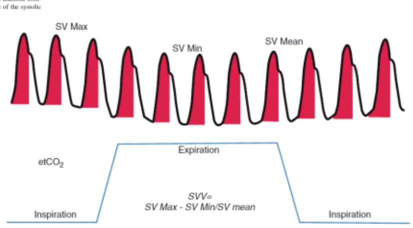
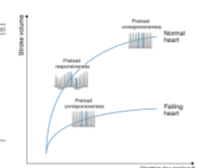


Fig. 7.3 Stroke volume variability (SVV). *SV* stroke volume, *etCO*$_2$ end-tidal carbon dioxide (in mmHg or kPa)

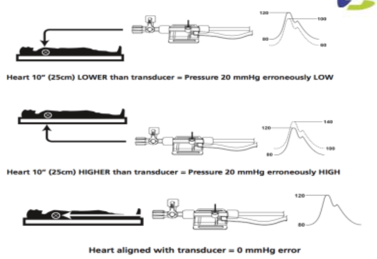
Systematic review/metaanalysis	Publication year	Types of studies	Patient type	Variable	AUC (95% confidence interval)
Marik et al. [7]	2009	29 studies 685 patients variable tidal volume	ICU and OR patients	PPV	0.94 (0.93–0.95)
				SPV	0.86 (0.82–0.90)
				SVV	0.84 (0.78–0.88)
				LVEDA	0.64 (0.53–0.74)
				GEDV	0.56 (0.37–0.67)
				CVP	0.55 (0.48–0.62)
Hong et al. [9]	2014	19 studies 850 patients variable tidal volume	Only ICU patients	PPV	0.88 (0.84–0.92)
				SVV	0.84 (0.79–0.89)
Yang and Du [10]	2014	22 studies 807 patients tidal volume > 8 ml/kg	Only ICU patients	PPV	0.94 (0.91–0.95)

AUC area under the curve, *ICU* intensive care unit, *OR* operating room, *PPV* pulse pressure variation, *SPV* systolic pressure variation, *SVV* stroke volume variation, *LVEDA* left ventricular end-diastolic area, *GEDV* global end-diastolic volume, *CVP* central venous pressure



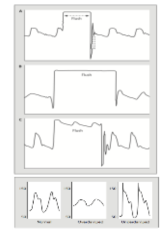
Renner. Best Pract Res Clin Anaesthesiol. 2009:159–71.

Consideraciones básicas .

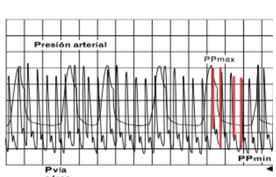


Consideraciones básicas .

Observar curva de presión arterial y test de snap.



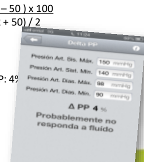
P. Sist máx: 150 - P. Diast máx: 98 = Presión Pulso máx: 52



VPP: $\frac{(Pp\ max - Pp\ min) \times 100}{PP\ promedio}$

VPP: $\frac{(52 - 50) \times 100}{(52 + 50) / 2}$

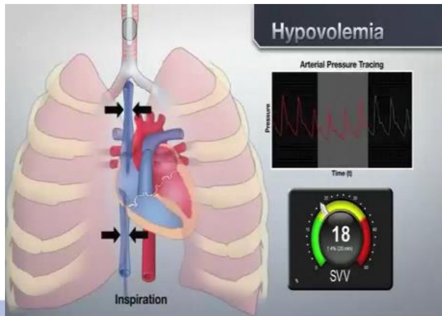
VPP: 4%



P. Sist min: 140 - P. Diast min: 90 = Presión Pulso min: 50

¿ CÓMO OBTENER LOS VALORES ?

Sistema Flotrac/Vigileo

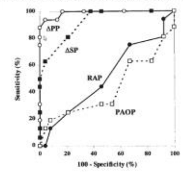


CLC Clínica Las Condes

Relation between Respiratory Changes in Arterial Pulse Pressure and Fluid Responsiveness in Septic Patients with Acute Circulatory Failure

FRÉDÉRIC MICHARD, SANDRINE BOUSSAT, DENIS CHEMLA, NADIA ANGUEL, ALAIN MERCAT, YVES LECARPENTIER, CHRISTIAN RICHARD, MICHAEL R. PINSKY, and JEAN-LOUIS TEBOUL

Am J Respir Crit Care Med 2000



CLC Clínica Las Condes

Michard et al. Critical Care (2015) 19:144
DOI 10.1186/s13054-015-0869-x

CRITICAL CARE

EDITORIAL — Open Access

Applicability of pulse pressure variation: how many shades of grey?

Frederic Michard[1*], Denis Chemla[2] and Jean-Louis Teboul[3]

	Limitations	Mechanisms for failure	Type of error
1	Spontaneous breathing activity	Irregular variations in intrathoracic pressure and thus the variation in stroke volume cannot correlate with preload dependency	False positive (may occasionally be false negative depending on the type of breathing)
2	Cardiac arrhythmias	The variation in stroke volume is related more to the irregularity in diastole than to the heart-lung interactions	False positive
3	Mechanical ventilation using low tidal volume (<8 ml/kg)	The small variations in intrathoracic pressure due to the low tidal volume are insufficient to produce significant changes in the intrathoracic pressure	False negative
4	Low lung compliance	The transmission of changes in alveolar pressure to the intrathoracic structures is attenuated	False negative
5	Open thorax	No change in intrathoracic pressure during the respiratory cycle	False negative
6	Increased intra-abdominal pressure	Threshold values of PPV will be elevated	False positive
7	Low HR/RR ratio < 3.6 (severe bradycardia or high frequency ventilation)	If the RR is very high, the number of cardiac cycles per respiratory cycle may be too low to allow variation in stroke volume	False negative

HR heart rate, RR respiratory rate

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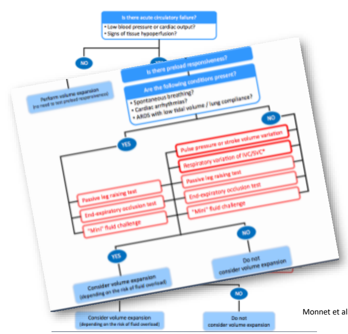

Monnet et al. Ann. Intensive Care (2016) 6:111

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Levantamiento pasivo de extremidades

Paso 1:		Paso 2:
GC: 3,5 lpm	⇨	GC: 4 lpm
VS: 44 ml		VS: 50 ml

Respuesta: ↑14%

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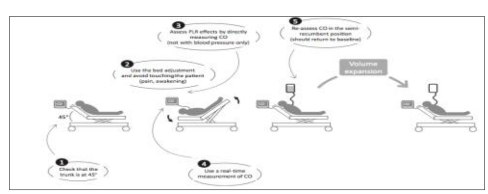
Passive leg raising: five rules, not a drop of fluid!

Xavier Monnet[1,2*] and Jean-Louis Teboul[1,2]



Monnet. *Critical Care*, 2015, *19*(1), 18.

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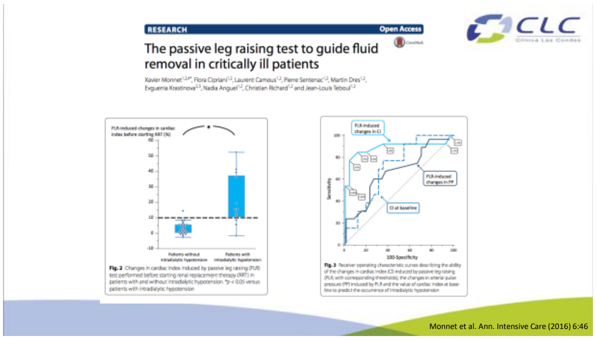
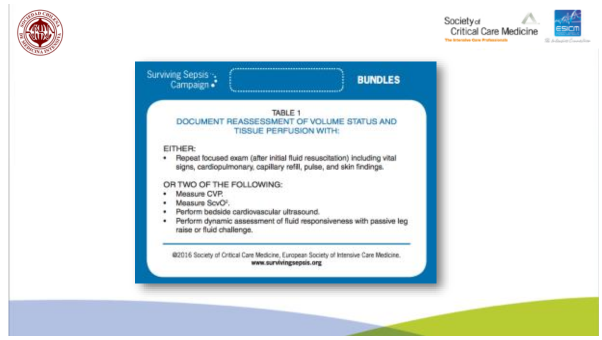

RESEARCH
Open Access
The passive leg raising test to guide fluid removal in critically ill patients
CLC
Clínica Las Condes
Monnet et al. Ann. Intensive Care (2016) 6:46


Society of Critical Care Medicine
Surviving Sepsis Campaign
BUNDLES
TABLE 1
DOCUMENT REASSESSMENT OF VOLUME STATUS AND TISSUE PERFUSION WITH:
EITHER:
Repeat focused exam (after initial fluid resuscitation) including vital signs, cardiopulmonary, capillary refill, pulse, and skin findings.
OR TWO OF THE FOLLOWING:
Measure CVP.
Measure ScvO2.
Perform bedside cardiovascular ultrasound.
Perform dynamic assessment of fluid responsiveness with passive leg raise or fluid challenge.
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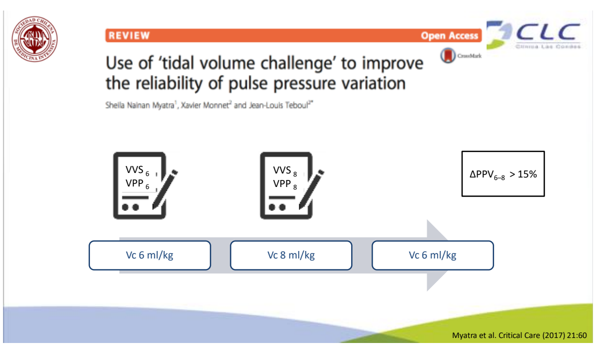
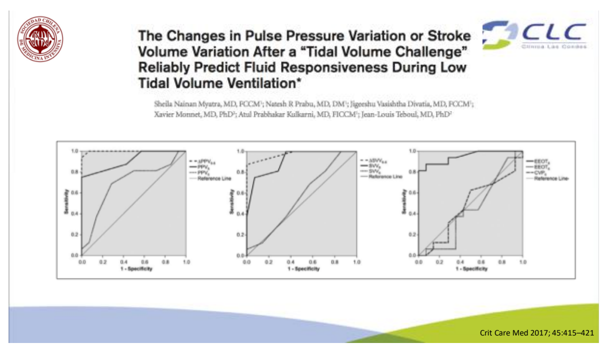
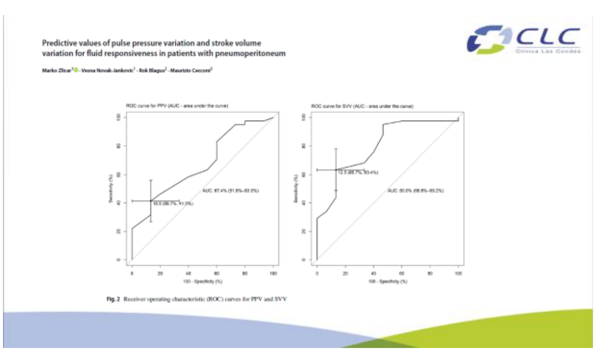
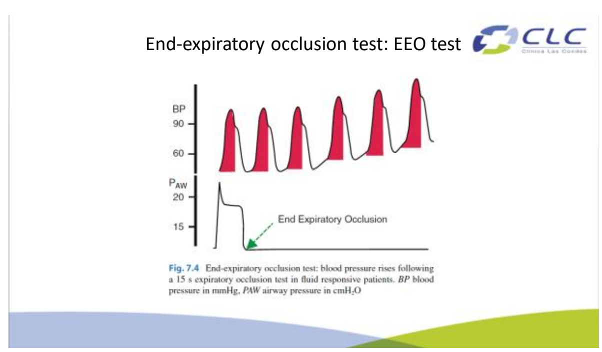
www.survivingsepsis.org

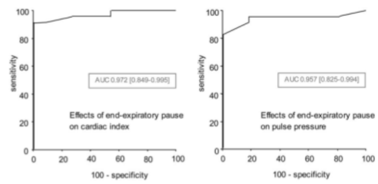

REVIEW
Open Access
Use of 'tidal volume challenge' to improve the reliability of pulse pressure variation
Sheila Nainan Myatra, Xavier Monnet and Jean-Louis Teboul
CLC
VVS 6
VPP 6
VVS 8
VPP 8
ΔPPV6-8 > 15%
Vc 6 ml/kg
Vc 8 ml/kg
Vc 6 ml/kg
Myatra et al. Critical Care (2017) 21:60


The Changes in Pulse Pressure Variation or Stroke Volume Variation After a "Tidal Volume Challenge" Reliably Predict Fluid Responsiveness During Low Tidal Volume Ventilation*
CLC
Crit Care Med 2017; 45:415–421


Predictive values of pulse pressure variation and stroke volume variation for fluid responsiveness in patients with pneumoperitoneum
CLC
Fig. 2 Receiver operating characteristic (ROC) curves for PPV and SVV

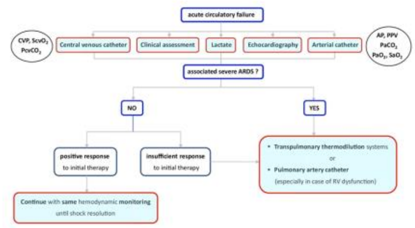

End-expiratory occlusion test: EEO test
CLC
BP
90
60
PAW
20
15
End Expiratory Occlusion
Fig. 7.4 End-expiratory occlusion test: blood pressure rises following a 15 s expiratory occlusion test in fluid responsive patients. BP blood pressure in mmHg, PAW airway pressure in cmH2O

Predicting volume responsiveness by using the end-expiratory occlusion in mechanically ventilated intensive care unit patients



Monnet et al. Crit Care Med 2009 Vol. 37; 3

How to choose?



Teboul JL et al ICM 2016

Conclusiones:

- Definir condiciones preliminares:
  - Conocer sus monitores
  - Confiabilidad de la Presión arterial invasiva
  - Condiciones del paciente: L I M I T S
- Integración de los parámetros en la toma de decisiones.
- Equipo alineado: quienes, cuando, como y que medimos …
- No olvidar que queremos:
  - Mejorar la volemia?
  - Corregir la hipoxia tisular?

Preguntas …