FORMAÇAO NO SESARAM

Choque Septico

Fluidos

Ressuscitação Hemodinamica Inicial

SESARAM E.P.E.
Serviço de Saúde da RAM E.P.E.

Medicina Intensiva

14.03.19

J. J. Nóbrega
jjpnobrega@gmail.com

The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3)

Mervyn Singer, MD, FRCP; Clifford S. Deutschman, MD, MS; Christopher Warren Seymour, MD, MSc; Manu Shankar-Hari, MSc, MD, FFICM; Djillali Annane, MD, PhD; Michael Bauer, MD; Rinaldo Bellomo, MD; Gordon R. Bernard, MD; Jean-Daniel Chiche, MD, PhD; Craig M. Coopersmith, MD; Richard S. Hotchkiss, MD; Mitchell M. Levy, MD; John C. Marshall, MD; Greg S. Martin, MD, MSc; Steven M. Opal, MD; Gordon D. Rubenfeld, MD, MS; Tom van der Poll, MD, PhD; Jean-Louis Vincent, MD, PhD; Derek C. Angus, MD, MPH

JAMA. 2016;315(8):801-810. doi:10.1001/jama.2016.0287

Sepsis

… é uma disfunção orgânica potencialmente fatal causada por uma resposta desregulada do hospedeiro a uma infecção

February 23, 2016

The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3)

Mervyn Singer, MD, FRCP[1]; Clifford S. Deutschman, MD, MS[2]; Christopher Warren Seymour, MD, MSc[3]; et al

» Author Affiliations | Article Information

JAMA. 2016;315(8):801-810. doi:10.1001/jama.2016.0287

Choque Septico

… sepsis com hipotensão persistente que requer vasopressores para manter a PAM ≥ 65 mmHg e lactato sérico > 2 mmol, apesar da ressuscitação volémica adequada

mortalidade hospitalar > 40%

- *Noradrenalina ⩾ 0.5 μg/kg/min mortalidade ⩾ 60%*
- *Noradrenalina ⩾ 1.0 μg/kg/min moratlidade ⩾ 90%*

February 23, 2016

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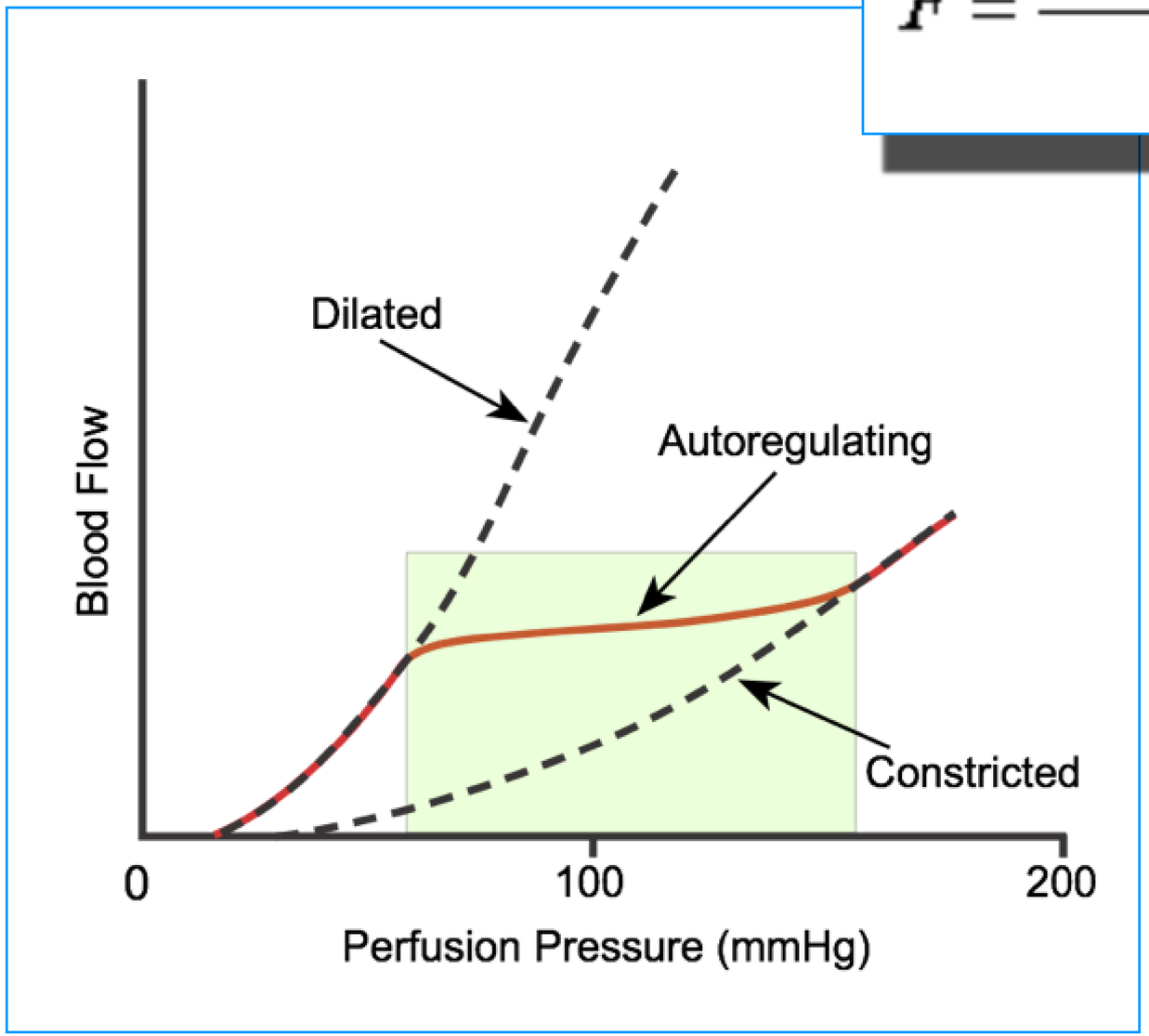
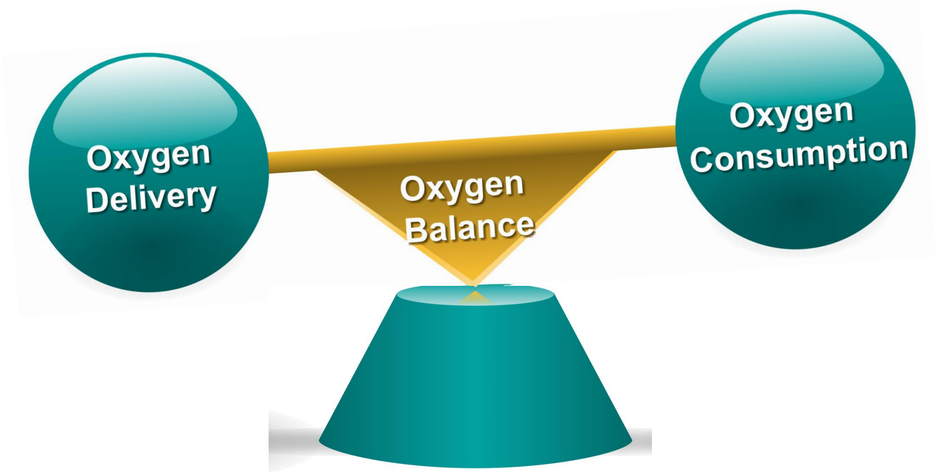
Choque Septico

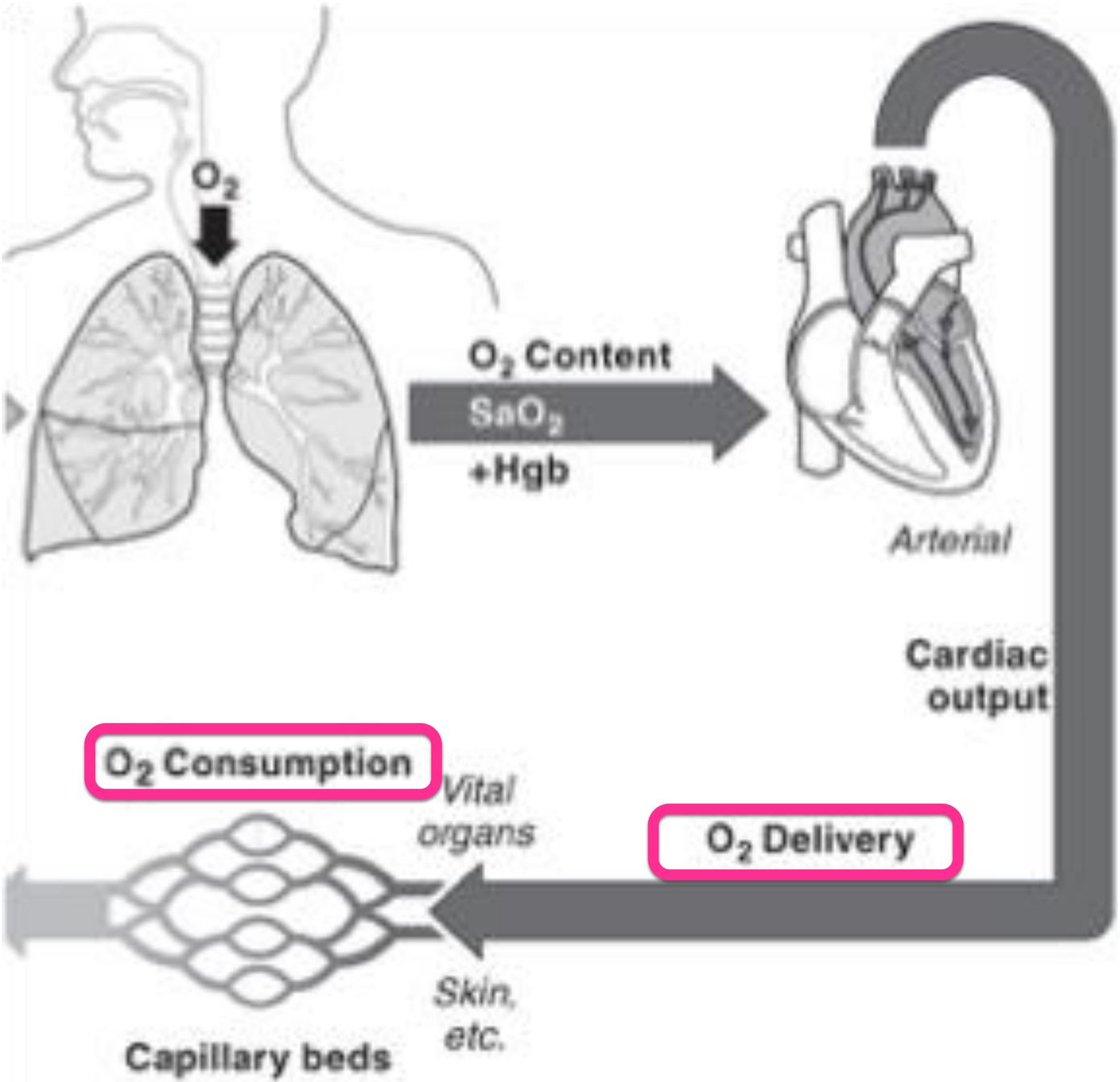
… sepsis com hipotensão persistente que requer vasopressores para manter a PAM ≥ 65 mmHg e lactato sérico > 2 mmol, apesar da ressuscitação volémica adequada ???

PAM ≥ 65 mmHg ?

$$F = \frac{(P_A - P_V)}{R}$$




Oxygen Delivery
Oxygen Balance
Oxygen Consumption


O_2
O_2 Content
SaO_2
+Hgb
Arterial
Cardiac output
O_2 Consumption
Vital organs
O_2 Delivery
Skin, etc.
Capillary beds

Intensive Care Med (2018) 44:2242–2244
https://doi.org/10.1007/s00134-018-5401-8

EDITORIAL

How I treat septic shock

Jean-Louis Vincent*

*Septic shock is an **emergency**, with every aspect of management a matter **not of hours** but of **minutes**…*

Surviving Sepsis Campaign

2016 BUNDLES

TO BE COMPLETED WITHIN 3 HOURS:

1) Measure lactate level.
2) Obtain blood cultures prior to administration of antibiotics.
3) Administer broad spectrum antibiotics.
4) Administer 30 ml/kg crystalloid for hypotension or lactate ≥4mmol/L.

"Time of presentation" is defined as the time of triage in the emergency department or, if presenting from another care venue, from the earliest chart annotation consistent with all elements of severe sepsis or septic shock ascertained through chart review.

TO BE COMPLETED WITHIN 6 HOURS:

5) Apply vasopressors (for hypotension that does not respond to initial fluid resuscitation) to maintain a mean arterial pressure (MAP) ≥65 mm Hg.
6) In the event of persistent hypotension after initial fluid administration (MAP < 65 mm Hg) or if initial lactate was ≥4 mmol/L, re-assess volume status and tissue perfusion and document findings according to Table 1.
7. Re-measure lactate if initial lactate elevated.

Surviving Sepsis Campaign

2018 BUNDLE

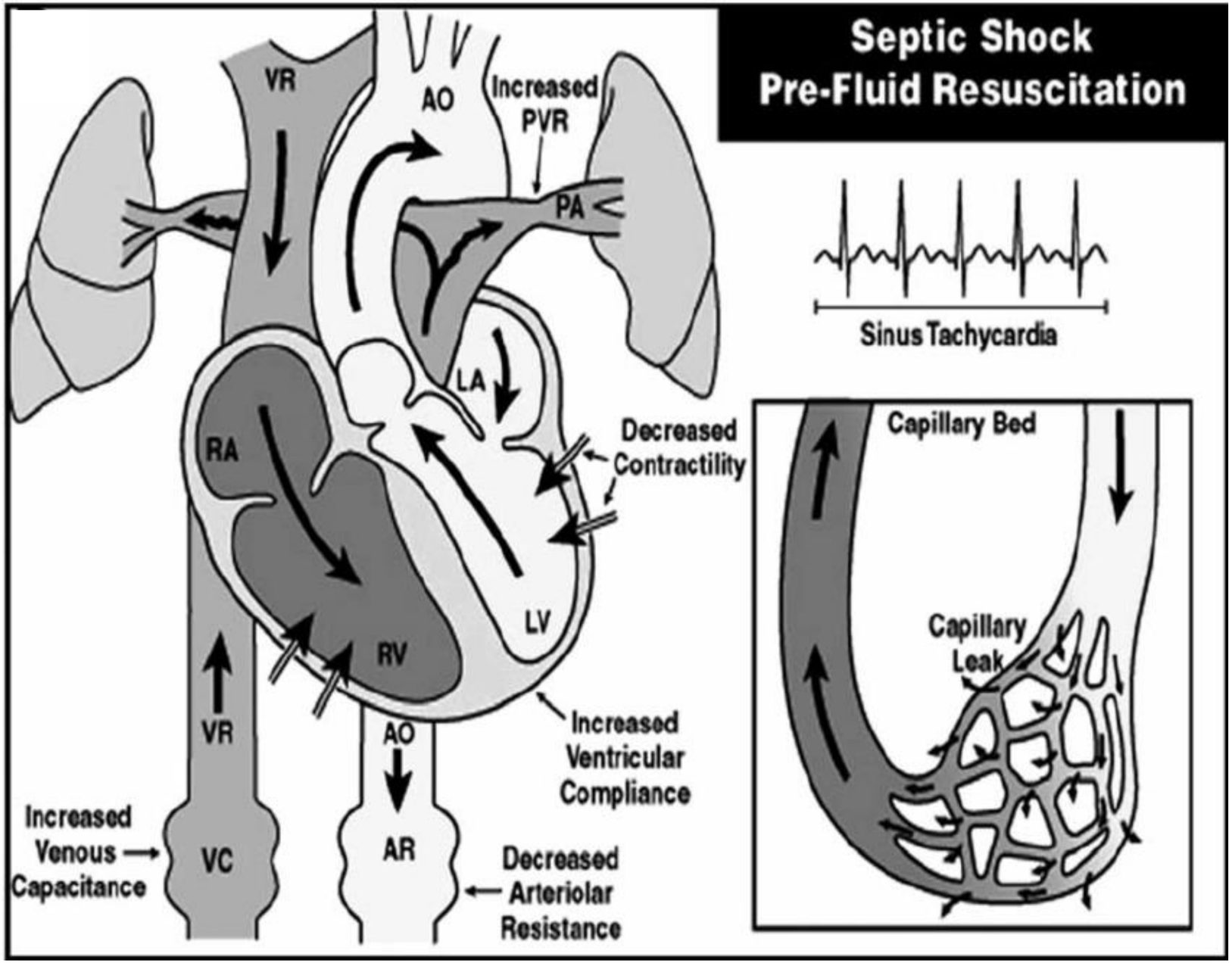
HOUR ONE BUNDLE: INITIAL RESUSCITATION FOR SEPSIS AND SEPTIC SHOCK (BEGIN IMMEDIATELY):

1) Measure lactate level.*
2) Obtain blood cultures before administering antibiotics.
3) Administer broad-spectrum antibiotics.
4) Begin rapid administration of 30ml/kg crystalloid for hypotension or lactate ≥4 mmol/L.
5) Apply vasopressors if hypotensive during or after fluid resuscitation to maintain a mean arterial pressure ≥ 65 mm Hg.

*Remeasure lactate if initial lactate elevated (> 2mmol/L).

www.survivingsepsis.org

- **Hipovolémia**
- **Vasoplegia**
- **↓Contractilidade**



Malbrain *et al. Ann. Intensive Care (2018) 8:66*
https://doi.org/10.1186/s13613-018-0402-x

Annals of Intensive Care

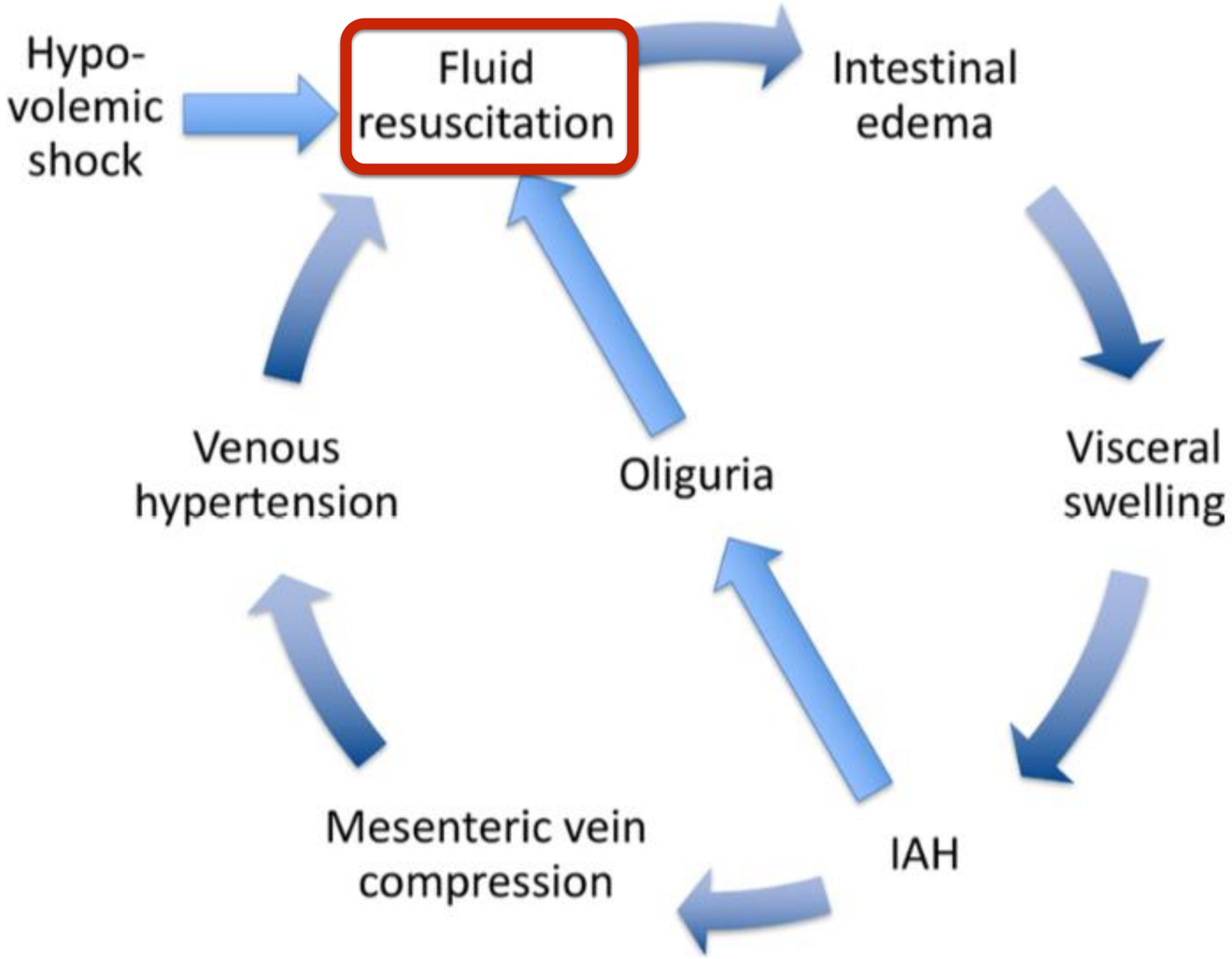
REVIEW Open Access

Principles of fluid management and stewardship in septic shock: it is time to consider the four D's and the four phases of fluid therapy

Manu L. N. G. Malbrain[1,2*], Niels Van Regenmortel[3], Bernd Saugel[4], Brecht De Tavernier[3], Pieter-Jan Van Gaal[3], Olivier Joannes-Boyau[5], Jean-Louis Teboul[6], Todd W. Rice[7], Monty Mythen[8] and Xavier Monnet[6]

- **Fluidoterapia de precisão**
- **Nem pouco nem muito**

A hipovolémia é prevalente no choque séptico

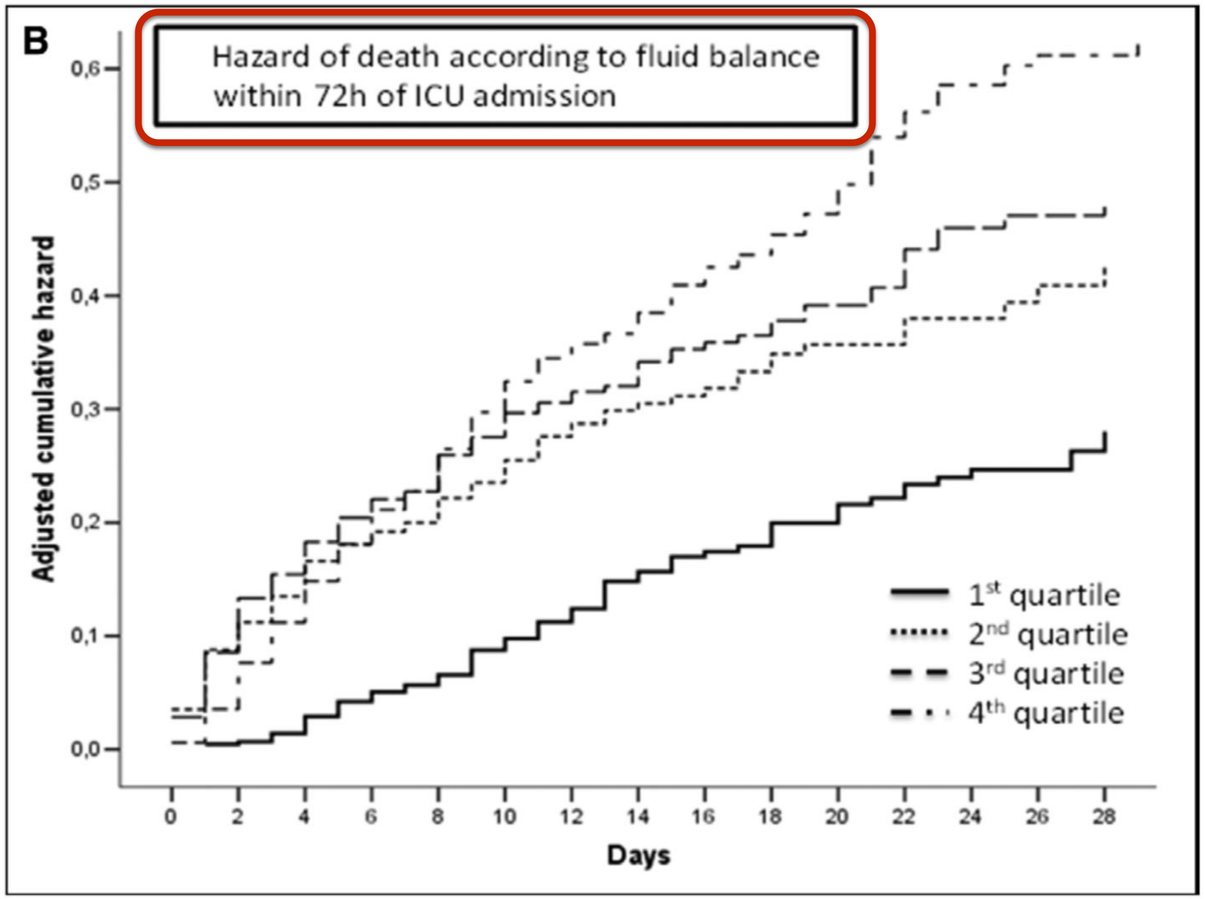


Higher Fluid Balance Increases the Risk of Death From Sepsis: Results From a Large International Audit*

Yasser Sakr, MD, PhD[1]; Paolo Nahuel Rubatto Birri, MD[1]; Katarzyna Kotfis, MD, PhD[2]; Rahul Nanchal, MD[3]; Bhagyesh Shah, MBBS, DA, IDCCM[4]; Stefan Kluge, MD[5]; Mary E. Schroeder, MD[6]; John C. Marshall, MD[7]; Jean-Louis Vincent, MD, PhD, FCCM[8]; on behalf of the Intensive Care Over Nations Investigators

Critical Care Medicine March 2017 • Volume 45 • Number 3

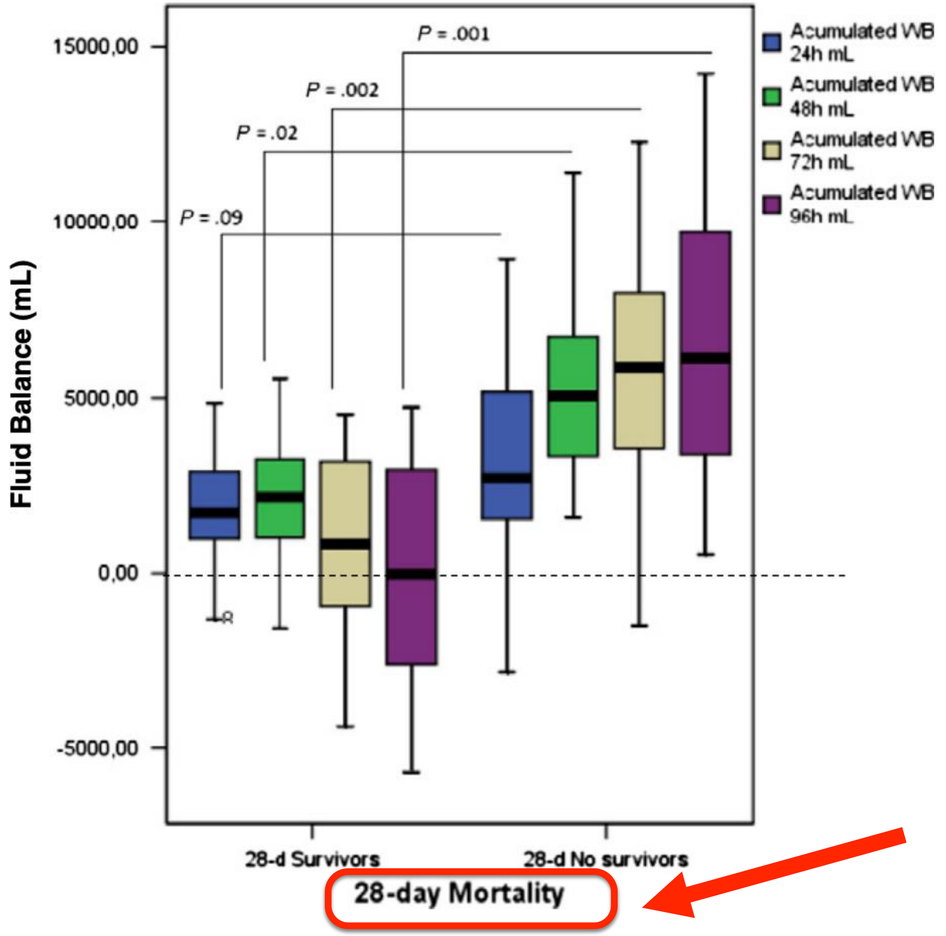
A sobrecarga de fluidos deve ser evitada

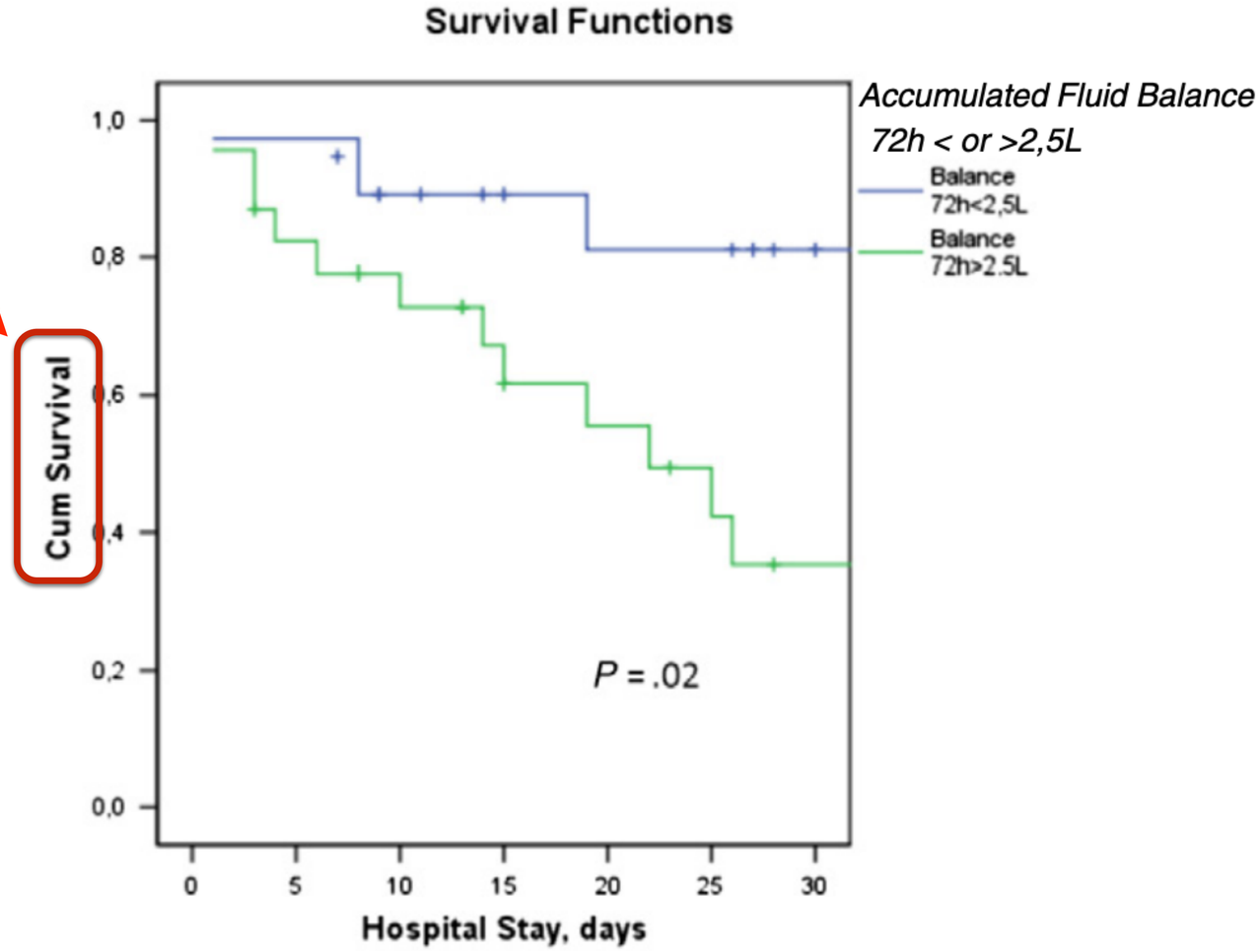


Fluid balance in sepsis and septic shock as a determining factor of mortality

Josep-Maria Sirvent, MD, PhD [a,*], Cristina Ferri, MD [b], Anna Baró, MD [a], Cristina Murcia, MD [a], Carolina Lorencio, MD [a]

A sobrecarga de fluidos deve ser evitada





Gestão meticulosa de FLUIDOS,

VASOPRESSORES e INOTRÓPICOS

Só se justifica dar fluidos se isso resultar num aumento do débito cardíaco sem agravar a perfusão tissular

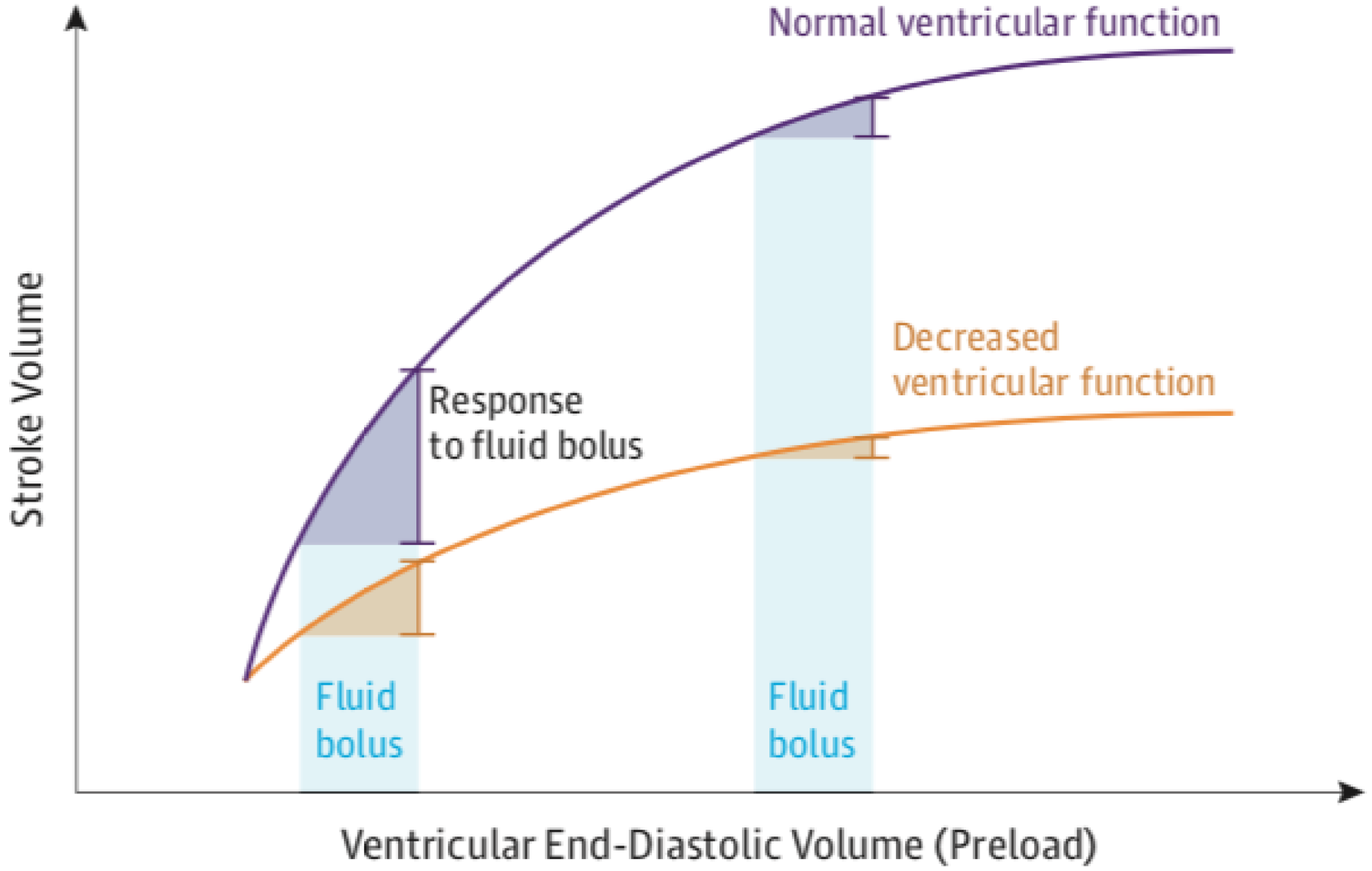
O retorno venoso é SEMPRE igual ao débito cardíaco !

Uma administração de fluidos expande SEMPRE o volume intravascular !

NÃO É SEGURO que uma administração de fluidos aumente o *preload* e MENOS CERTO que aumente o débito cardíaco

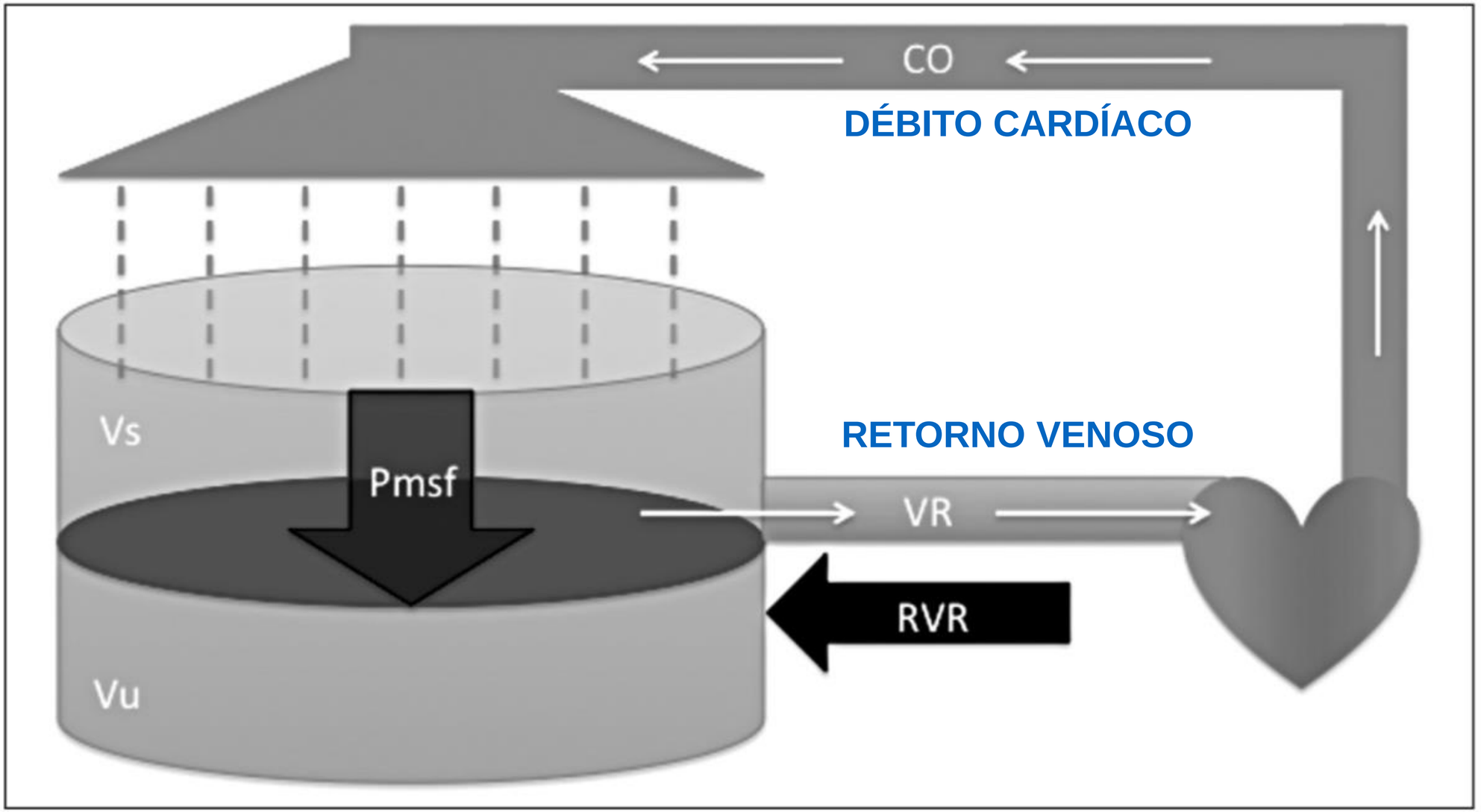
Crit Care. 2018; 22: 74.
Published online 2018 Mar 20. doi: 10.1186/s13054-018-1993-1
Effects of Fluids on the Macro- and Microcirculations
Victoria A. Bennett, Alexander Vidouris, and Maurizio Cecconi

aproximadamente 50% dos doentes com instabilidade hemodinâmica permanecem responsivos aos fluidos após a ressuscitação inicial



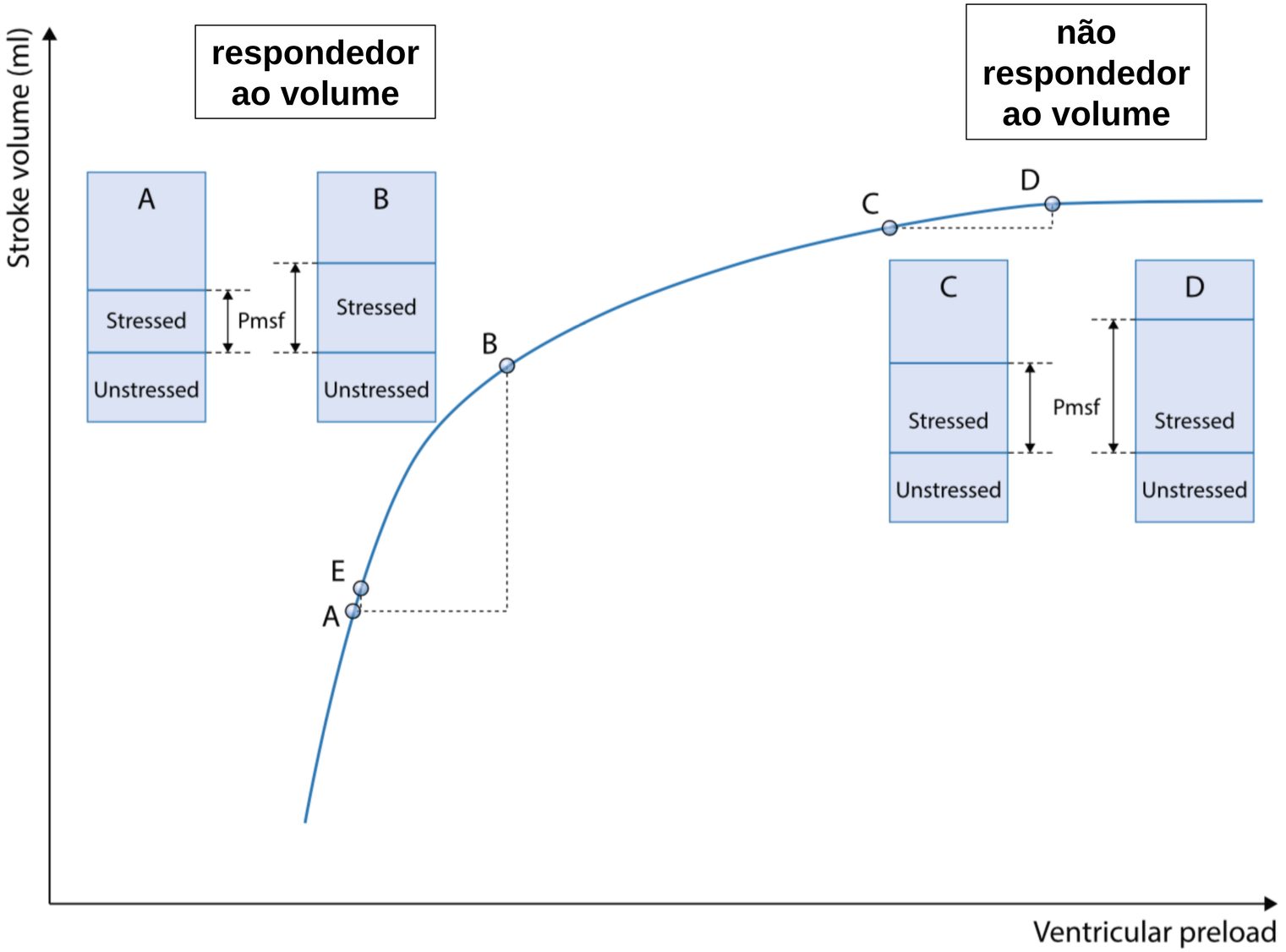
JAMA. 2016 Sep 27;316(12):1298-309. doi: 10.1001/jama.2016.12310.
Will This Hemodynamically Unstable Patient Respond to a Bolus of Intravenous Fluids
Bentzer P, Griesdale DE, Boyd J, MacLean K, Sirounis D, Ayas NT.

Volume Stressado *vs* Volume Não Stressado



From cardiac output to blood flow auto-regulation in shock.
Aya HD, Carsetti A, Bazurro S, Bastoni D, Malbrain ML, Cecconi M.
Anaesthesiol Intensive Ther. 2015;47 Spec No:s56-62. doi: 10.5603/AIT.a2015.0077. Epub 2015 Nov 20. Review.
PMID: 26588480

Fluxo de retorno
—>gradiente de pressão
—>Pmsf > PVC



Crit Care. 2018; 22: 74.
Published online 2018 Mar 20. doi: 10.1186/s13054-018-1993-1
Effects of Fluids on the Macro- and Microcirculations
Victoria A. Bennett, Alexander Vidouris, and Maurizio Cecconi

Apesar do meu doente persistir instável dou ou não fluidos?

DGS desde 1899 Direção-Geral da Saúde

NORMA

da Direção-Geral da Saúde

Francisco Henrique Moura George

Digitally signed by Francisco Henrique Moura George
DN: c=PT, o=Direção-Geral da Saúde, ou=Direção-Geral da Saúde, cn=Francisco Henrique Moura George
Date: 2016.09.30 12:19:54 +01'00'

NÚMERO: 010/2016
DATA: 30/09/2016

ASSUNTO:	Via Verde Sépsis do Adulto
PALAVRAS-CHAVE:	Choque séptico, infeção grave, via verde, sépsis
PARA:	Médicos e Enfermeiros do Sistema de Saúde e Unidades/Instituições do Sistema Integrado de Emergência Médica (SIEM)
CONTACTOS:	Departamento da Qualidade na Saúde (dqs@dgs.pt)

Tabela E – Avaliação Básica e terapêutica

	Ação	Tempo máximo para início de administração ou procedimento*	Observações	Grau de Recomendação	Nível de Evidência
a)	**Administração de até 20-30 ml/Kg de cristaloide**	15 min	Guiar a administração inicial por critérios clínicos – corrigir hipovolémia e hipoperfusão tissular.	I	A
			A escolha da solução cristaloide deve considerar o risco de acidemia hipercloremica.	IIb	A

DGS desde 1899 Direção-Geral da Saúde

NORMA

da Direção-Geral da Saúde

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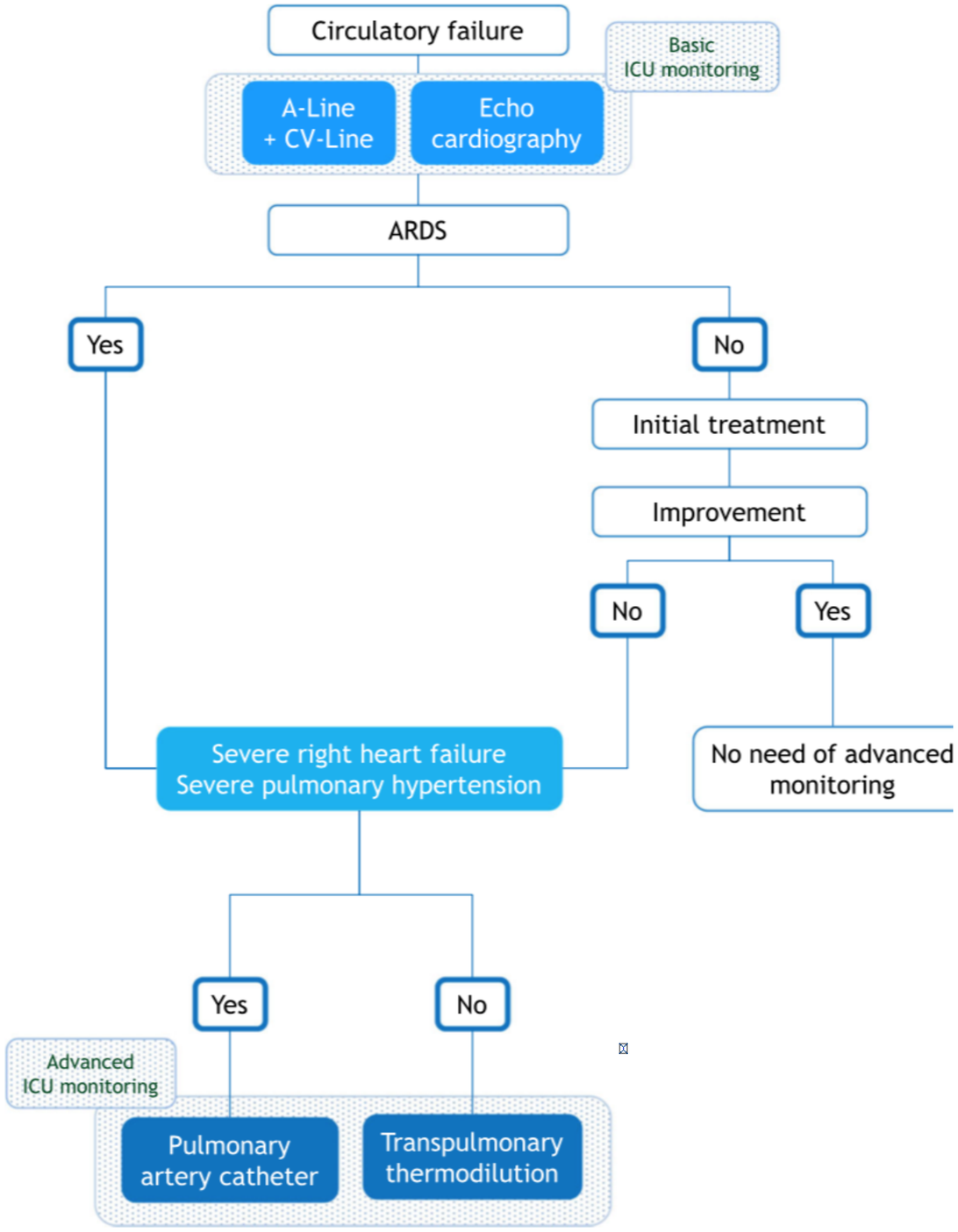
Tabela F Avaliação Avançado e Terapêutica

	Ação	Observações	Grau de Recomendação	Nível de Evidência
a)	Cristaloides	Se TA média <65 mmHg ou lactato>=2 mmol/l e evidência de responsividade a fluídos	I	A
b)	Noradrenalina	Para manter TA média >65mmHg preferencialmente após correção volémica;	I	B
c)	Cateter Arterial	Se TA média <65 mmHg ou necessidade presumida ou real de vasopressores após o algoritmo básico de avaliação e terapêutica.	I	B
d)	Cateter Venoso Central	Se for necessário vasopressor ou avaliação de SVCO2 ou delta de CO2	II	C



- **CVC e Linha Arterial** para todos
- **Ecocardiografia para avaliação inicial**
- **Medições de DÉBITO CARDÍACO** para avaliar a resposta aos fluidos nos doente que não respondem à terapêutica inicial
- **Termodiluição transpulamonar** nos doentes com choque septico e ARDS associado

Crit Care. 2017 Jun 19;21(1):147. doi: 10.1186/s13054-017-1739-5.

Transpulmonary thermodilution: advantages and limits.

Monnet X, Teboul JL.

Intensive Care Med. 2014; 40(12): 1795–1815.. doi: 10.1007/s00134-014-3525-z

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

Maurizio Cecconi, Daniel De Backer, Massimo Antonelli, Richard Beale, Jan Bakker, Christoph Hofer,Roman Jaeschke, Alexandre Mebazaa, Michael R. Pinsky, Jean Louis Teboul, Jean Louis Vincent, andAndrew

Malbrain *et al. Ann. Intensive Care (2018) 8:66*
https://doi.org/10.1186/s13613-018-0402-x

Annals of Intensive Care

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Bólus de Fluidos ≠ *Fluid Challenge*

Malbrain et al. Ann. Intensive Care (2018) 8:66
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Bolus de fluidos

- Infusão rápida de fluidos durante um curto período de tempo
- Geralmente para corrigir hipovolemia, hipotensão, fluxo sanguíneo inadequado ou perfusão microcirculatória comprometida
- O volume de bolus líquido é heterogêneo, tipicamente 500-1000 ml
- O volume mínimo que é capaz de aumentar a pressão para trás do retorno venoso é de 4 ml / kg

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Fluid Challenge (Desafio Fluido)

- Teste dinâmico para avaliar a responsividade aos fluidos, administrando um bólus de fluido e monitorizando simultaneamente o efeito hemodinâmico

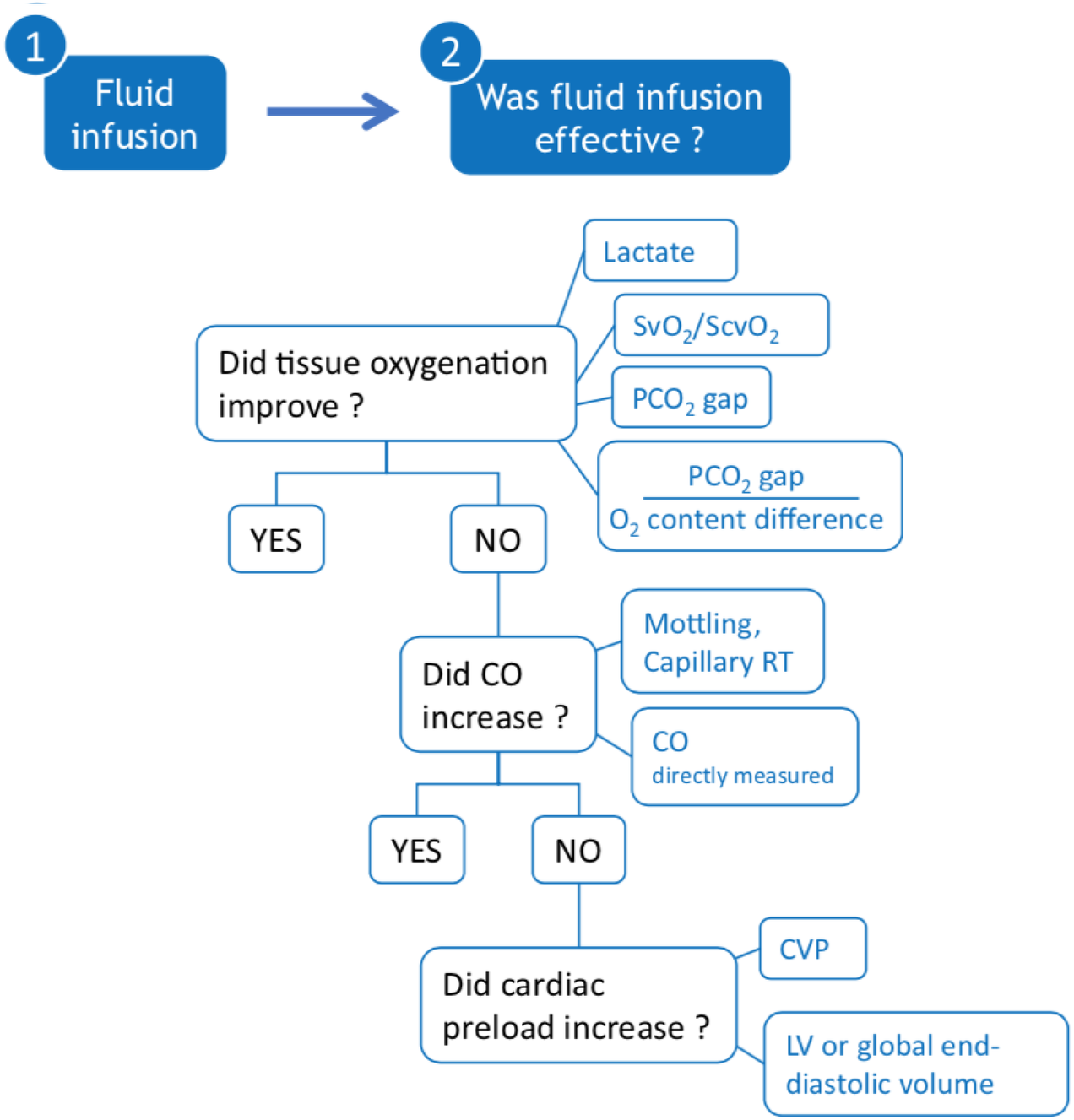
Assessment of fluid responsiveness: recent advances

Xavier Monnet[a] *and Jean-Louis Teboul*[b]

Curr Opin Crit Care 2018, 24:000–000

Antes de dar fluidos, preveja se ocorrerá aumento do débito cardíaco

Method	Variable	Threshold	Main limitations
Pulse pressure/Stroke volume variations	Pulse pressure or stroke volume	12%	Cannot be used in case of spontaneous breathing, cardiac arrhythmias, low tidal volume/lung compliance
Inferior vena cava diameter variations	Diameter	12%	Cannot be used in case of spontaneous breathing, low tidal volume/lung compliance
Superior vena cava diameter variations	Diameter	36%[a]	• Requires performing transoesophageal Doppler • Cannot be used in case of spontaneous breathing, low tidal volume/lung compliance
Passive leg raising	Cardiac output	10%	Requires a direct measurement of cardiac output
End-expiratory occlusion test	Cardiac output	5%	• Cannot be used in nonintubated patients • Cannot be used in patients who interrupt a 15-s respiratory hold
'Mini'-fluid challenge (100 ml)	Cardiac output	6%[b]	Requires a precise technique for measuring cardiac output
'Conventional' fluid challenge (500 ml)	Cardiac output	15%	• Requires a direct measurement of cardiac output • Induces fluid overload if repeated
Tidal volume fluid challenge	Pulse pressure vari	3.5%	Requires a precise technique for measuring cardiac output

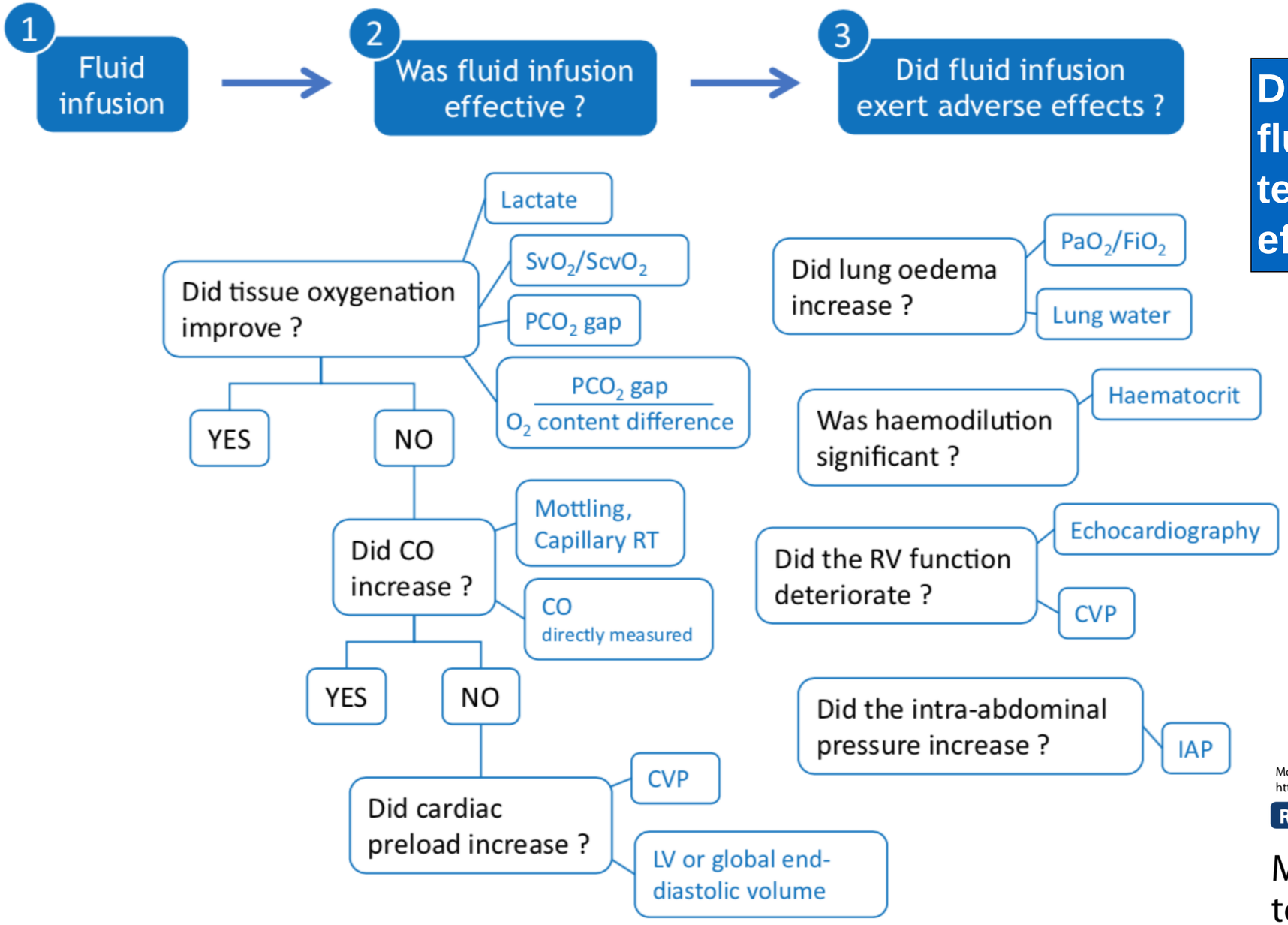


Durante a administração do fluidos avalie a eficácia terapêutica e a ocorrência de efeitos adversos

) 8:54 Annals of Intensive Care

...received fluid. How
s its efficacy and side effects?

nd Jean-Louis Teboul[1,2]



Durante a administração do fluidos avalie a eficácia terapêutica e a ocorrência de efeitos adversos

Monnet and Teboul *Ann. Intensive Care (2018) 8:54*
https://doi.org/10.1186/s13613-018-0400-z

Annals of Intensive Care

REVIEW

My patient has received fluid. How to assess its efficacy and side effects?

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

Sepsis Regulations: Guidance Document 405.4 (a)(4)

(i) Protocols shall apply to all patients in the hospital except those excluded as described in (ii) below, and include use of explicit algorithms and/or alert systems to assist in the early identification of patients with severe sepsis and septic shock including an approach to stratifying patients into sepsis, severe sepsis, and septic shock based on a constellation of appropriate clinical and laboratory findings. Protocols directed at treatment should address both ER and inpatient presentations of severe sepsis and septic shock for adults and for children.

(ii) Protocols must make exclusion criteria explicit. Appropriate criteria for exclusion from application of a severe sepsis/septic shock protocol include the following: patients for whom the interventions in the protocol are clinically contraindicated; persons with advance directives in place at the time of care which preclude any of the protocol interventions; persons for whom the patient or surrogate decision maker declined or is unwilling to consent to such interventions; and those enrolled in IRB approved clinical trials for which trial interventions are inconsistent with established protocols. Protocols for children may exclude newborns and infants in the NICU. Hospitals will be required to track and provide a limited amount of information regarding excluded patients (including reasons for exclusions) for purposes of data reporting to the Department.

(iii) For adults, treatment targets to maintain adequate perfusion and oxygenation and normalize lactate must be specified, including explicit methods for measurement of adequate perfusion and oxygenation;