



## **RECUSA DO TRATAMENTO HEMOTERÁPICO AUTONOMIA DO PACIENTE X AUTONOMIA DO MÉDICO**

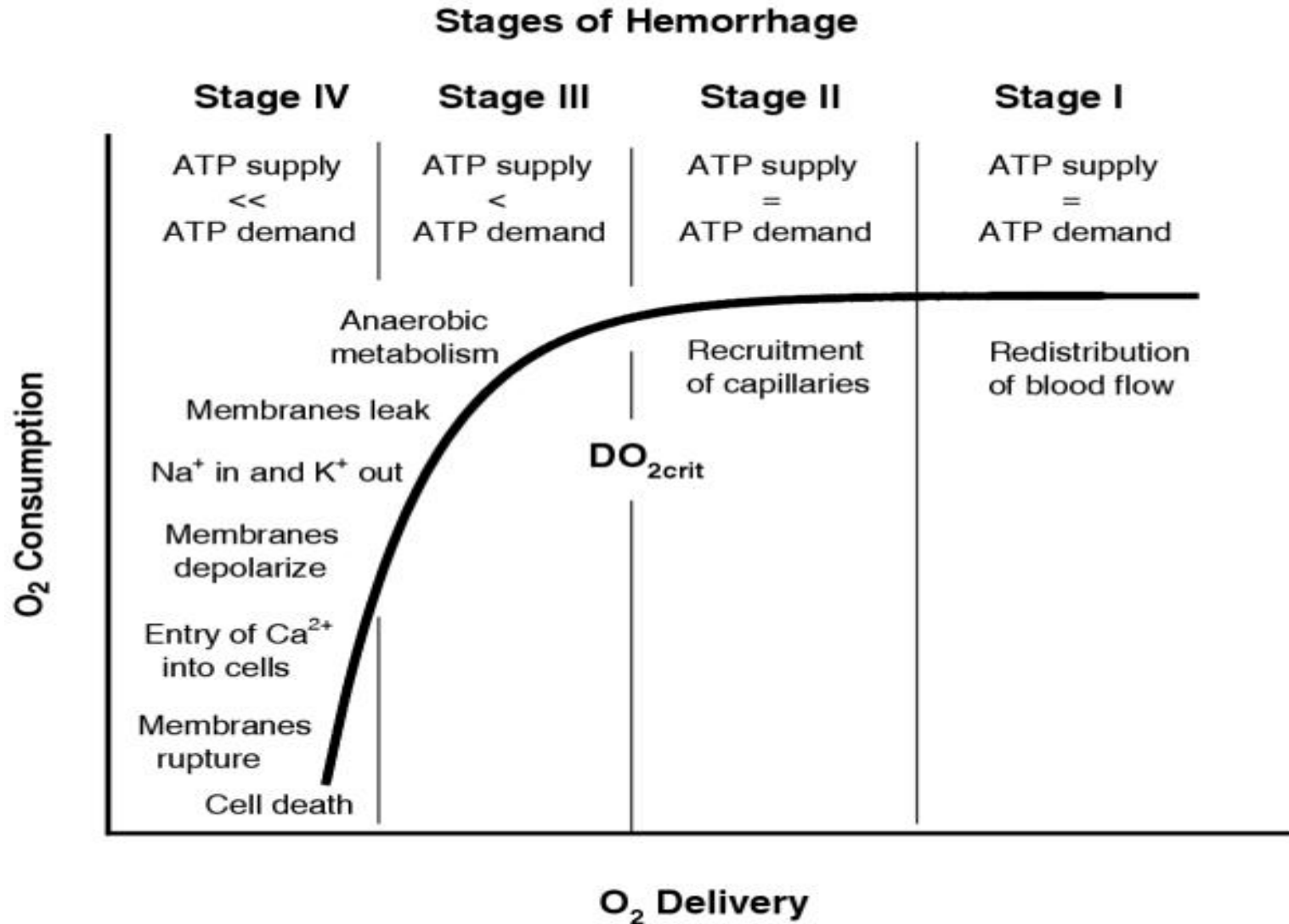
**Aspectos técnicos da indicação da  
transfusão de sangue e hemoderivados**

# Fisiologia do transporte, consumo e extração de Oxigênio

- $DO_2 = DC \times CaO_2 \times 10$  (  $VN > 1.000$  )
- $VO_2 = DC \times (CaO_2 - CvO_2) \times 10$  (  $VN \sim 200 - 260$  )
- $DC = VS^* \times Fc$
- $EO_2 = VO_2 / DO_2$  ou  $(CaO_2 - CvO_2) / CaO_2$  ou  $SaO_2 - SvO_2 / SaO_2$
- $CaO_2 = 1,34 \times Hb \times SaO_2 + 0,0031 \times PaO_2$
- $CvO_2 = 1,34 \times Hb \times SvO_2 + 0,0031 \times PvO_2$

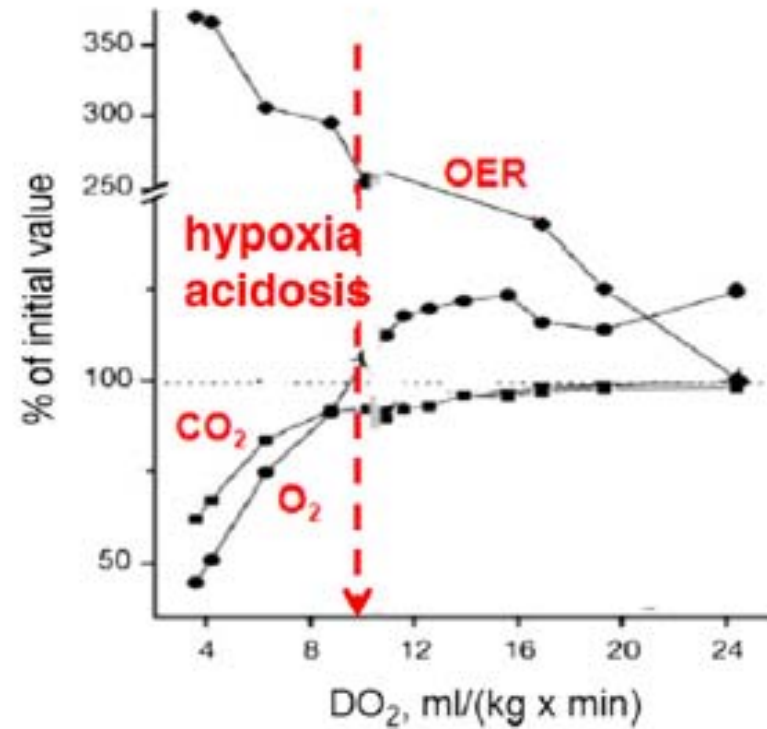
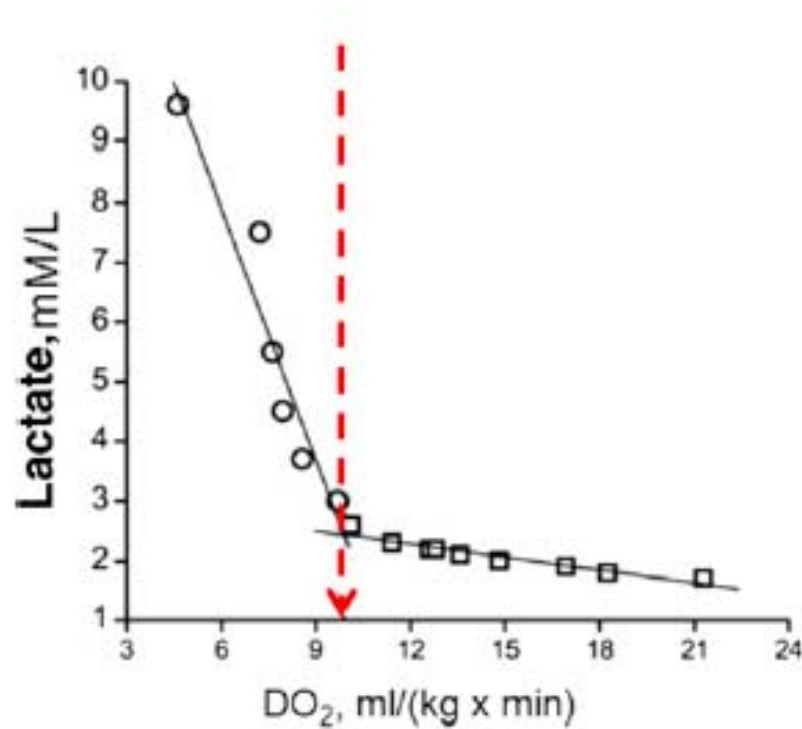
\* VS depende da pré-carga, contratilidade e resistência vascular periférica

# Alterações fisiopatológicas na relação VO<sub>2</sub>/DO<sub>2</sub>



*Critical Care*

DO<sub>2</sub> crítica: Aumento do Lactado, Diminuição do VO<sub>2</sub>, aumento da E<sub>O2</sub> e queda da produção de CO<sub>2</sub>



# TRANSFUSION PRACTICE

## Mortality and morbidity in patients with very low postoperative Hb levels who decline blood transfusion

*Jeffrey L. Carson, Helaine Noveck, Jesse A. Berlin, and Steven A. Gould*

**TABLE 4. Mortality or morbidity stratified by postoperative Hb level\***

Postoperative Hb (g/dL)	Total study population	30-day in-hospital mortality and/or morbidity†	No cardiovascular disease (n = 199)		Cardiovascular disease (n = 57)	
			Number	30-day in-hospital mortality and/or morbidity†	Number	30-day in-hospital mortality and/or morbidity†
1.1-2.0	4	4 (100)	2	2 (100)	2	2 (100)
2.1-3.0	12	11 (91.7)	9	8 (88.9)	3	3 (100)
3.1-4.0	19	10 (52.6)	14	6 (42.9)	5	4 (80.0)
4.1-5.0	26	15 (57.7)	18	9 (50.0)	8	6 (75.0)
5.1-6.0	49	14 (28.6)	34	8 (23.5)	15	6 (40.0)
6.1-7.0	50	11 (22.0)	40	9 (22.5)	10	2 (20.0)
7.1-8.0	96	9 (9.4)	82	8 (9.8)	14	1 (7.1)

\* Analysis limited to multicenter data (n = 256); postoperative Hb is prior to event.

† Defined as arrhythmia, congestive heart failure; myocardial infarction, bacteremia, pneumonia, deep wound infection, or death; 74 patients with at least one event. Data reported as number (%).

# Estudos Clínicos

- Transfusion Requirements In Critical Care

TRICC - NEJM -1998 (838 pcts)

Aumento da mortalidade em pacientes:

- Com < 55 anos
- Pacientes menos graves ( APACHE II < 20)

- Anemia and blood transfusion in critically ill patients.

ABC - JAMA – 2002 (3.534 pcts)

Que o uso da transfusão estava relacionado:

- Risco de morte
- Duração do tempo de internação

- Transfusion practice in the critically ill.

CRIT – Crit Care Med – 2003 (4.892 pcts)

Que o número de bolsas transfundidas esta relacionado:

- Aumento do tempo de internação
- Aumento da mortalidade
- Aumento da incidência de SARA

- Sepsis Occurrence in Acutely Ill Patients study.

SOAP – Anesthesiology -2008 ( 3.147pcts)

- Não confirmou os dados de pior evolução:
  - Leucodepleção.....

*Review Article*

**Anemia and Blood Transfusions in Critically Ill Patients.**

Journal of Blood Transfusion

Volume 2012, Article ID 629204, 7 pages

doi:10.1155/2012/629204

# Estudos clinicos

**Table 1 Multicenter observational studies of transfusion in general ICU patients**

Author	Year study was conducted	Country/region	No. of patients and number of ICUs	Percentage transfused in ICU	Pretransfusion hemoglobin level	Mean no. of units transfused in ICU	Mean age of blood (days)
Hebert et al. [9]	1993	Canada	5,298 patients in 6 ICUs	25.0	Mean: 8.6 ± 1.3 g/dl	NS	NS
Vincent et al. [3]	1999	Western Europe	3,534 patients in 146 ICUs	37.0	Mean: 8.4 ± 1.3 g/dl	4.8 ± 5.2	162 ± 67
Rao et al. [6]	1999	UK	1,247 patients in 9 ICUs	53.0	Median: 8.5 (IQR: 7.9-9) g/dl	6.75 (hemorrhage) and 4.25 (anemia)	NS
Corwin et al. [5]	2000 - 2001	USA	4,892 patients in 284 ICUs	44.0	Mean: 8.6 ± 1.7 g/dl	4.6 ± 4.9	21 ± 11.4
Walsh et al. [7]	2001	UK (Scotland)	1,023 patients in 10 ICUs	39.5	Median: 7.8 (7.3-8.5) g/dl	Mean: 1.87 unit/ICU admission	NS
French et al. [10]	2001	Australia and New Zealand	1,808 patients in 18 ICUs	19.8	Median: 8.2 (range: 4.4-18.7) g/dl	Mean: 4.18	NS
Vincent et al. [34]	2002	Western and Eastern Europe	3,147 patients in 198 ICUs	33.0	Median: 8.2 g/dl	5.0 ± 5.8	NS
Westbrook et al. [8]	2008	Australia and New Zealand	5,128 patients in 47 ICUs	14.7	Mean: 7.7 g/dl	Median: 2 (IQR: 1-4)	Median: 14 (IQR: 9.5-21.5)

ICU intensive care unit; NS not specified; IQR interquartile range

## EDITORIAL

### Patient blood management during cardiac surgery: Do we have enough evidence for clinical practice?

Marco Ranucci, MD,<sup>a</sup> Solomon Aronson, MD,<sup>b</sup> Wulf Dietrich, MD, PhD,<sup>c</sup> Cornelius M. Dyke, MD,<sup>d</sup> Axel Hofmann, ME,<sup>e,f</sup> Keyvan Karkouti, MD,<sup>g</sup> Marcel Levi, MD, PhD,<sup>h</sup> Gavin J. Murphy, MD, FRCS,<sup>i</sup> Frank W. Sellke, MD,<sup>j</sup> Linda Shore-Lesserson, MD,<sup>k</sup> and Christian von Heymann, MD,<sup>l</sup> endorsed by the European Association of Cardiothoracic Anaesthesiologists (EACTA)

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### Transfusão e mortalidade perioperatória hospitalar ou após 30 dias

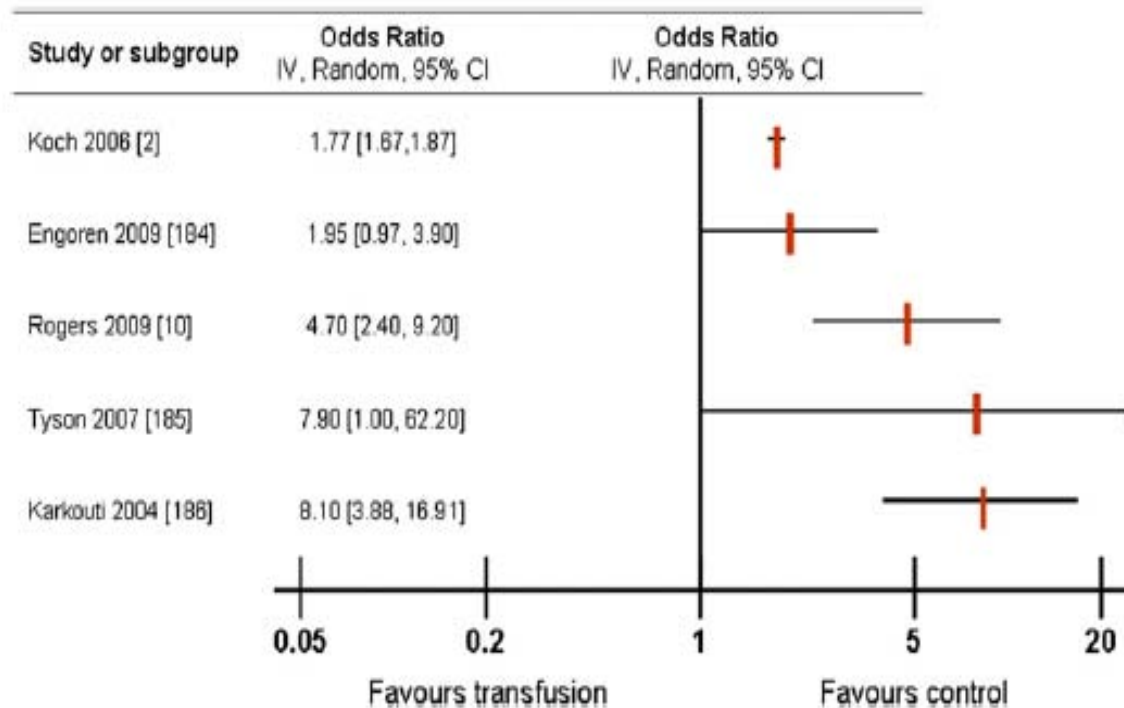


FIGURE 1. Forest plot of studies evaluating the effect of red blood cell transfusion on perioperative mortality (in-hospital or 30-day mortality). *IV*, Inclusive value; *CI*, confidence interval.



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### Transfusão e infecção no pós operatório

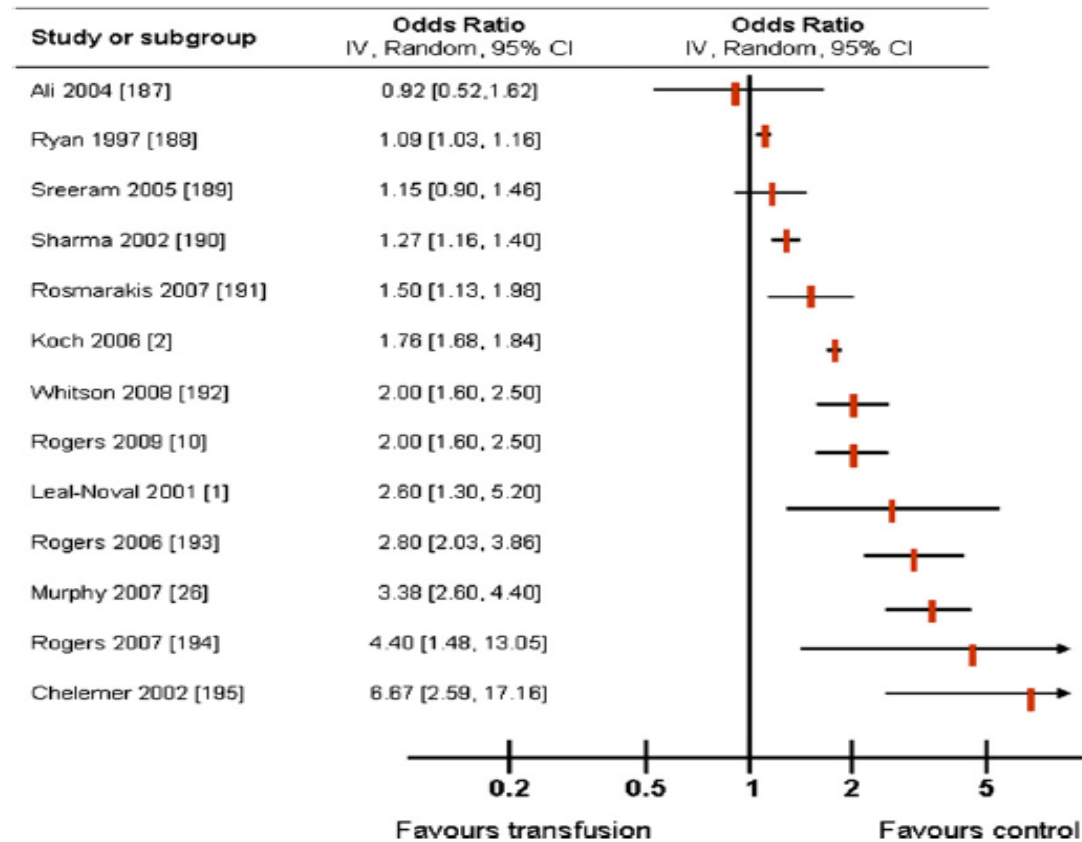


FIGURE 2. Forest plot of studies evaluating the effect of red blood cell transfusion on postoperative infection (sepsis, bacteremia, or any infection). IV, Inclusive value; CI, confidence interval.

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#### Transfusão e morbidade cardíaca

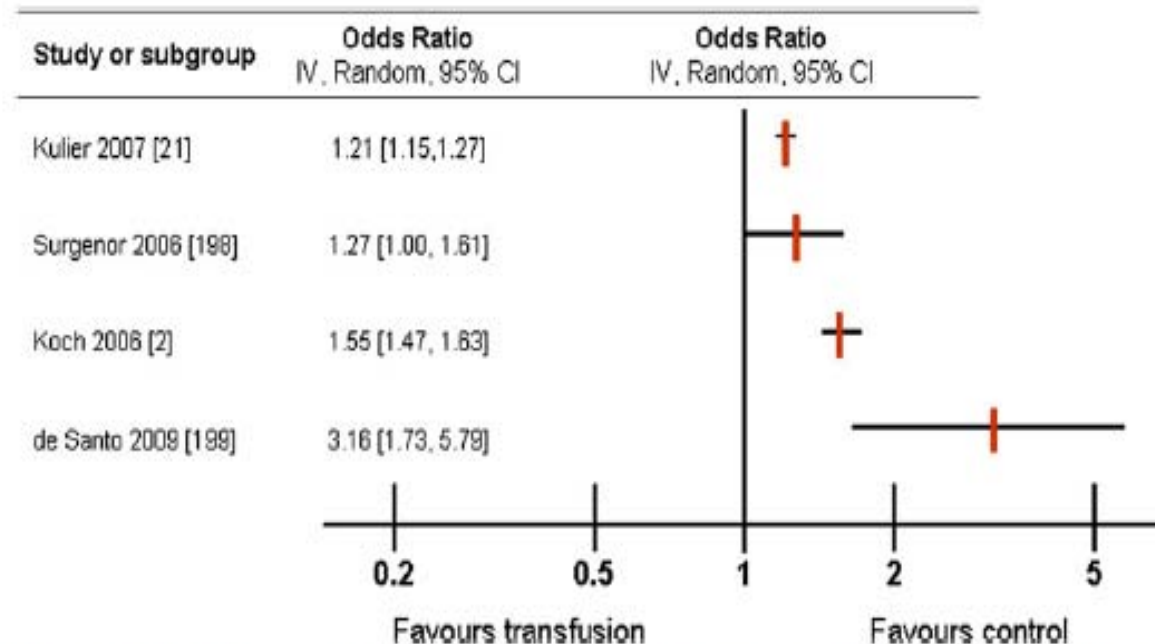


FIGURE 4. Forest plot of studies evaluating the effect of RBC transfusion on postoperative cardiac morbidity (major cardiac complication, low cardiac output). *IV*, Inclusive value; *CI*, confidence interval.

# Blood transfusion in cardiac surgery is a risk factor for increased hospital length of stay in adult patients

*Journal of Cardiothoracic Surgery* 2013, 8:54 doi:10.1186/1749-8090-8-54

## Transfusion Requirements After Cardiac Surgery (TRACS)

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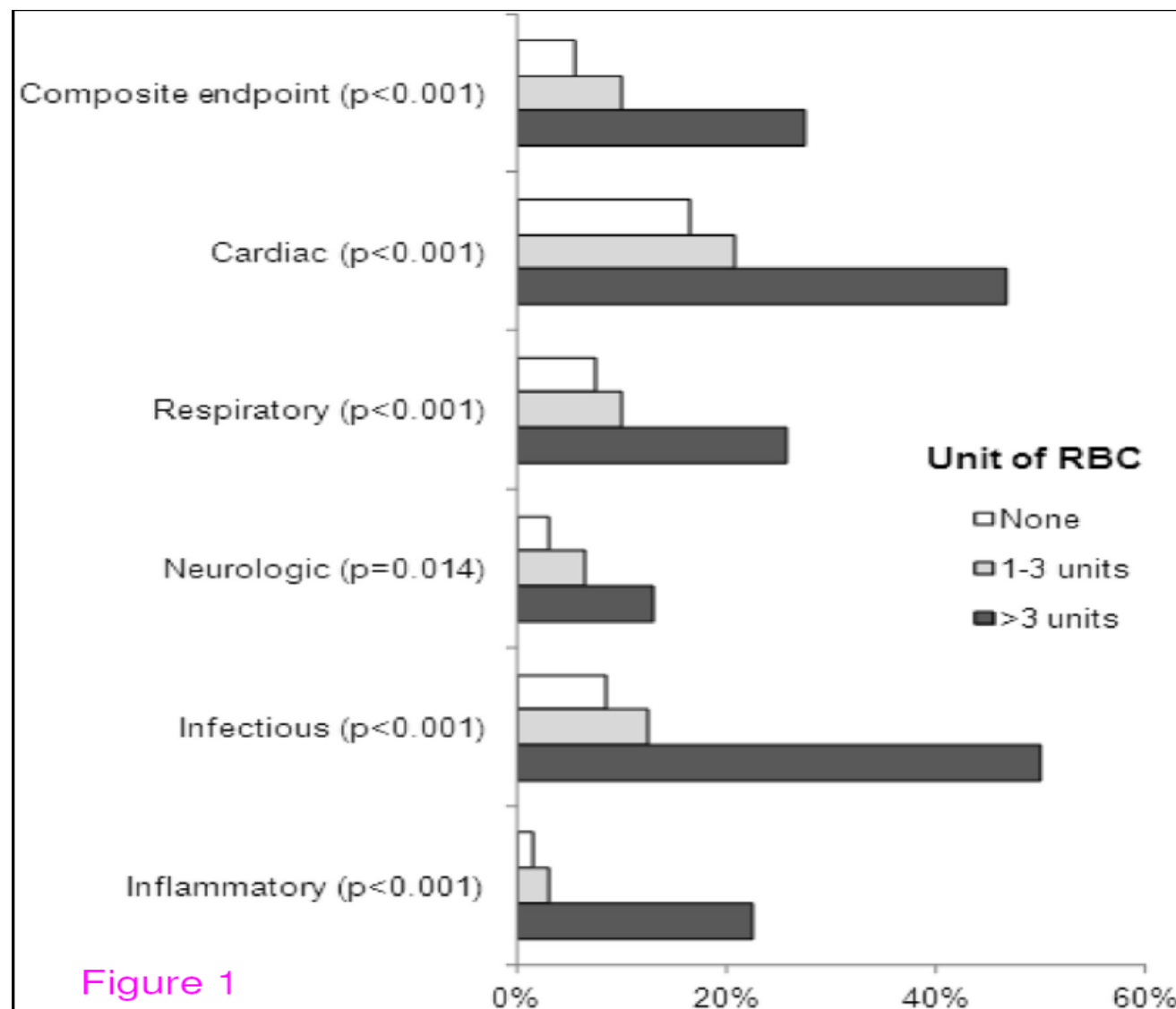
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## A new perspective on best transfusion practices

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	CAP (1998) <sup>68</sup>	ASA (2006) <sup>69</sup>	STS (2007) <sup>70</sup>	SCCM (2009) <sup>32</sup>	SIMTI (2011) <sup>71-73</sup>	AABB (2012) <sup>74</sup>
Target population	General	Perioperative (general)	Cardiac surgery	Critically ill	Perioperative (general)	Hospitalised, haemodynamically stable
RBC usually indicated	Hb <6 g/dL	Hb <6 g/dL	Hb <6 g/dL (Hb <7 g/dL in postoperative patients and higher if risk of end-organ ischaemia)	Hb <7 g/dL if ventilated, trauma, or stable cardiac disease (Hb <8 g/dL in acute coronary syndrome)	Hb <6 g/dL (Hb 6-8 g/dL if risk factors present; Hb 6-10 g/dL if symptoms of hypoxia present)	Hb ≤7 g/dL in critically-ill patients; Hb ≤8 g/dL in surgical patients, or patients with pre-existing cardiovascular disease; When symptoms are present
RBC rarely indicated	Hb >10 g/dL	Hb >10 g/dL	Hb >10 g/dL	Hb >10 g/dL	Hb >10 g/dL	
Equivocal	Hb 6-10 g/dL	Hb 6-10 g/dL				Patients with acute coronary syndrome
Factors to consider in making the decision	Peripheral tissue oxygenation, clinical signs and symptoms, Hb, extent/rate of bleeding	Ischaemia, extent/rate of bleeding, volume status, risk factors for hypoxia complications	Age, severity of illness, cardiac function, ischaemia, extent/rate of blood loss, Hb, SVO <sub>2</sub>	Volume status, shock, duration/extent of anaemia, cardiopulmonary parameters	Rate of blood loss, Hb level, risk factors, symptoms of hypoxia/ischaemia	Hb levels as well as symptoms (chest pain, orthostatic hypotension, unresponsive tachycardia, heart failure)

**Legend** AABB: American Association of Blood Banks; ASA: American Society of Anesthesiologists; CAP: College of American Pathologists; Hb: haemoglobin; SCCM: Society of Critical Care Medicine; SIMTI: Italian Society of Transfusion Medicine and Immunohaematology; STS: Society of Thoracic Surgeons; SVO<sub>2</sub>: mixed venous oxygen saturation.

## **Clinical evidence of blood transfusion effectiveness**

Andreas Pape<sup>1</sup>, Peter Stein<sup>1</sup>, Oliver Horn<sup>1</sup>, Oliver Habler<sup>2</sup>

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### **Conclusões**

Se a transfusão de sangue afetará o desfecho clínico, dependerá das demandas individuais de cada paciente (dinâmica da perda de sangue, prevalência do consumo de oxigênio, escolha do indicador de transfusão).

A decisão de administrar uma transfusão de sangue, deverá, assim, ter bases em julgamentos clínicos da relação risco/benefício, que incluem os riscos associados a transfusão e a anemia respectivamente.

Para obter evidência sistemática, necessitamos um grande estudo prospectivo para investigar quais são os gatilhos apropriados para transfundir em várias populações de pacientes.

# Red blood cell transfusion in the critically ill patient

Christophe Lelubre and Jean-Louis Vincent\*

## Abstract

Red blood cell (RBC) transfusion is a common intervention in intensive care unit (ICU) patients. Anemia is frequent in this population and is associated with poor outcomes, especially in patients with ischemic heart disease. Although blood transfusions are generally given to improve tissue oxygenation, they do not systematically increase oxygen consumption and effects on oxygen delivery are not always very impressive. Blood transfusion may be lifesaving in some circumstances, but many studies have reported increased morbidity and mortality in transfused patients. This review focuses on some important aspects of RBC transfusion in the ICU, including physiologic considerations, a brief description of serious infectious and noninfectious hazards of transfusion, and the effects of RBC storage lesions. Emphasis is placed on the importance of personalizing blood transfusion according to physiological endpoints rather than arbitrary thresholds.

## Conclusão

A transfusão de sangue pode salvar vidas. Durante as últimas 2 décadas, porém, surgiram preocupações quanto a sua segurança com trabalhos sugerindo que a morbidade e mortalidade podem estar elevadas em pacientes que recebem transfusão de sangue. Portanto, a decisão de transfundir deverá ser individualizada, baseada em procedimentos e tomadas de decisão relacionadas a variáveis fisiológicas além dos valores de hemoglobina. Esta estratégia, associadas a alternativas para limitar a perda de sangue, deverá limitar, também, a exposição desnecessária a transfusão de células sanguíneas

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