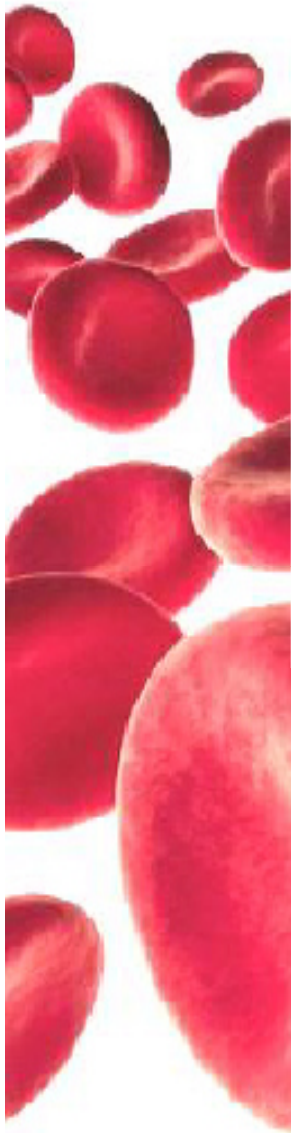


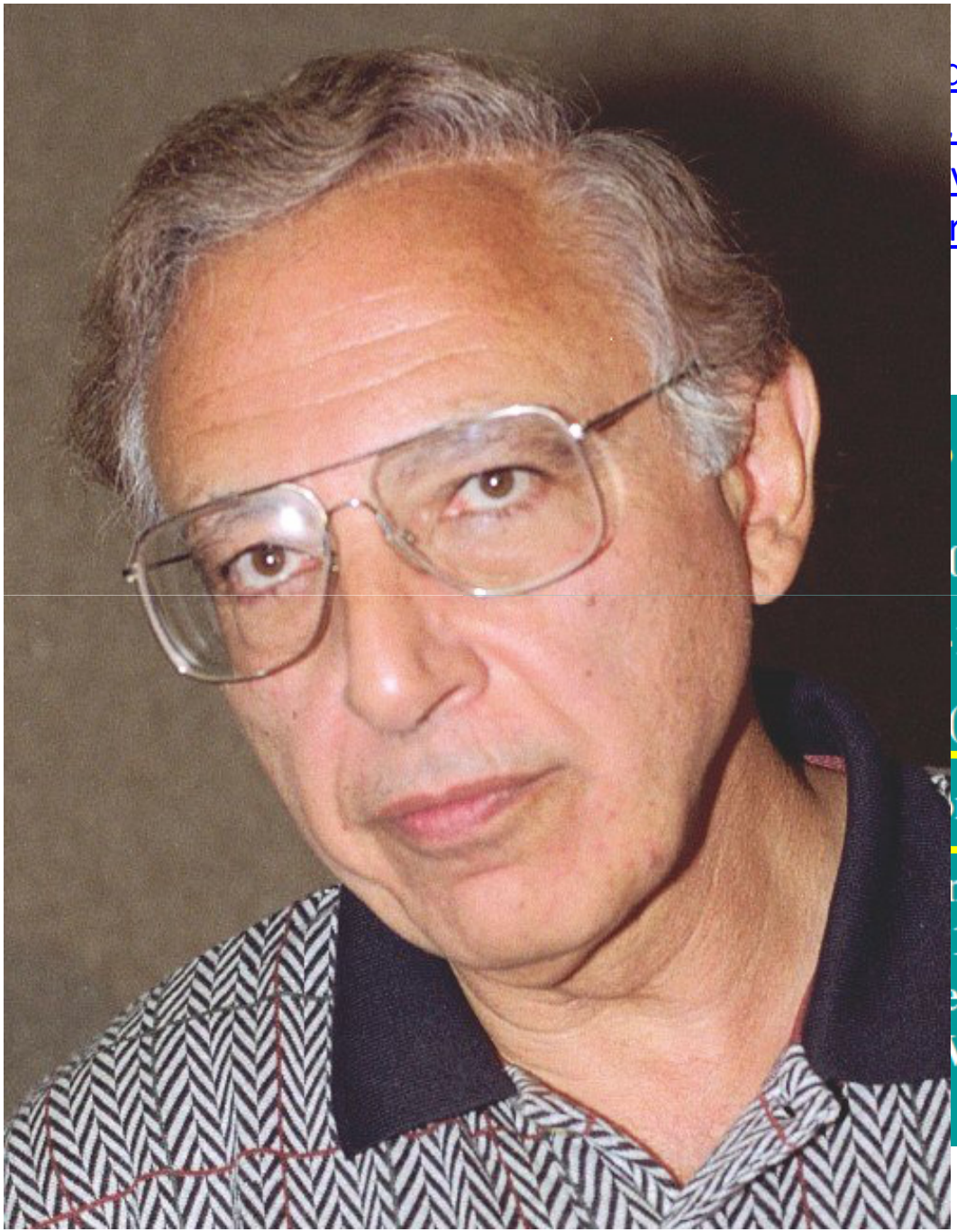
Congresso PBM Bologna 2018

Venerdì 19 ottobre 2018 – Ospedale Maggiore

Cos'è il PBM

Marco Pavesi

SERVIZIO SANITARIO REGIONALE
EMILIA-ROMAGNA
Azienda Unità Sanitaria Locale di Bologna



dico, biologo e
, noto soprattutto per
virus HIV di tipo 1,
r e a Françoise Barré-

of Aids History

0's-1981).

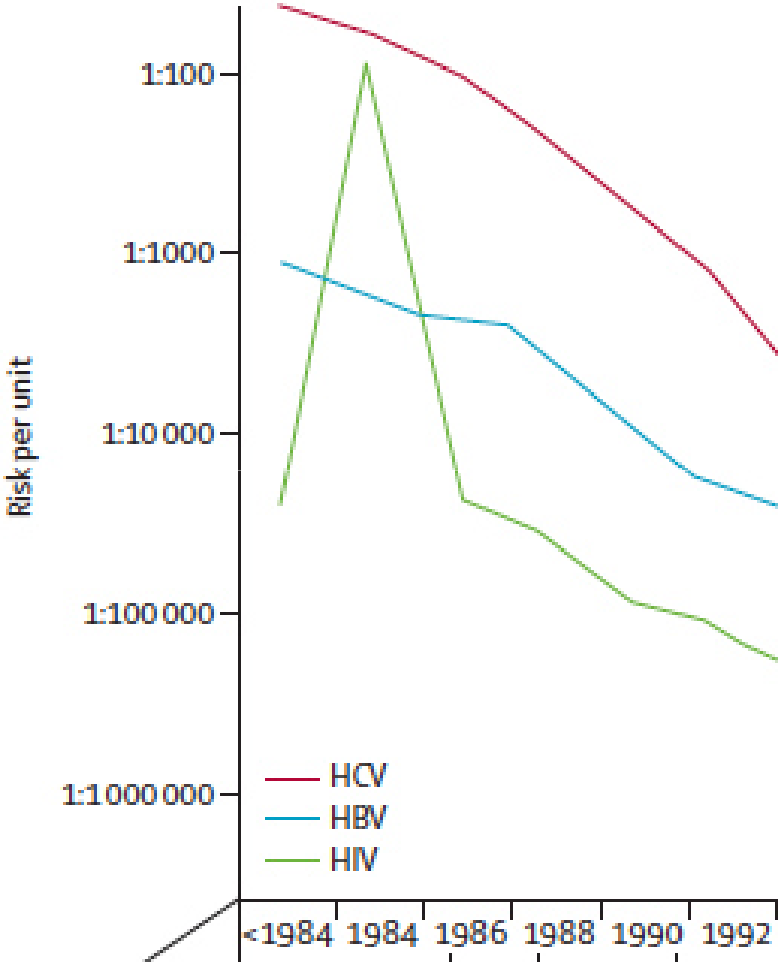
-1982).

(1982-1985).

n (1986-1988).

m by, Blood Testing (1984)
1986)
ent (1986)
Vaccine (? ?)

(From Jonathan Mann, WHO)



The AIDS epidemic has raised the level of apprehension regarding the transmission of infectious disease by transfusion

THE MEDICAL JOURNAL OF AUSTRALIA Vol. 148 March 21, 1988

POINT OF VIEW

The paradigm shift in blood transfusion

James P. Isbister

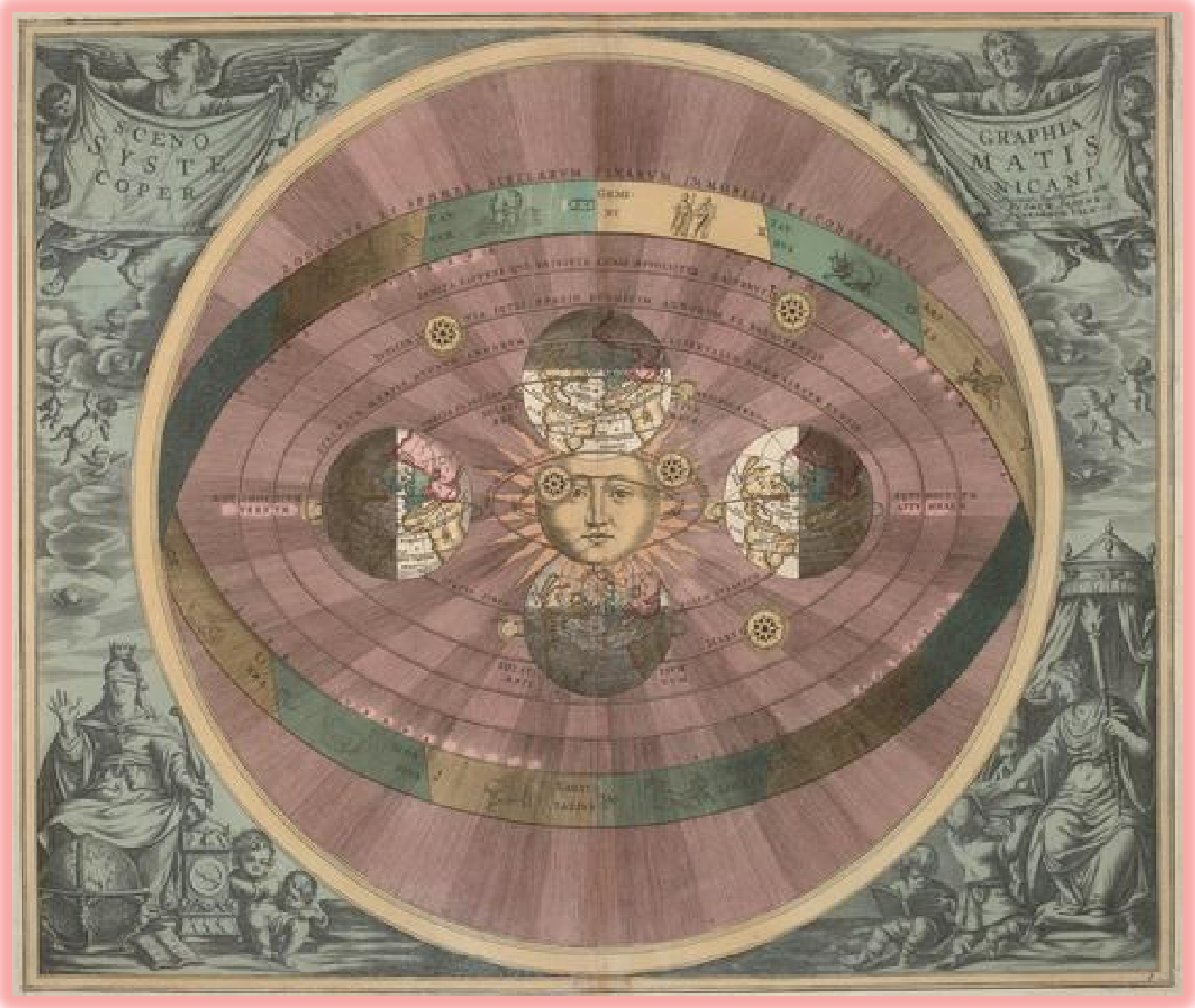
purpose of this paper

assess the effects of AIDS
on transfusion policies and practices

suggest that we are undergoing a major paradigm shift
in clinical blood-transfusion therapy

rather than donor focus

a greater patient focus


SCENO
SYSTE
COPER
GRAPHIA
MATIS
NICANI

Potential risks of blood transfusion

1 infectious agents

Emerging infectious diseases

2 transfusion reactions

3 alloimmunisation

4 medical errors

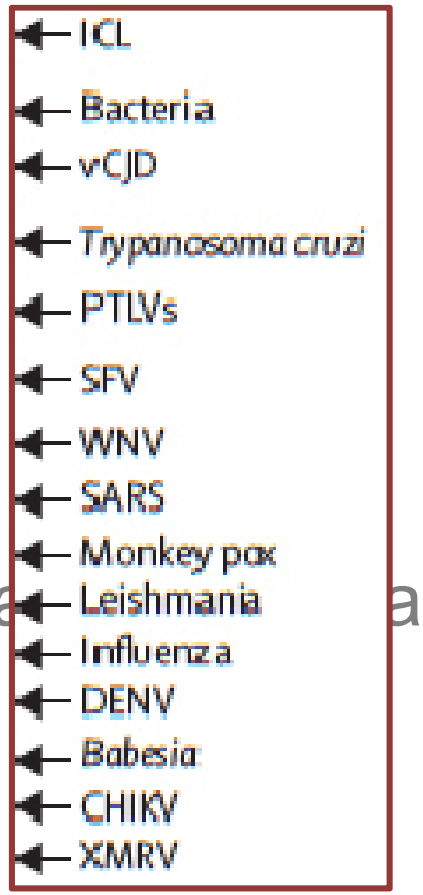
5 transfusion-associated acute

6 transfusion-associated circula ad

7 iron overload

8 immunomodulation

9 storage lesions

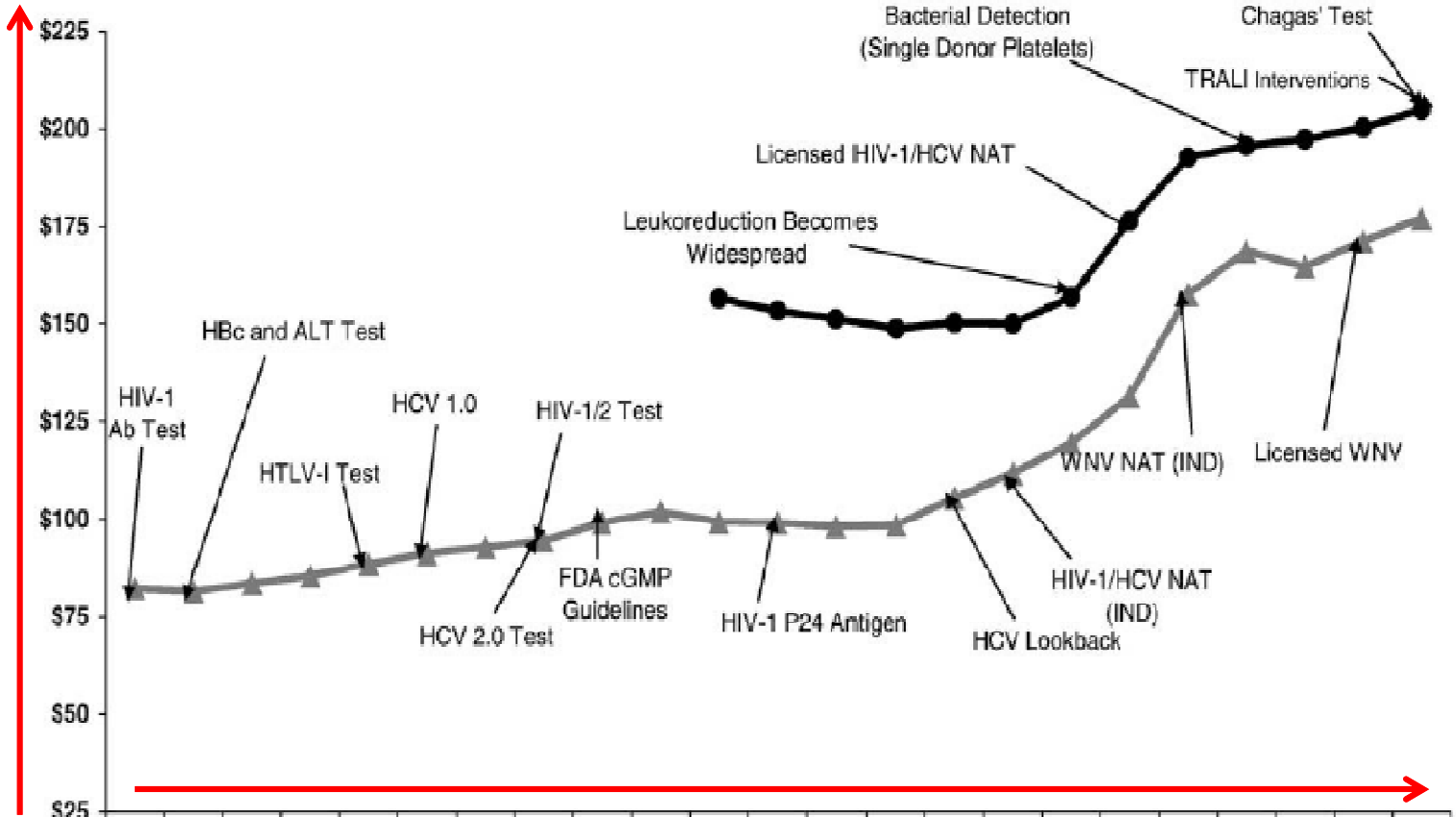


STANFORD
SCHOOL OF MEDICINE
Stanford University Medical Center

Lawrence Tim Goodnough

" The safest blood transfusion is the one not given "

Costi



	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
RBCs	82	82	84	85	89	91	93	95	99	102	99	99	98	99	106	112	119	131	158	169	165	171	177
RBCs, LR											157	153	151	149	150	150	157	176	193	196	197	200	205

Brian Custer and Jeffrey S. Hoch
www.thelancet.com Vol 381 May 25, 2013

Transfusion Medicine Reviews, Vol 23, No 1 (January), 2009: pp 1-12
Lawrence T Goodnough

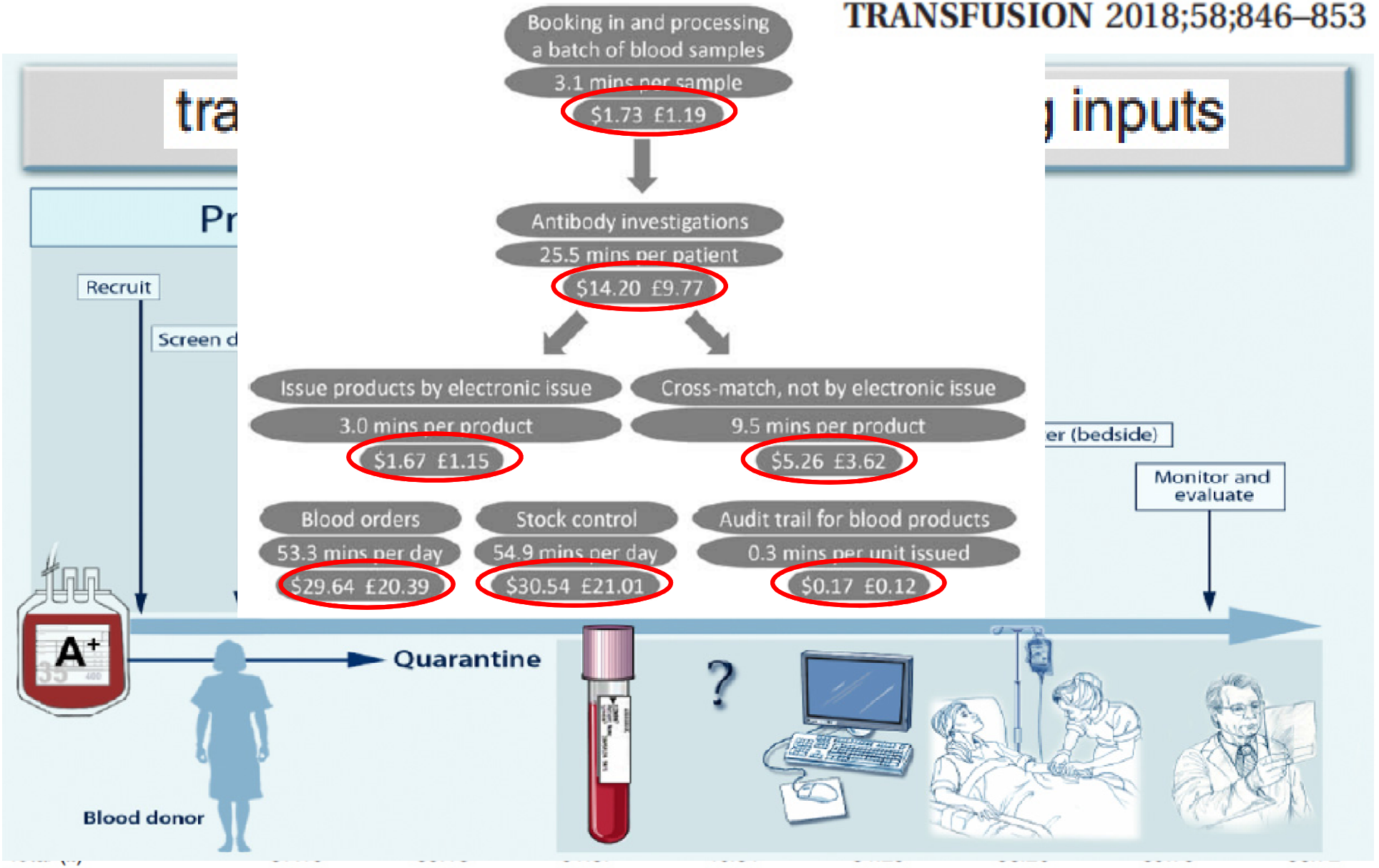
TRANSFUSION 2018;58;846–853

Accurate costs of blood transfusion: a microcosting of administering blood products in the United Kingdom National Health Service

BACKGROUND: In an environment of limited health care resources, it is crucial for health care systems which provide blood transfusion to have accurate and comprehensive information on the costs of transfusion, incorporating not only the costs of blood products, but also their administration.

Elizabeth A. Stokes

TRANSFUSION 2018;58;846–853



Total ($)	83.13	52.51	89.20	58.59	78.87	48.26	86.69	56.28

Elizabeth A. Stokes

TRANSFUSION 2015;55:1082–1089

Increased hospital costs associated with red blood cell transfusion

BACKGROUND: Red blood cell (RBC) transfusion is independently associated in a dose-dependent manner with increased intensive care unit stay, total hospital length of stay, and hospital-acquired complications. Since little is known of the cost of these transfusion-associated adverse outcomes our aim was to determine the total hospital cost associated with RBC transfusion and to assess any dose-dependent relationship.

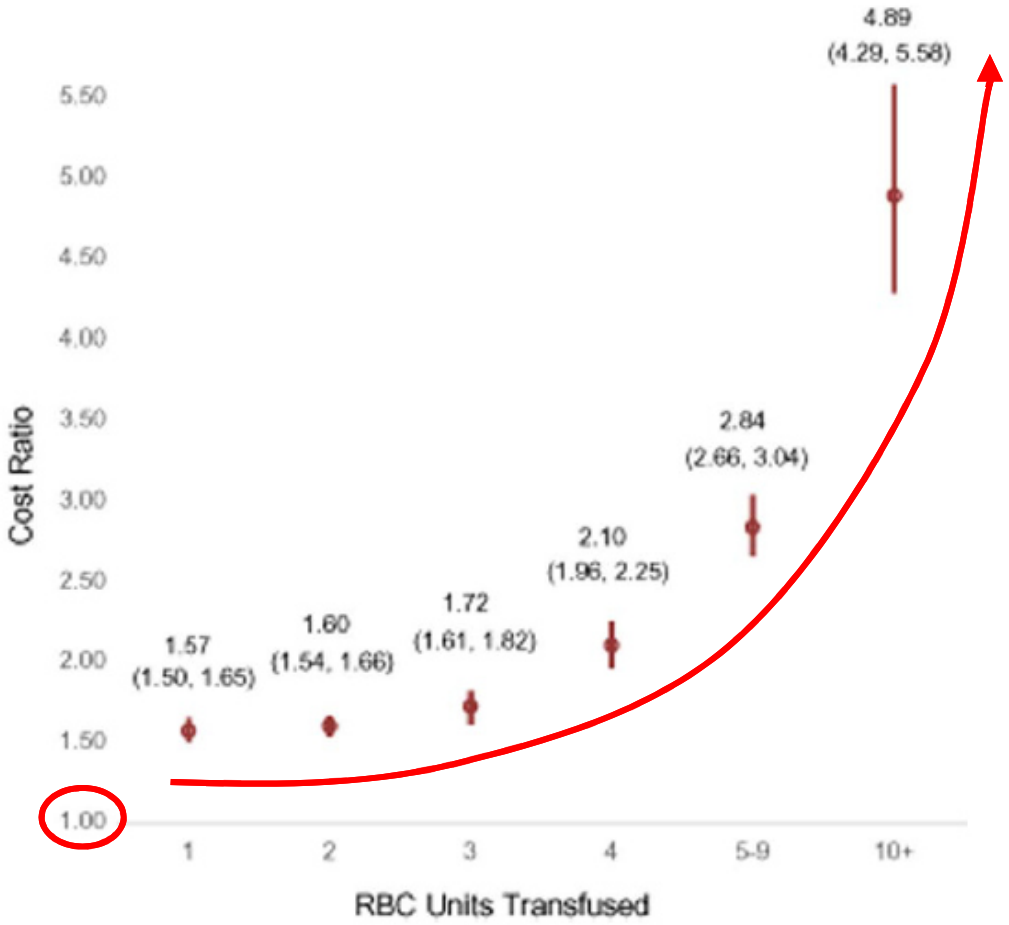
Kevin M. Trentino

TRANSFUSION 2015;55:1082–1089

Top 10 adjusted DRGs with highest volume of acute-care inpatients transfused and adjusted incremental costs associated with RBC transfusion*

Adjusted DRG family	Adjusted cost *without* RBC transfusion	Adjusted cost *with* RBC transfusion
Q61–RBC disorders	2,524 (2,324-2,724)	4,626 (4,278-4,977)
I08–other hip and femur procedures	11,084 (10,590-11,577)	20,322 (19,341-21,302)
G46–complex gastroscopy	5,549 (5,160-5,938)	10,174 (9,452-10,897)
G47–other gastroscopy	4,110 (3,870-4,350)	7,536 (7,074-7,998)
I03–hip replacement	17,542 (16,758-18,327)	32,164 (30,544-33,785)
R61–lymphoma and nonacute leukemia	6,791 (6,173-7,409)	12,452 (11,278-13,625)
G02–major small and large bowel procedures	14,976 (14,012-15,939)	27,457 (25,553-29,361)
Q60–reticuloendothelial and immunity disorders	5,881 (5,347-6,415)	10,783 (9,787-11,779
G61–GI hemorrhage	2,687 (2,515-2,859)	4,927 (4,595-5,260)
R60–acute leukemia	11,256 (9,193-13,320)	20,639 (16,860-24,417)

TRANSFUSION 2015;55:1082–1089



Cost ratios (95% CIs) of hospital costs associated with number of RBC units transfused. The reference group was inpatients not transfused any RBC units. Data have been adjusted for hospital type, patient age, sex, admission type, discharge type, adjusted DRG, and adjusted CCI.

Kevin M. Trentino

STANFORD
SCHOOL OF MEDICINE
Stanford University Medical Center

Lawrence Tim Goodnough

" The ~~safest~~ cheapest blood transfusion is the one not given "

TRANSFUSION 2010;50:742-744.

The cost of blood: did you pay too much or did you get a good deal?

To no surprise, restrictive triggers lead to reduced overall transfusion costs because fewer units are transfused.[20]

Brian Custer

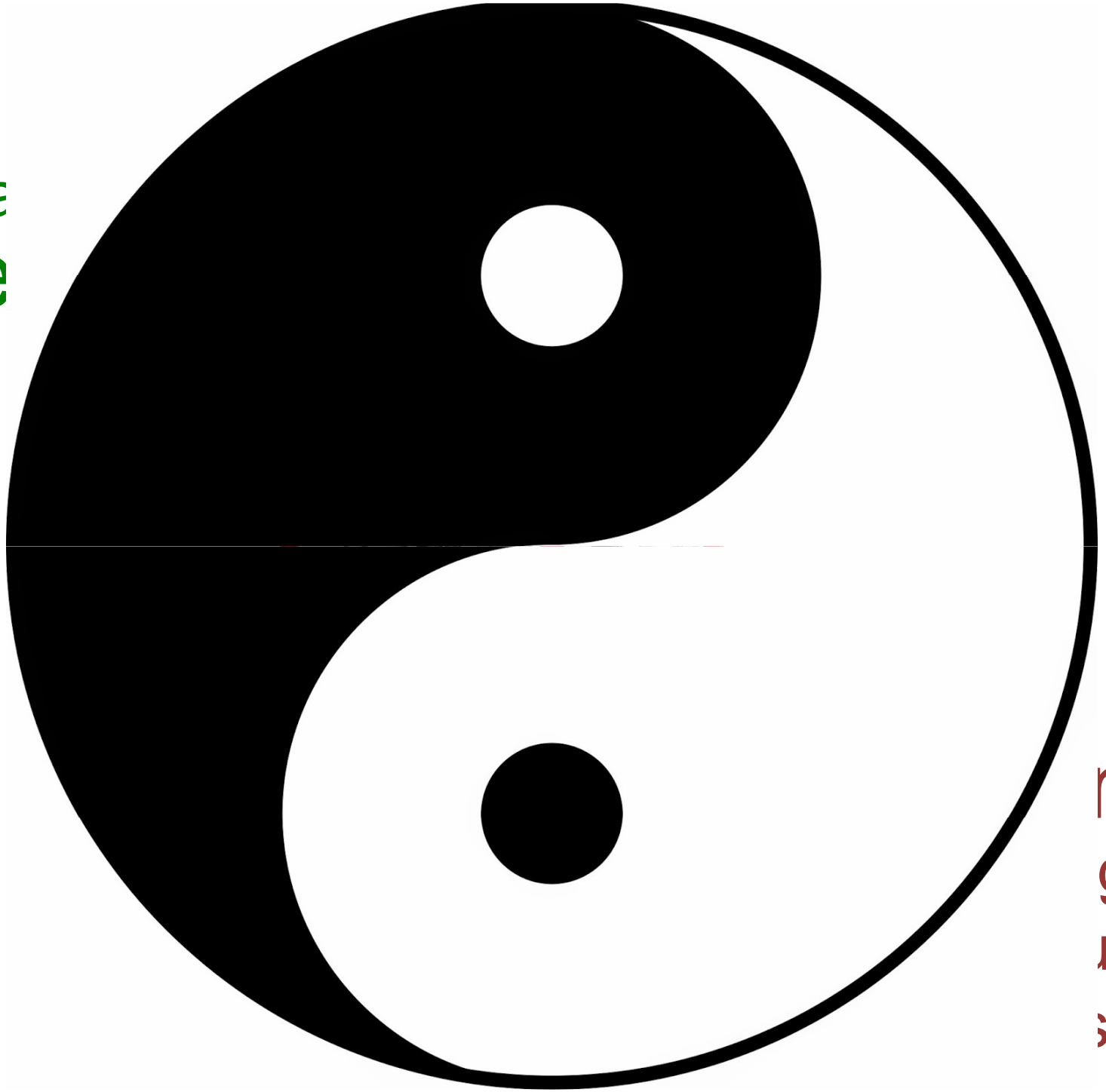
British Journal of Anaesthesia **107** (S1): i41–i59 (2011)

What is really dangerous: anaemia or transfusion?

both anaemia and transfusion are associated with organ injury and increased morbidity and mortality across a wide span of disease states and surgical interventions. Further characterization of the mechanisms of injury is needed to appropriately balance these risks and to develop novel treatment strategies that will improve patient outcomes.

A. Shander

in
tollera
life



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J Thorac Cardiovasc Surg 2012;144:538-46

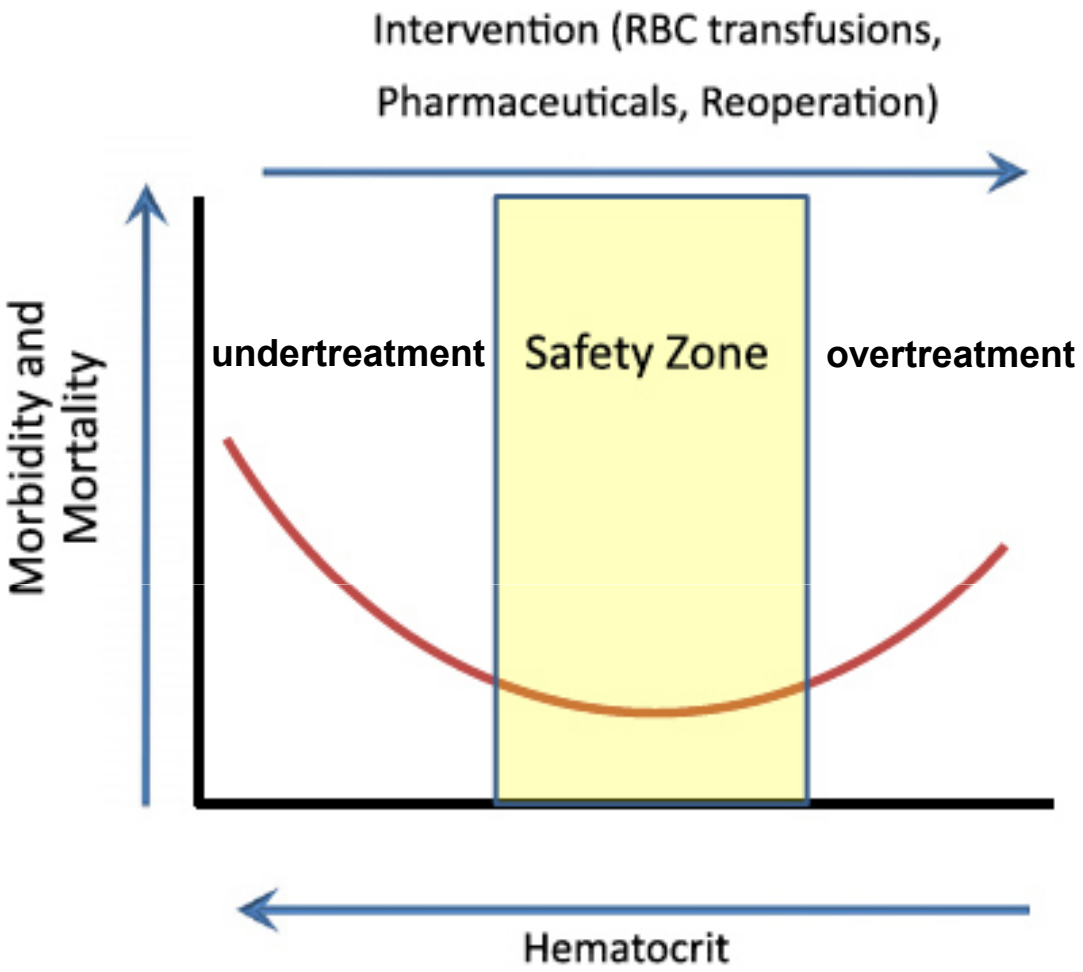


FIGURE 4. Pictorial representation of a U-shaped relationship that exists between adverse events related to degree of anemia on the left and degree of intervention on the right. The "safety zone" at the bottom of the curve reflects a balance between tolerable anemia and interventions to correct anemia. *RBC*, Red blood cell.

Gabriel Loor

TRANSFUSION 2014;54:2595-2597

Tolerating anemia: taking aim at the right target before pulling the transfusion trigger

deciding when to give blood

Colleen G. Koch,

Anesthesiology 2015; 122:241–75

Practice Guidelines for Perioperative Blood Management

*An Updated Report by the American Society of Anesthesiologists Task Force on Perioperative Blood Management**

Anaesthesia 2016, 71, 829–842

AAGBI guidelines: the use of blood components and their alternatives 2016

JAMA Published online October 12, 2016

Clinical Practice Guidelines From the AABB Red Blood Cell Transfusion Thresholds and Storage

Eur J Anaesthesiol 2017; **34:**332–395

Management of severe perioperative bleeding: guidelines from the European Society of Anaesthesiology

Journal of Cardiothoracic and Vascular Anesthesia 32 (2018) 88–120

2017 EACTS/EACTA Guidelines on patient blood management for adult cardiac surgery

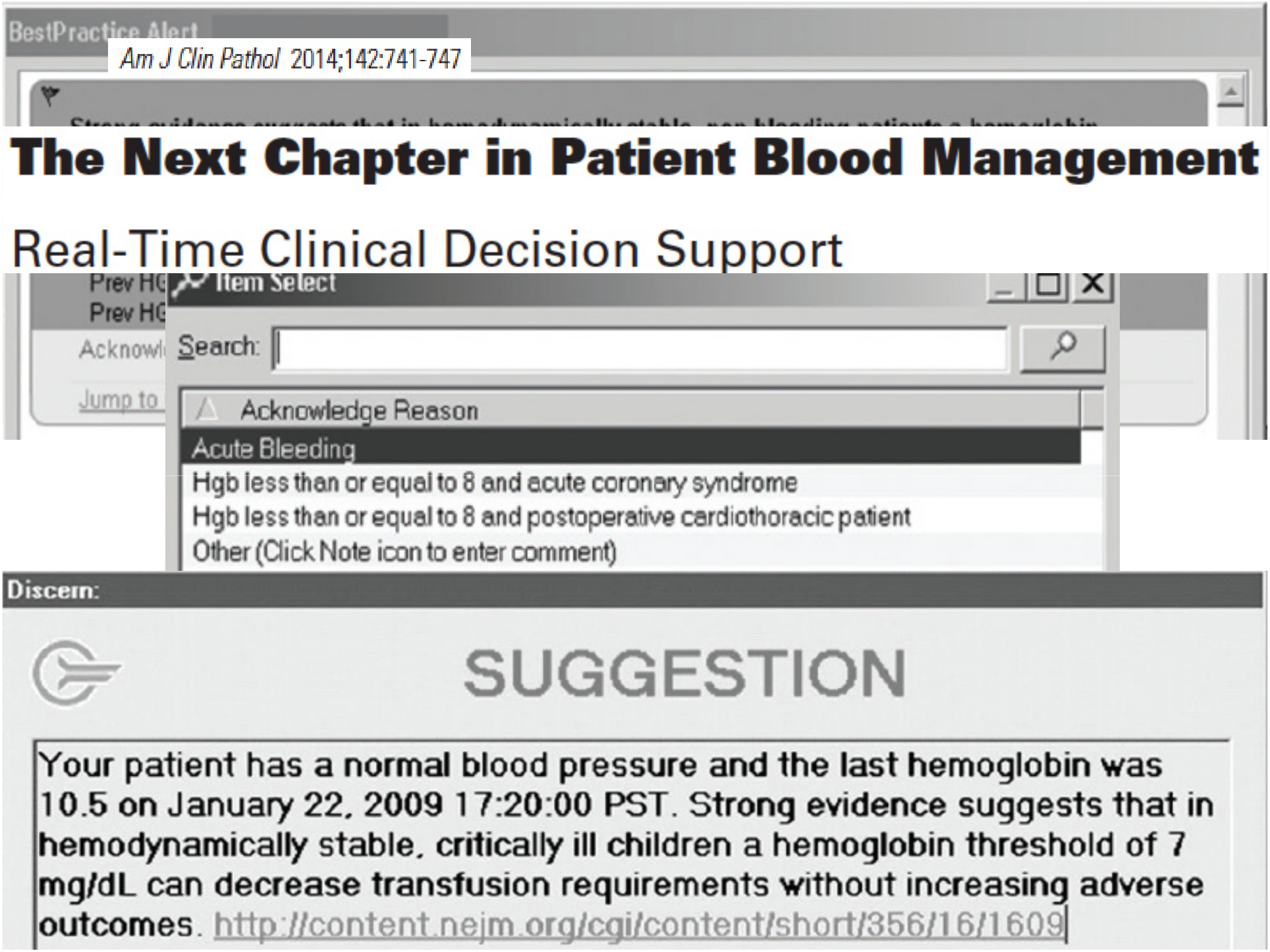
LINEE GUIDA

- **consigliabile l'adozione di un regime trasfusionale restrittivo**
  < 7 g/dl con un target post-trasfusionale compreso tra 7-9 g/dl

- **pazienti con infarto miocardico acuto e ischemia cerebrovascolare**
  e' appropriata l'adozione di un **trigger trasfusionale a 8 g/dl**
  con un **target post-trasfusionale compreso tra 8-10 g/dl**

- **il trigger point deve essere integrato da una valutazione clinica**
  (adeguatezza della riserva cardiopolmonare), del suo stato di normovolemia, dal sanguinamento, dal monitoraggio della perfusione, ossigenazione tessutale, valore dei lattati , del difetto di basi e , se possibile della SVO_2

- **se indicazione alla trasfusione**
  somministrare **una unita' alla volta** e procedere a **valutazione del livello di Hb post-trasfusionale** raggiunto per considerare eventuale ulteriore indicazione


BestPractice Alert
Am J Clin Pathol 2014;142:741-747
The Next Chapter in Patient Blood Management
Real-Time Clinical Decision Support
Item Select
Search:
Acknowledge Reason
Acute Bleeding
Hgb less than or equal to 8 and acute coronary syndrome
Hgb less than or equal to 8 and postoperative cardiothoracic patient
Other (Click Note icon to enter comment)
Discern:
SUGGESTION
Your patient has a normal blood pressure and the last hemoglobin was 10.5 on January 22, 2009 17:20:00 PST. Strong evidence suggests that in hemodynamically stable, critically ill children a hemoglobin threshold of 7 mg/dL can decrease transfusion requirements without increasing adverse outcomes. http://content.nejm.org/cgi/content/short/356/16/1609

Am J Clin Pathol 2014;142:741-747

The Next Chapter in Patient Blood Management

Real-Time Clinical Decision Support

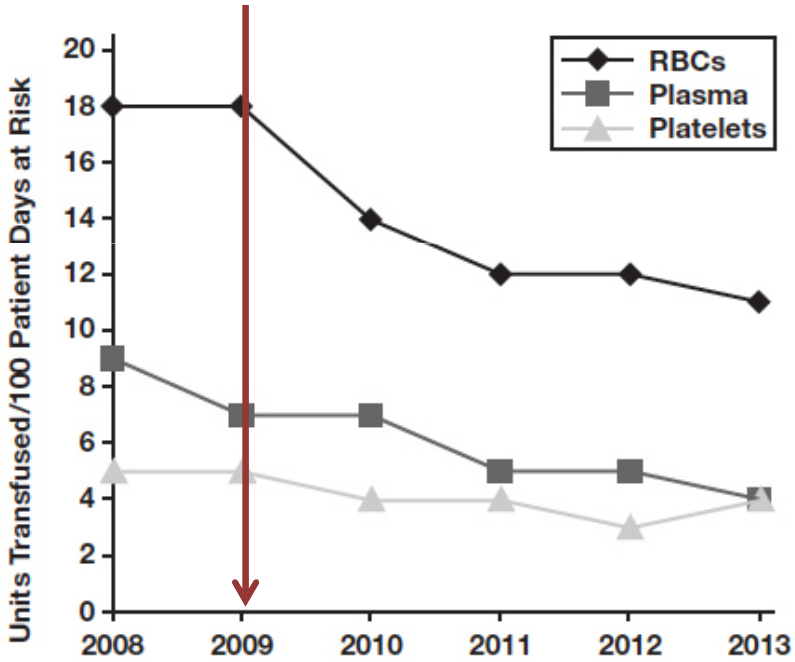


Figure 2 Blood components issued to patients at Stanford Hospital and Clinics. Transfusion of RBCs decreased by 24% from 2008 through 2013.

Key SHOT messages

working with
SERIOUS HAZARDS OF TRANSFUSION
Affiliated to the Royal College of Pathologists
SHOT

Favorire una cultura che rafforzi
il **senso di responsabilità** basato

sulla **conoscenza** dei concetti che regolano
il riconoscimento di una condizione di
indicazione trasfusionale appropriata

sul **rispetto** delle evidenze riportate
nelle **linee guida** e nei **protocolli proposti**

Approvvigionamento

TRANSFUSION Volume 47, August 2007 Supplement

Unlocking the essentials of effective blood inventory management

recipient

patient demand affects how many donors may be called

donor

Judith Chapman

TRANSFUSION Volume 47, August 2007 Supplement

Unlocking the essentials of effective blood inventory management

Shortages occur
when supply does not meet demand

recipient

donors

Judith Chapman

CENTRO NAZIONALE SANGUE

ISTITUTO SUPERIORE DI SANITÀ

Ministero della Salute

Autosufficienza legge 21 ottobre 2005, n. 219,

Obiettivo strategico
necessario per coprire
il fabbisogno di sangue
e suoi componenti
sia in condizioni di normalità
che di criticità

CENTRO NAZIONALE SANGUE

ISTITUTO SUPERIORE DI SANITÀ

Ministero della Salute

Autosufficienza legge 21 ottobre 2005, n. 219,

Ogni anno viene presentato un
Programma di Autosufficienza Nazionale
che attraverso la valutazione
dei consumi e dei fabbisogni
dell'anno precedente definisce
i livelli di produzione e le risorse necessarie

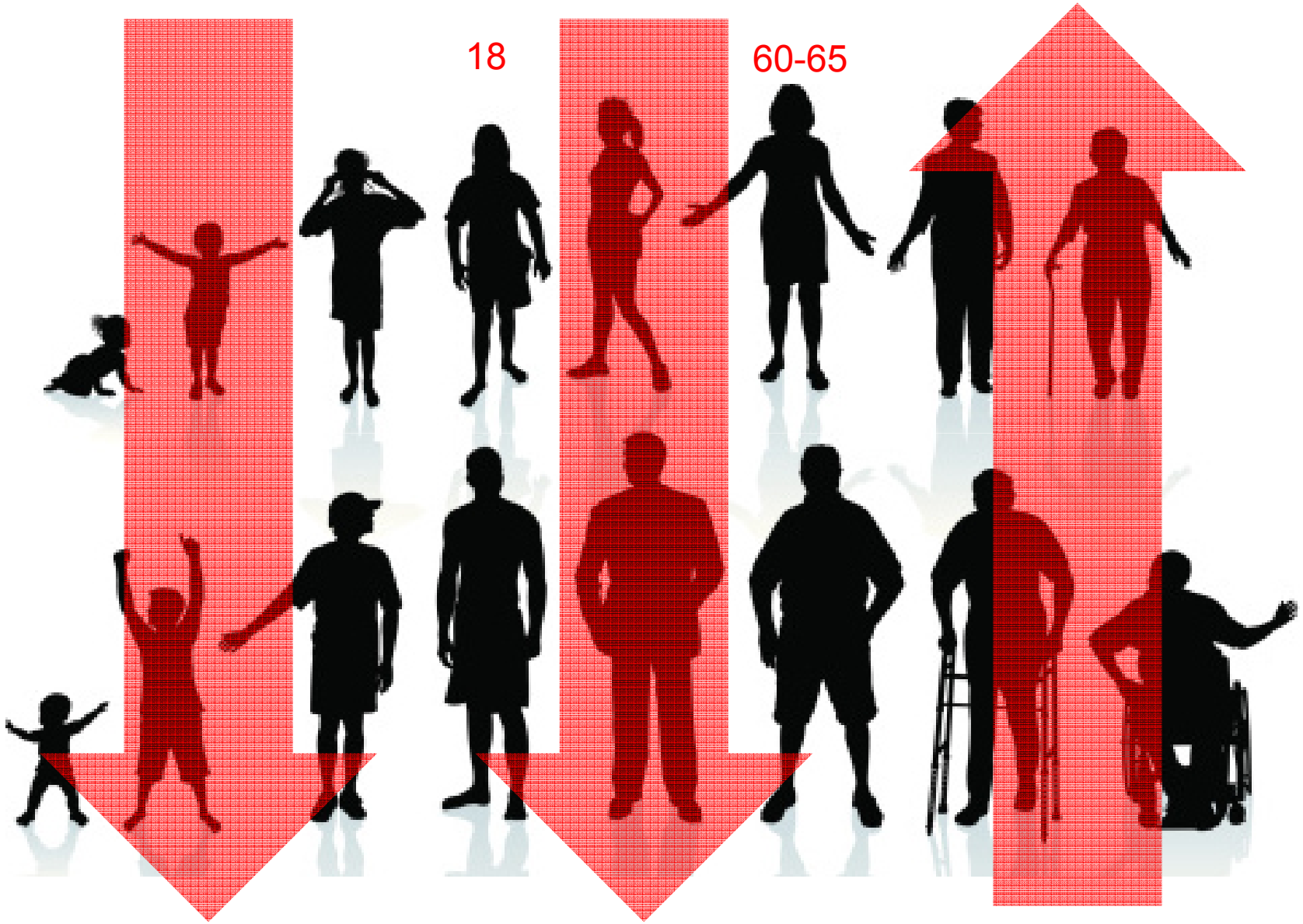
L'**autosufficienza** è garantita
dai donatori volontari

Programma di Autosufficienza 2016	2016 Produzione	2016 Consumo	2016 - IP
Valle d'Aosta	5.506	4.568	1,21
Piemonte	213.056	183.392	1,16
Liguria	71.117**	72.535	0,98
Lombardia	472.820	460.978	1,03
Prov. Auton. di Trento	24.843	19.726	1,26
Prov. Auton. di Bolzano	21.320	20.007	1,07
Friuli V Giulia	60.777	52.544	1,16
Veneto	253.983	243.591	1,04
Emilia-Romagna	213.347	210.802	1,01
Toscana	159.599	163.825	0,97
Umbria	41.444	42.417	0,98
Marche	75.437	75.303	1,00
Lazio	188.280	216.420	0,87
Sardegna	82.287	111.680	0,74
Abruzzo	54.153	55.119	0,98
Campania	169.917	168.040	1,01
Molise	16.012	15.797	1,01
Puglia	156.912	158.234	0,99
Basilicata	23.539	24.715	0,95
Calabria	69.435	69.239	1,00
Sicilia	197.252	198.544	0,99
S.T. Forze Armate	1.521	926	1,64

Indice di Performance (IP)

$$\frac{\text{Produzione}}{\text{Consumo}} \geq 1$$

Indice di performance = 1



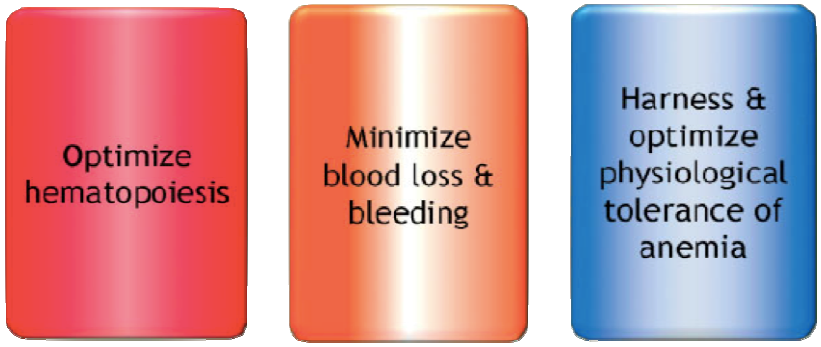
Chi utilizza il sangue

dai reparti di emergenza
(Pronto Soccorso e rianimazioni)

dai reparti di chirurgia
(Interventi chirurgici all'addome.
all'apparato cardiovascolare.
ortopedici, ai bambini,
durante il parto)

per pazienti oncologici
e per l'assistenza ad anziani
e bambini con malattie croniche

TRANSFUSION Volume 47, August 2007 Supplement



PBM could reduce blood demand

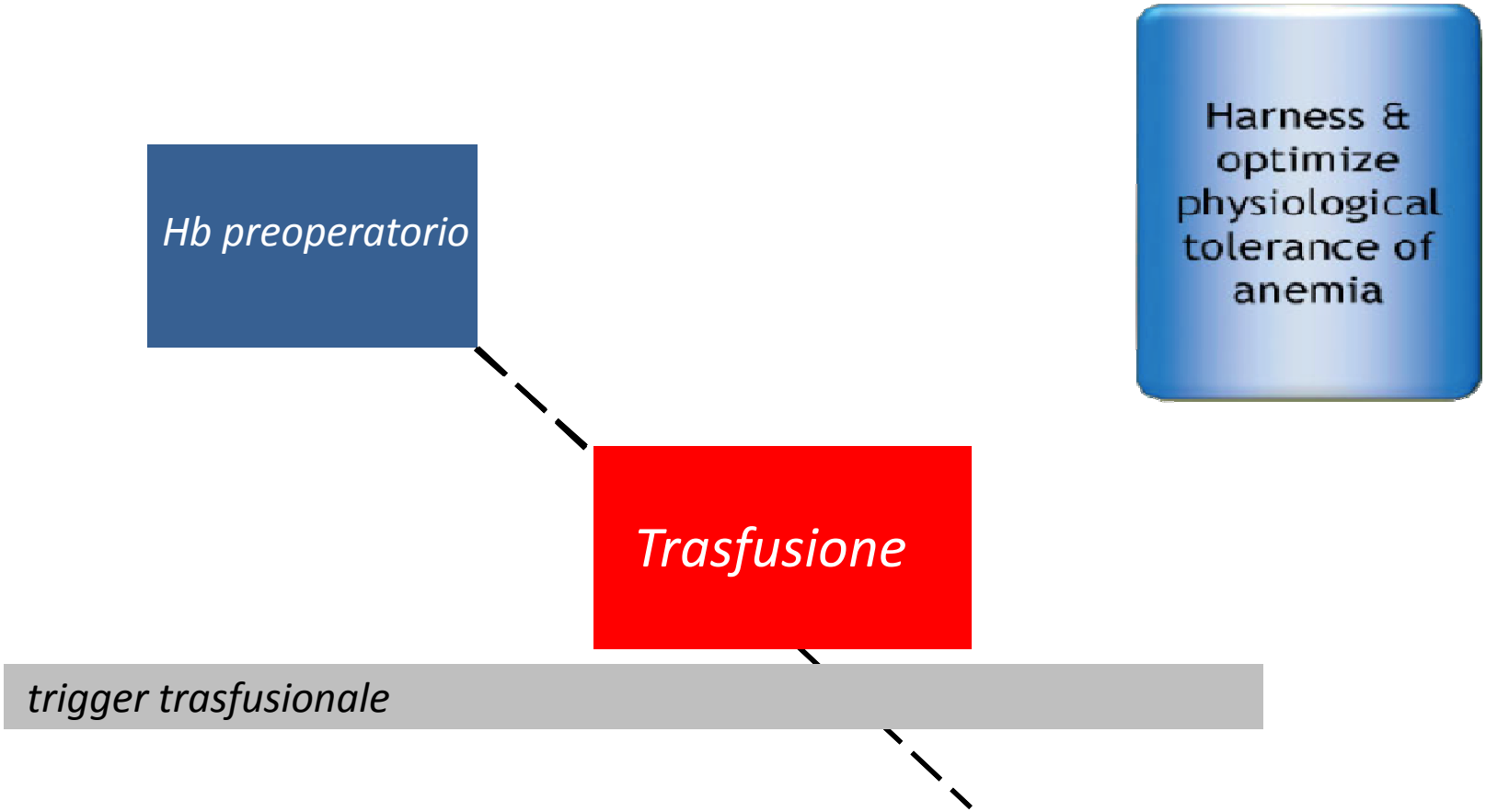
Indice di Performance (IP) **> 1**

demand lowering may increase availability of blood despite donors reduction

recipient

donor

Appropriatezza e adeguatezza trasfusionale



Appropriatezza trasfusionale
una scelta motivata da un criterio funzionale

$$DO_2 = VO_2$$

Adeguatezza trasfusionale
una scelta motivata da un criterio di corrispondenza alle necessità

$DO_2 = VO_2$

$DO_2 = CaO_2 \times CO$

1g Hb = 1,38 ml O_2

a riposo

VO_2 250-300 ml/min

Hb = 6 g/100 ml

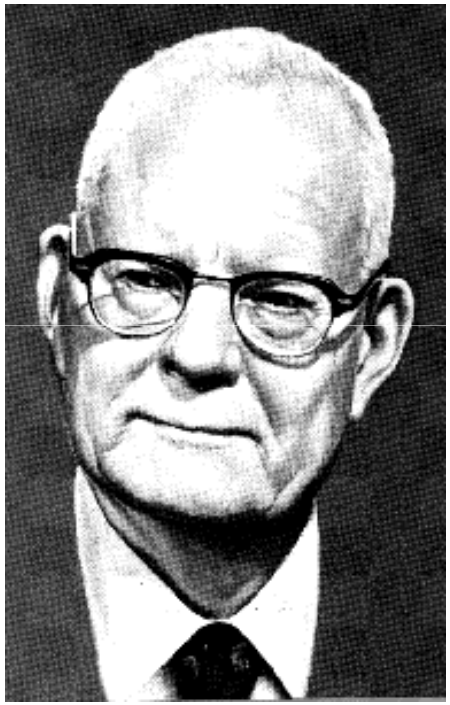
100 ml sangue : 8,3 ml O_2

Vol. ematico 5.000 ml

414 ml O_2

Previsione del fabbisogno
data-driven approach

was an American
statistician, professor,
author, lecturer,
and consultant



William Edwards Deming

“In God we Trust, all others bring data”

‘data-driven decision making’

“Deming’s *PDAC* cycle”

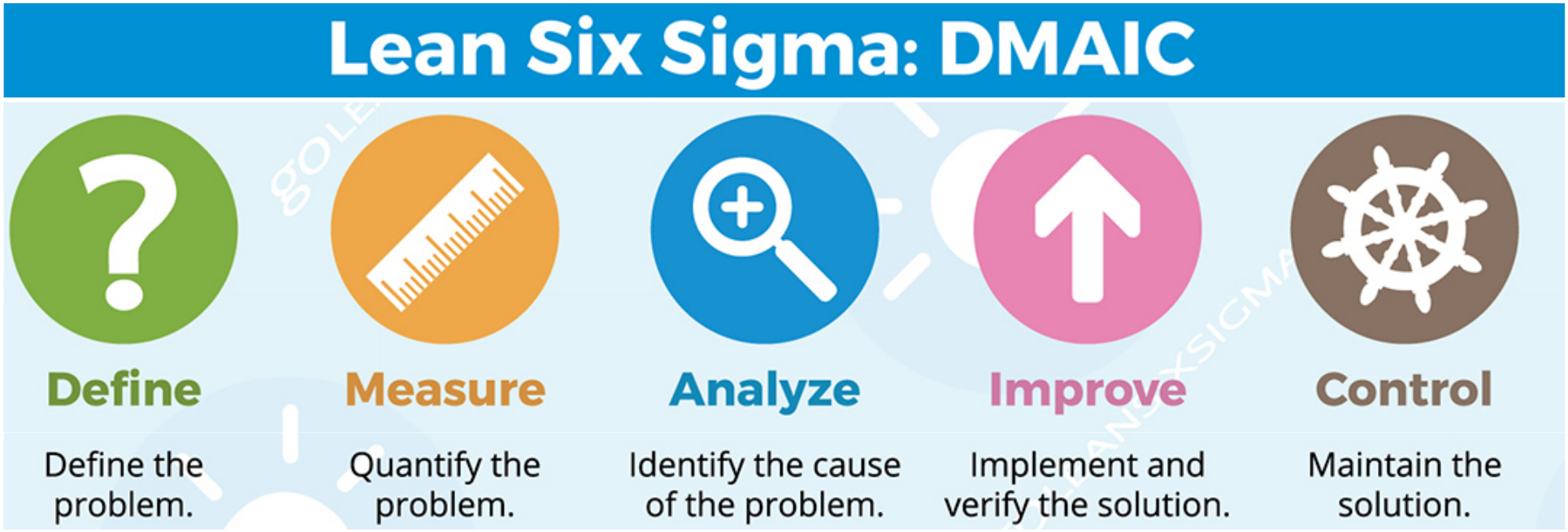
creare un modello scientifico
formulando delle ipotesi
valutandole e analizzandole

stabilire degli obiettivi
come raggiungerli
creare una ipotesi
e una previsione

Implementare quanto pianificato
fare in modo che si realizzi
testare la propria ipotesi

rilevare le cause che
giustificano risultati
inattesi o imprevisti
che hanno determinato
la differenza tra risultati
ottenuti e risultati pianificati

misurare per verificare
valutare quanto succede
e fare l’analisi

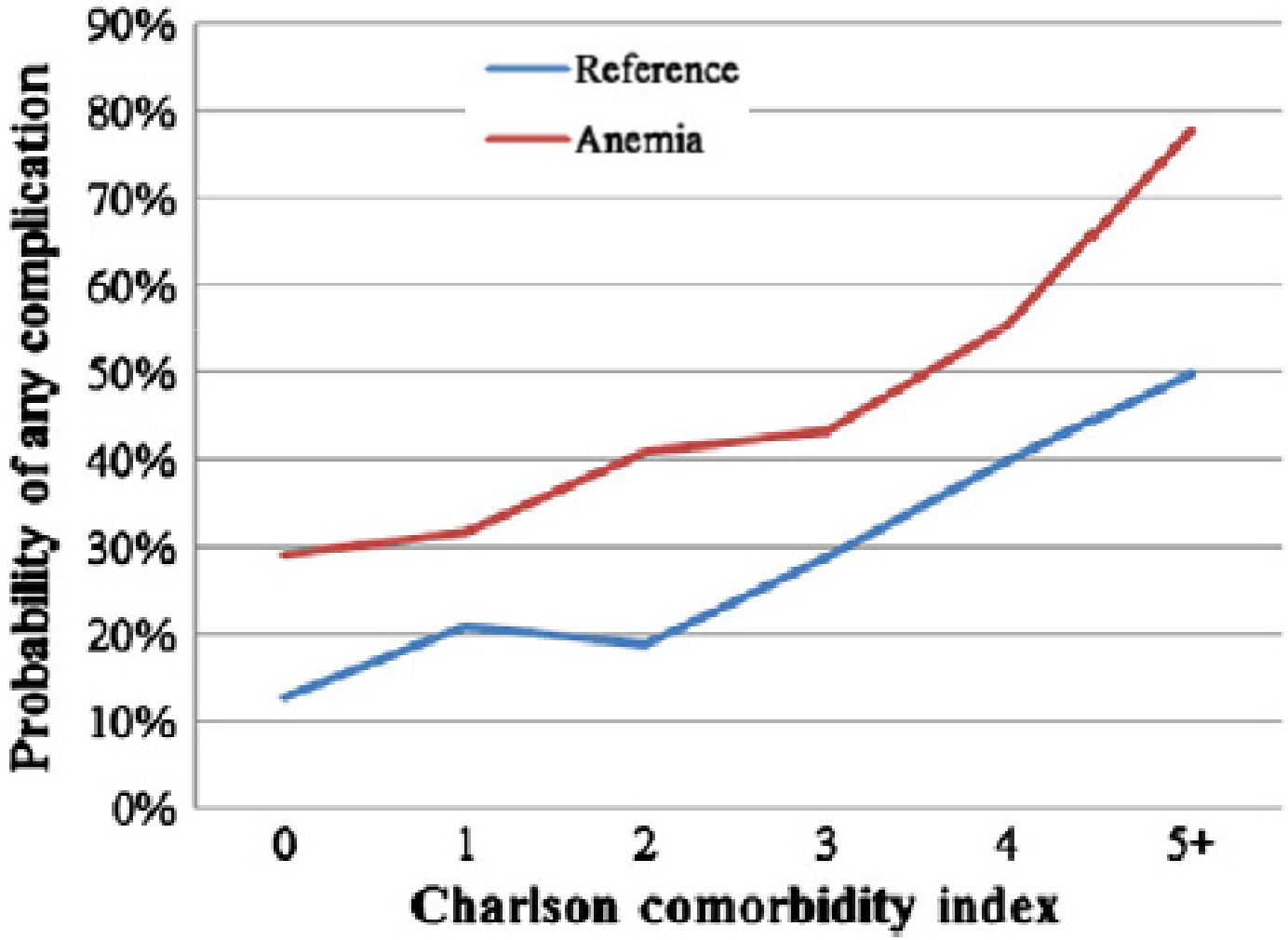


Fattori di rischio prevedibili ed evitabili

The Journal of Arthroplasty 30 (2015) 846–848

Preoperative Anemia Increases Postoperative Complications and Mortality Following Total Joint Arthroplasty

Jessica Viola, BS,



Modifying risks to improve outcome in cardiac surgery: An anesthesiologist's perspective

Annals of Cardiac Anaesthesia

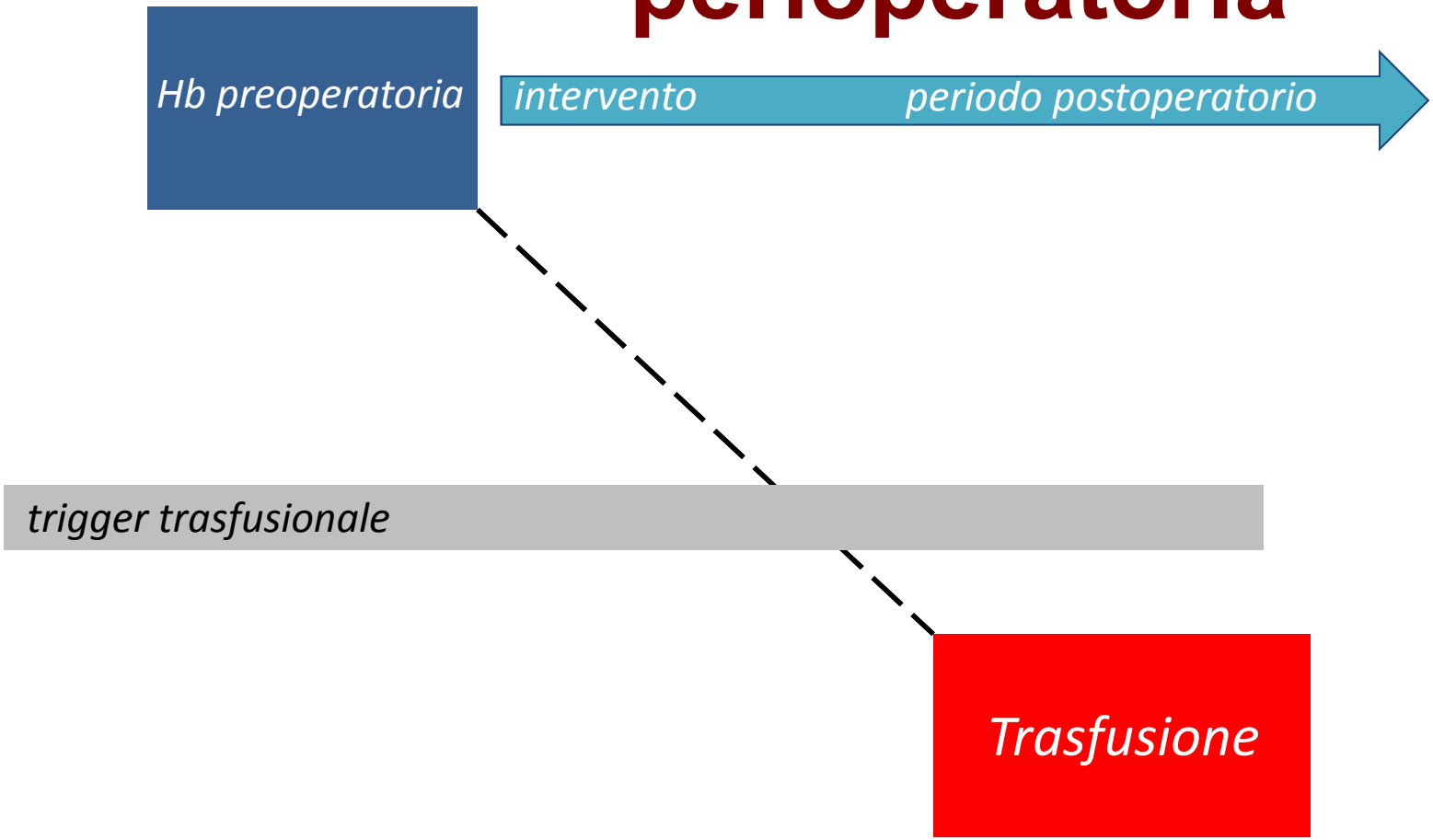
Nonmodifiable factors	Modifiable factors
Age	LV dysfunction/congestive heart failure
Sex	Control of diabetes
Race	Control of hypertension
Prior myocardial infarction	Alleviation of renal dysfunction
Prior cardiac surgery	Managing atherosclerosis
Emergent surgery	Smoking cessation
Combined procedure	Anemia
CABG surgery for left main disease	
Obesity	

CABG: Coronary artery bypass graft, LV: Left ventricular

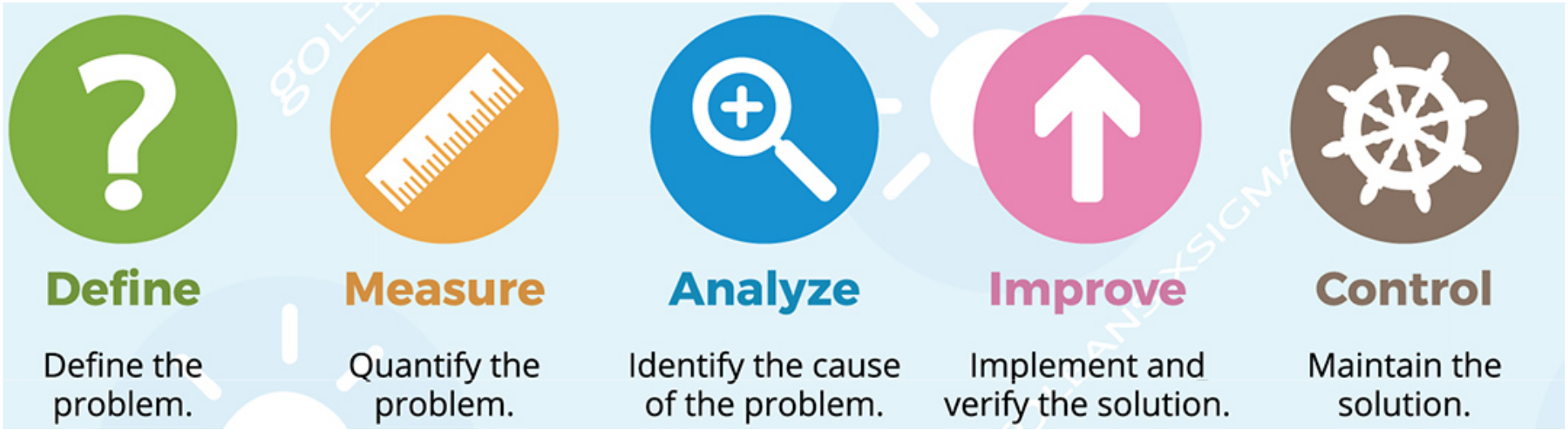
The modifiable and nonmodifiable risk factors

Chakravarthy M - Ann Card Anaesth. 2017

anemia perioperatoria



Lean Six Sigma: DMAIC



lo storico dell'Hb drift rappresenta la base di riferimento per la preparazione del paziente

contenimento delle perdite

le perdite devono essere note

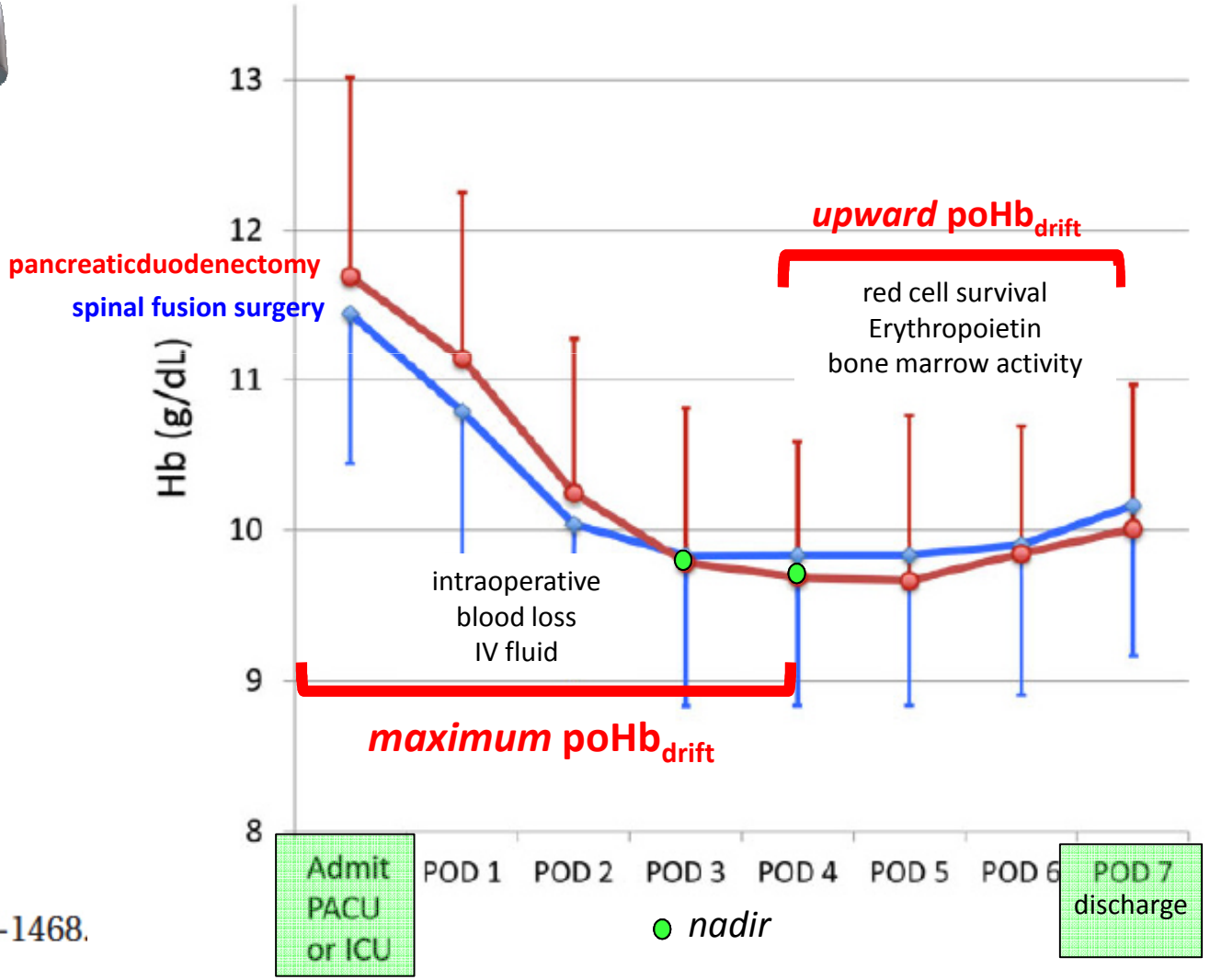
preoperative Hb

trasfusion trigger

Trasfusion

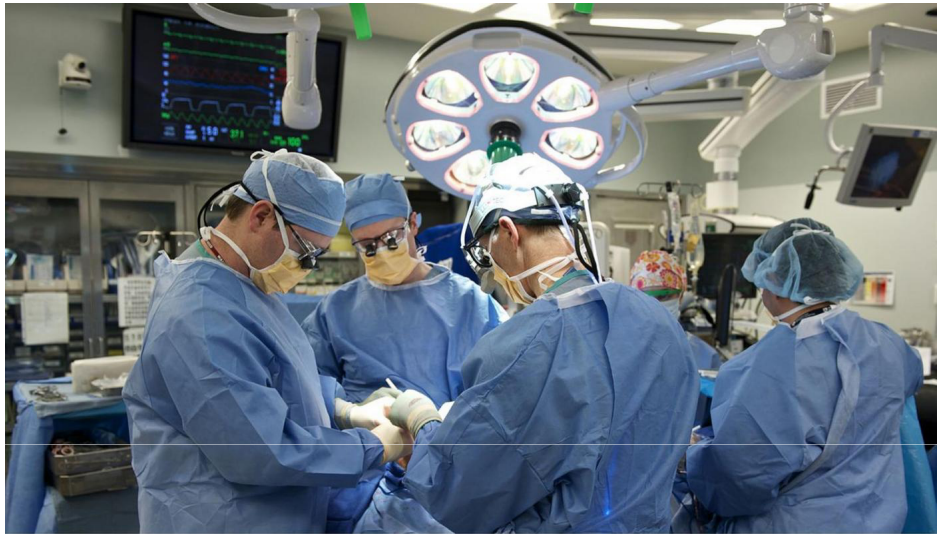
minimizzazione delle perdite

è necessario individuare
le modalità con cui avvengono
per minimizzarle



TRANSFUSION 2014;54:1460-1468.
Michael C. Grant

coinvolgimento chirurgico



tecniche chirurgiche minimamente invasive

attenta ed accurata emostasi

emostatici locali

coinvolgimento anestesiologico

tecniche anestesiologiche

ipotensione controllata

antifibrinolitici

BJA British Journal of Anaesthesia

Intraoperative fluids and postoperative haemoglobin

Br J Anaesth 2015; 115: 15–24

we believe it is important to highlight that a proportion of post-operative transfusions are potentially related to large-volume intraoperative crystalloid infusion and that anaesthetists should be aware of this.

Gestione appropriata dei liquidi infusi

Svezzamento rapido dai liquidi parenterali

A. Cumberworth* and J. Cumberworth

Strategie di risparmio del sangue

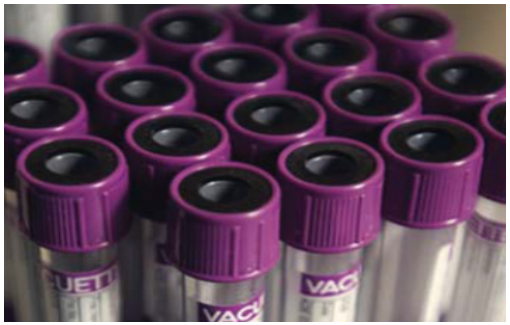
minimizzazione delle perdite iatrogene

Monitoraggio [Hb] continuo e non-invasivo

circa 0,25 ml/Kg/die –
prelievi ematici 70 ml/die
500 ml di sangue/settimana

Corwin HL .Chest 1995;108(3):767-771

Monitoraggio arterioso “close-system” con lettura diretta dei dati

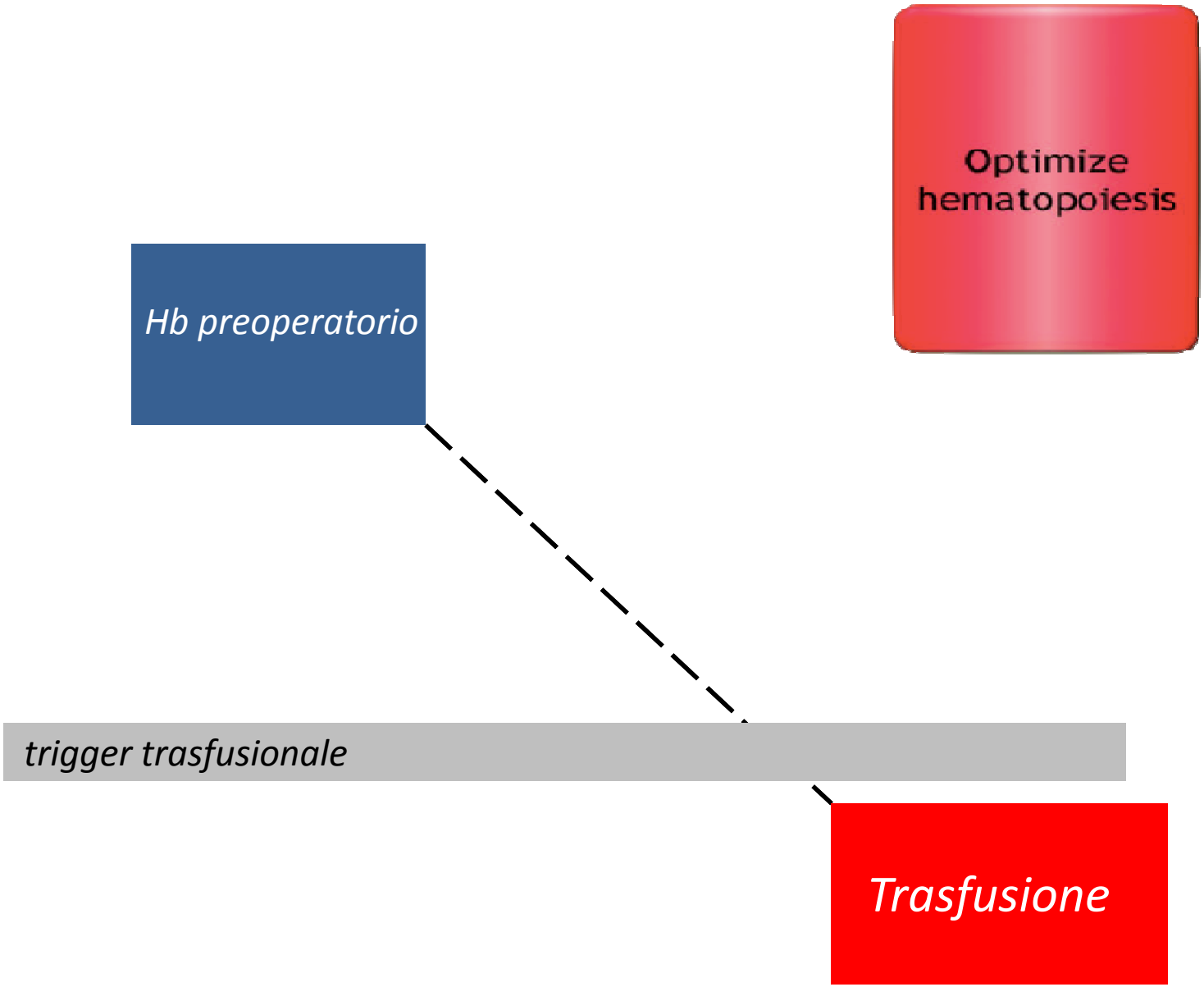


Provette per test ematici a basso contenuto

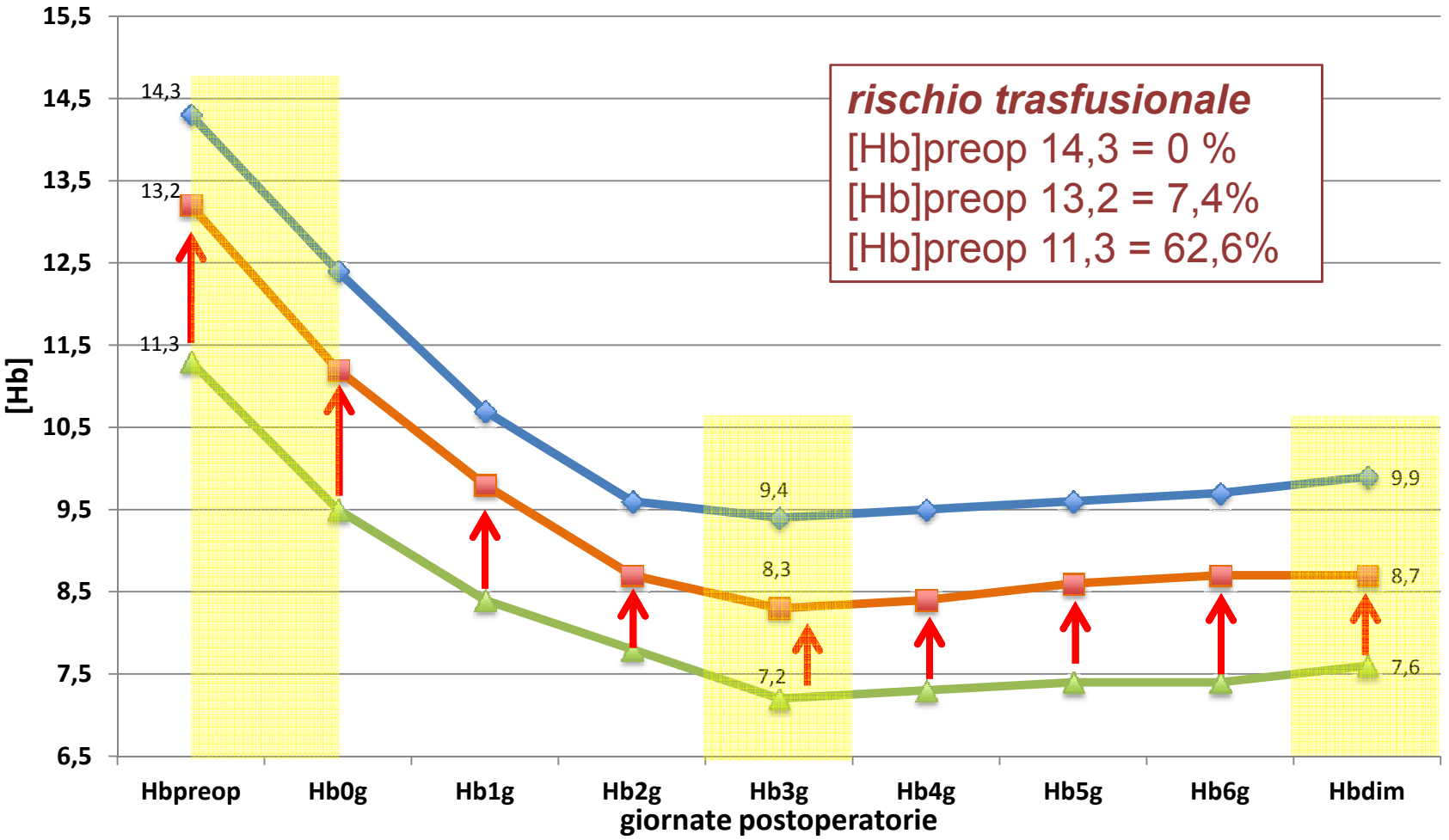
ogni 50 ml di sangue aumenta del 18% il rischio di anemia da moderata a severa

Salisbury AC . Arch Intern Med 2011; 171(18):1646-1653

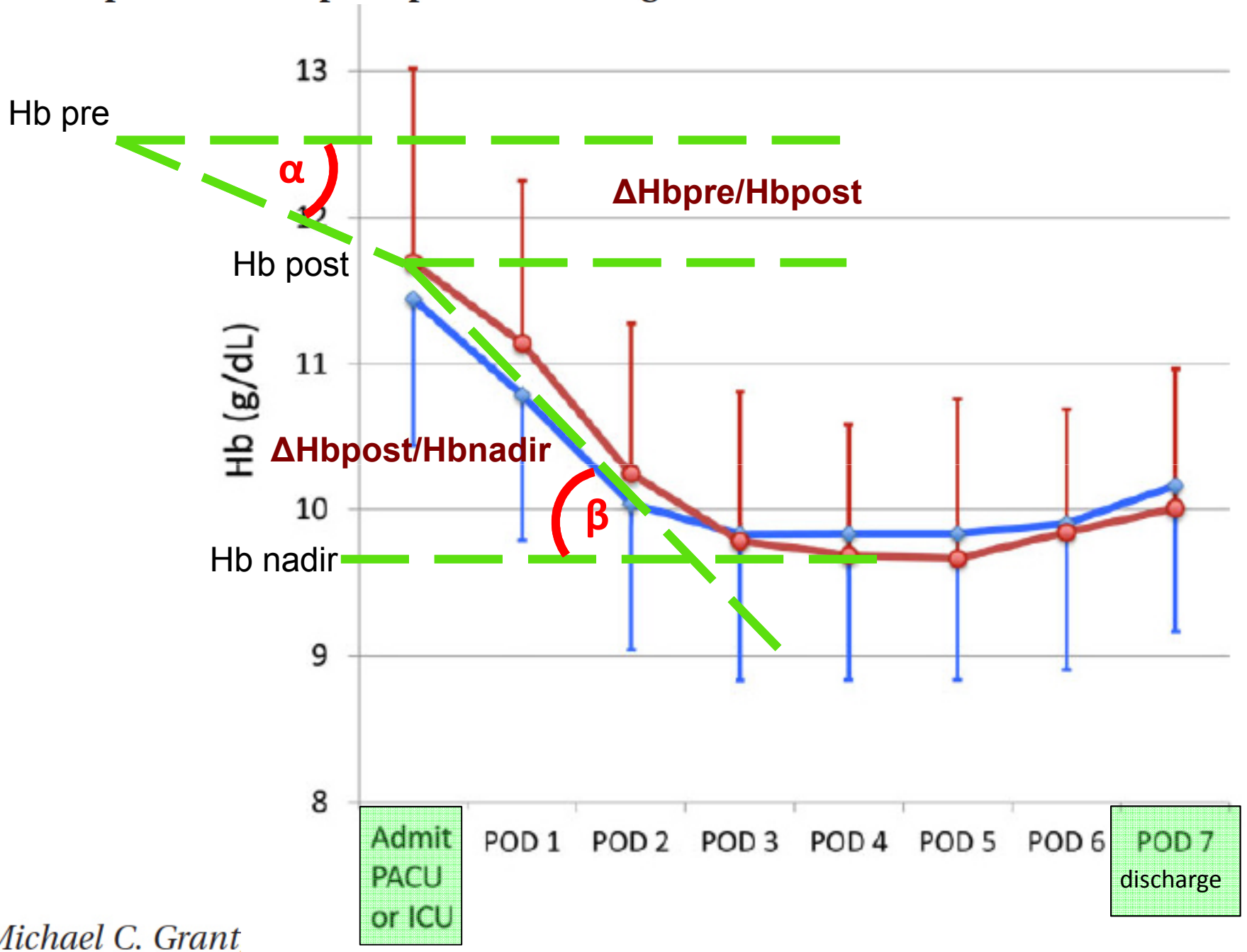
AJCC - November 2013, Volume 22, No. 6


Optimize hematopoiesis
Hb preoperatorio
trigger trasfusionale
Trasfusione

drift [Hb] postoperatoria



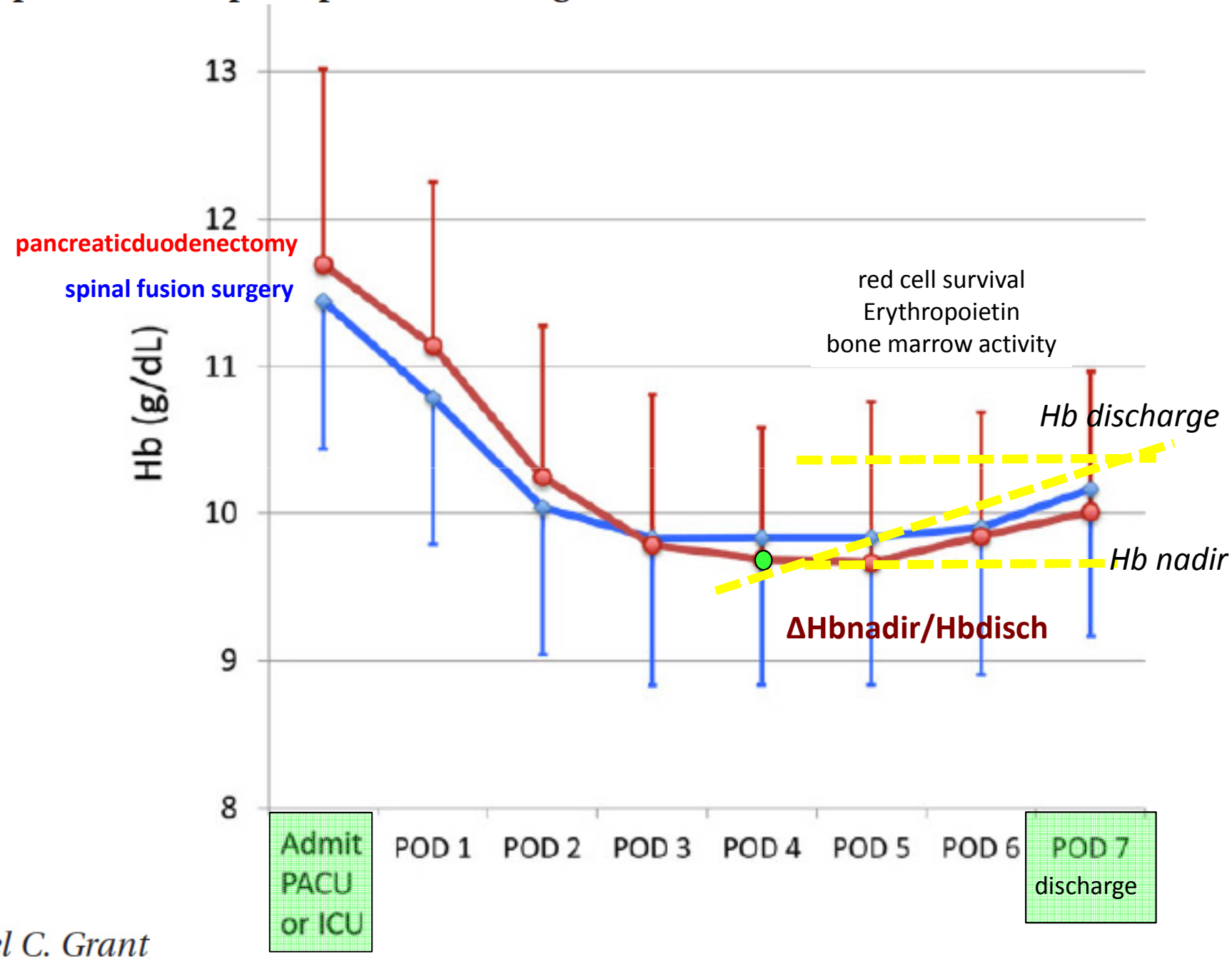
Clinical predictors of postoperative hemoglobin drift TRANSFUSION 2014;54:1460-1468.



Michael C. Grant

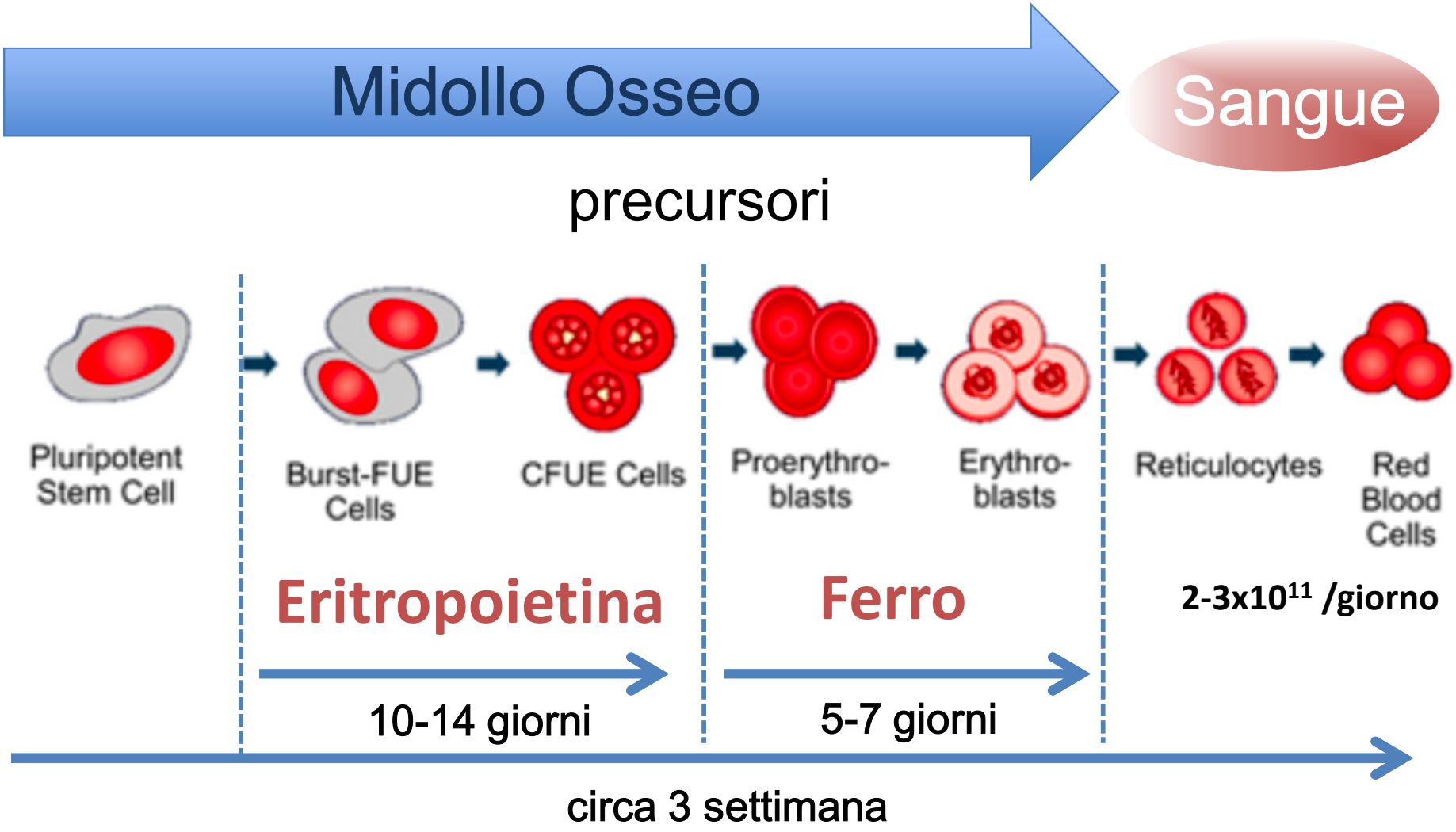
Clinical predictors of postoperative hemoglobin drift

TRANSFUSION 2014;54:1460-1468.



Michael C. Grant

Eritropoiesi



in condizioni di anemia acuta, la produzione di GR puo' crescere anche di 10 vo

Reprinted from Lankhorst CE, Wish JB. Anemia in renal disease: diagnosis and management. *Blood Rev*. 2010;24:39-47, with permission from Elsevier.

By David Bessman

Blood, Vol. 50, No. 6 (December), 1977

Erythropoiesis During Recovery From Iron Deficiency: Normocytes and Macrocytes

In 26 patients with severe iron deficiency and microcytic anemia (MCV < 70 fl), serial red cell size distribution histograms (erythrograms) were taken before and during iron therapy. Initially all patients had a single population of red cells, all microcytes. With the first reticulocytosis after iron therapy, a new population of cells appeared, larger in volume than the original.

CORRECTION OF IRON-DEFICIENCY ANEMIA results in accelerated erythropoiesis with brisk reticulocytosis in 3–8 days and a subsequent increase in red cell mass.[1] The newly produced red cells reflect the bone marrow's response to iron repletion.

Effects of postoperative intravenous iron on transfusion requirements after lower limb arthroplasty

M. Muñoz

Correspondence BJA

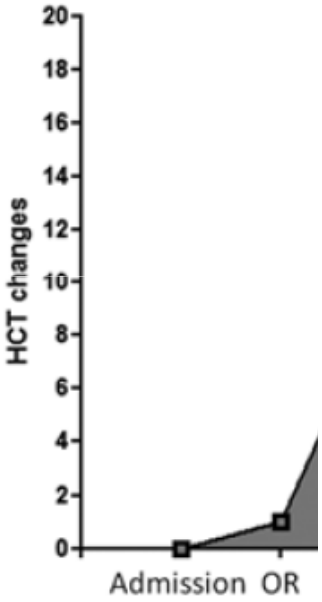
Br J Anaesth. 2012 Mar;108(3):532-4

Table 1 Patients' characteristics and postoperative i.v. iron supplementation. Values are expressed as mean (SD) or incidence (%). #*P*-value (two-way ANOVA or Pearson χ^2). **P*<0.05, 600 *vs* control; ***P*<0.05, 600 *vs* 300 (Student's *t*-test *post-hoc*). M, male; F, female; THA, total hip arthroplasty; TKA, total knee arthroplasty; THA-HF, total hip arthroplasty for hip fracture; preOP, preoperative; POD, postoperative day; ABT, allogeneic blood transfusion; LOS, length of hospital stay

	Postoperative i.v. iron dose (mg)			#*P*-value
	0 (control)	300	600	
Patients (*n*)	19	32	63	
Gender (M/F)	3/15	11/20	15/44	0.308
Age (yr)	75 (10)	74 (10)	73 (13)	0.205
Surgery (*n*)				0.208
TKA	13	16	25	
THA	1	7	15	
THA-HF	5	9	23	
Hb preOP (g dl^{-1})	12.5 (1.5)	11.8 (1.2)	12.4 (1.3)**	0.031
Hb POD1 (g dl^{-1})	8.7 (1.0)	8.7 (0.8)	9.1 (0.6)*,**	0.012
Hb POD7 (g dl^{-1})	10.1 (0.7)	9.6 (0.7)*	9.8 (0.9)	0.009
ABT rate [*n* (%)]	16 (84)	20 (62)	29 (46)	0.010
ABT index (U pte^{-1})	2.0 (0.9)	1.4 (1.3)	0.9 (1.2)*	0.007
Hb pre-ABT (g dl^{-1})	7.6 (0.8)	7.7 (0.8)	7.7 (0.9)	0.566
Infection [*n* (%)]	5 (26.3)	5 (15.6)	2 (3.2)	0.009
In-hospital death [*n* (%)]	1 (5.3)	0 (0)	1 (1.6)	0.379
LOS (days)	11.8 (3.6)	11.3 (4.2)	9.2 (3.0)*,**	0.013

Minerva Anestesiol 2014;80:885-93

Percentage hematocrit variation (PHEVAR) index as a quality indicator of patient blood management in cardiac surgery

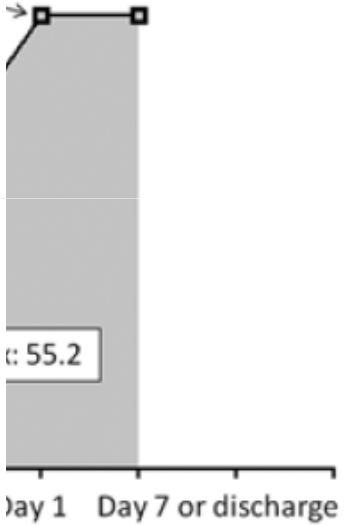


Key messages

— The concept of PBM is based on the preservation of the patient's own blood. We are presently lacking an indicator of the efficacy of PBM programs.

— The percentage variation of the hematocrit (PHEVAR) during the hospital stay is a possible comprehensive index of the institution ability to develop a PBM.

— In a series of adult patients undergoing cardiac surgery, the PHEVAR was calculated. High values of PHEVAR were associated to a worse postoperative outcome.



TRANSFUSION 2017;57;1347–1358

Improved outcomes and reduced costs associated with a health-system–wide patient blood management program: a retrospective observational study in four major adult tertiary-care hospitals

Western Australia PBM data system

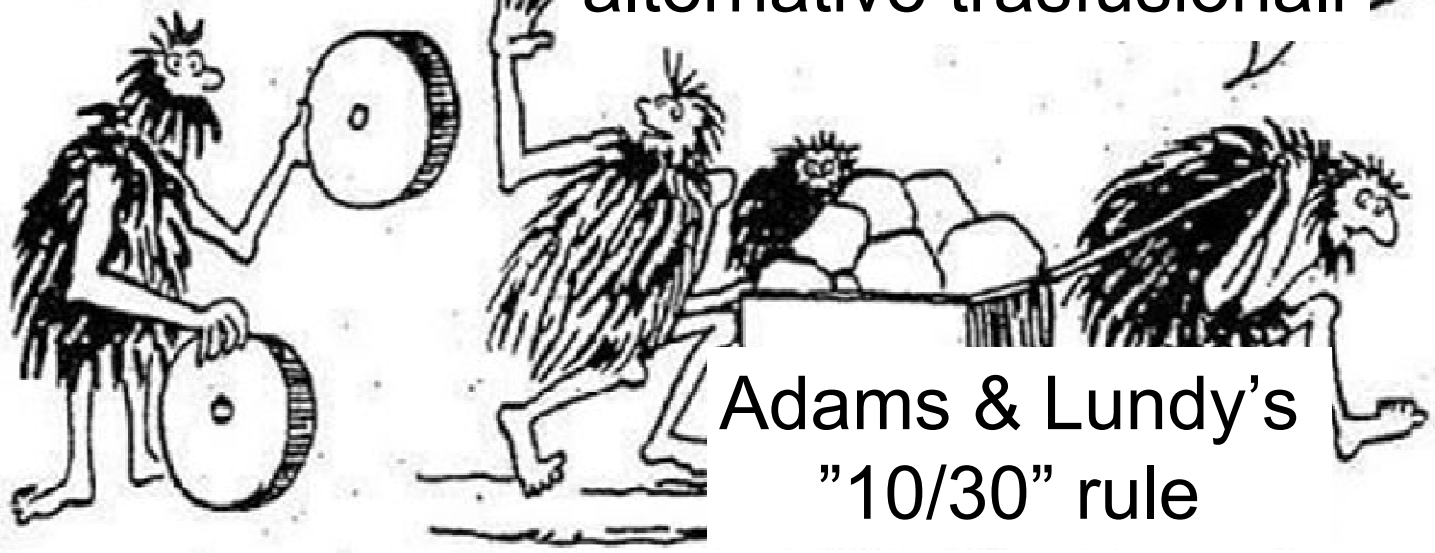
retrospective study of 605,046 patients between July 2008 and June 2014

Michael F. Leahy

Abbiamo sempre fatto così!!

introdurre
nuove pratiche

appropriatezza
strategie di risparmio
alternative trasfusionali



Adams & Lundy's
"10/30" rule

rimuovere gli ostacoli

working with

SERIOUS HAZARDS OF TRANSFUSION SHOT

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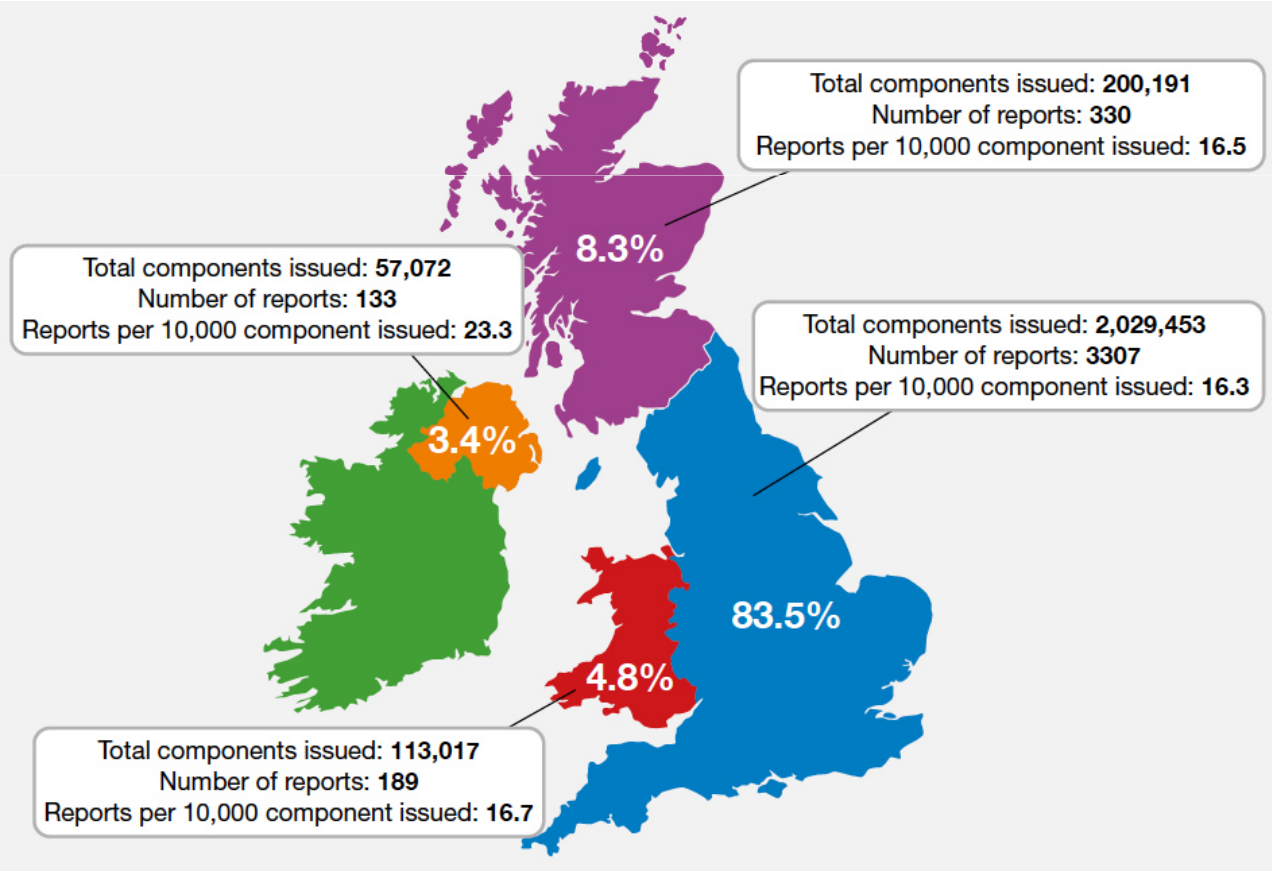
ANNUAL SHOT REPORT 2017

Percentage of SHOT reports submitted by UK country



ANNUAL SHOT REPORT 2017

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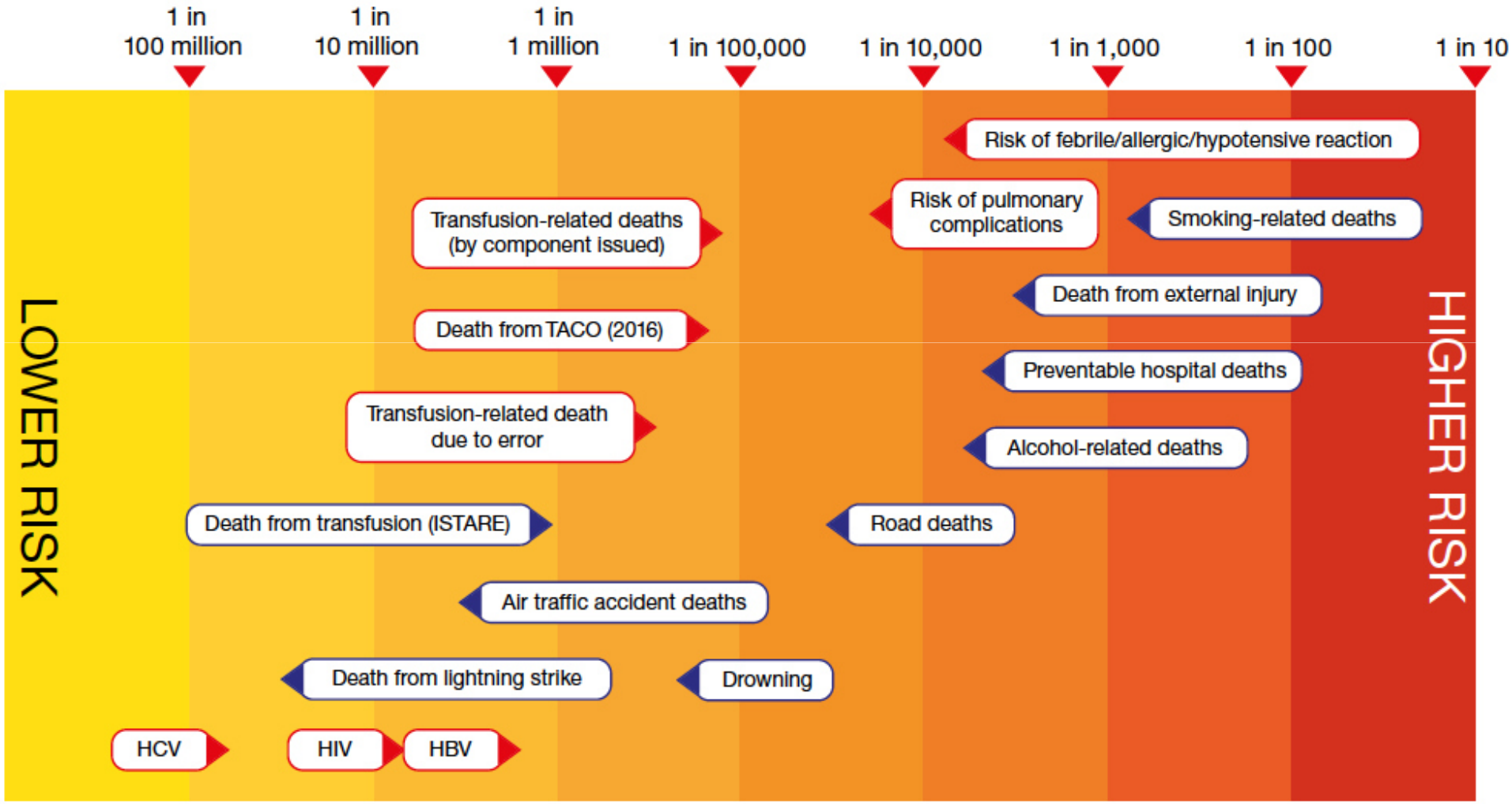

Viral transmissions denote risk of infection, not deaths.

ANNUAL SHOT REPORT 2017

working with SERIOUS HAZARDS OF TRANSFUSION SHOT

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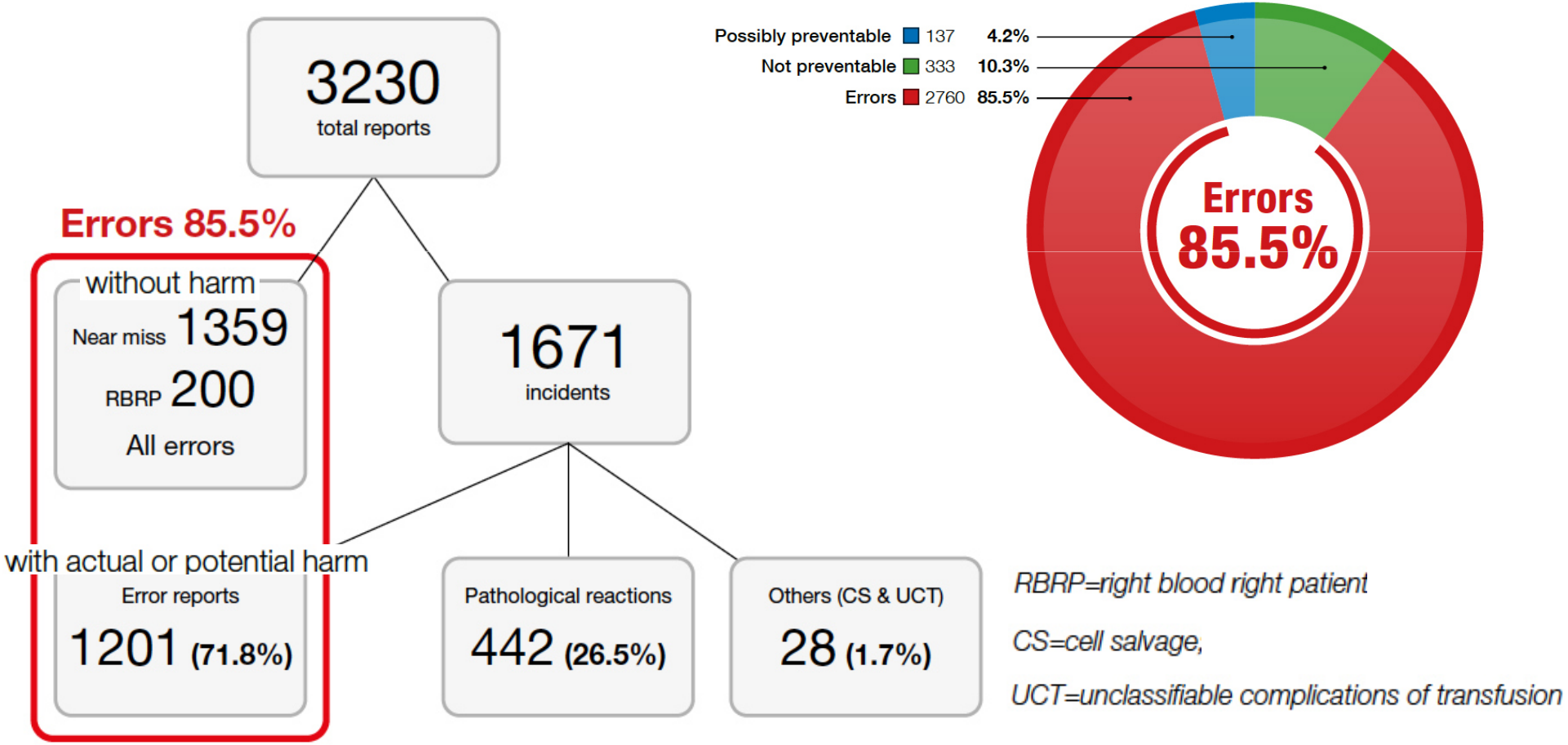
Cases included in the 2017 Annual SHOT Report n=3230



RBRP=right blood right patient

CS=cell salvage,

UCT=unclassifiable complications of transfusion

Key SHOT messages

working with
SERIOUS HAZARDS OF TRANSFUSION
Affiliated to the Royal College of Pathologists
SHOT

Preventing transfusion error

Every hospital should have a policy for formally checking the identity of the patient against the blood component label at the bedside

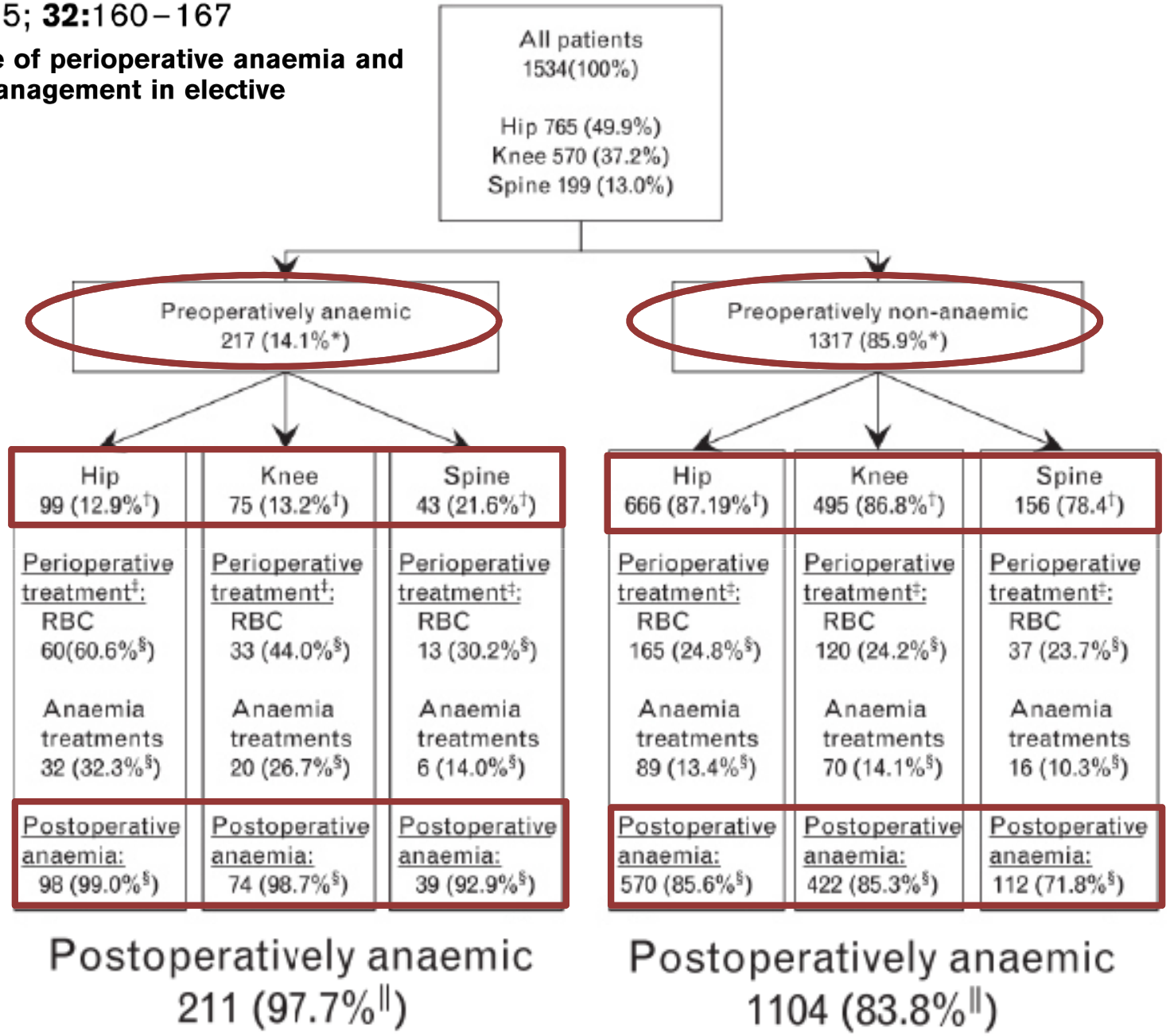
At each step in the transfusion process , do not assume that errors have not been made in previous steps; verify each step, particularly patient identification

Resources allocation is critical : inadequate staffing , lack of training and poor supervision are all likely to be associated with an increased risk of error

Eur J Anaesthesiol 2015; **32:**160–167

PREPARE: the prevalence of perioperative anaemia and need for patient blood management in elective orthopaedic surgery

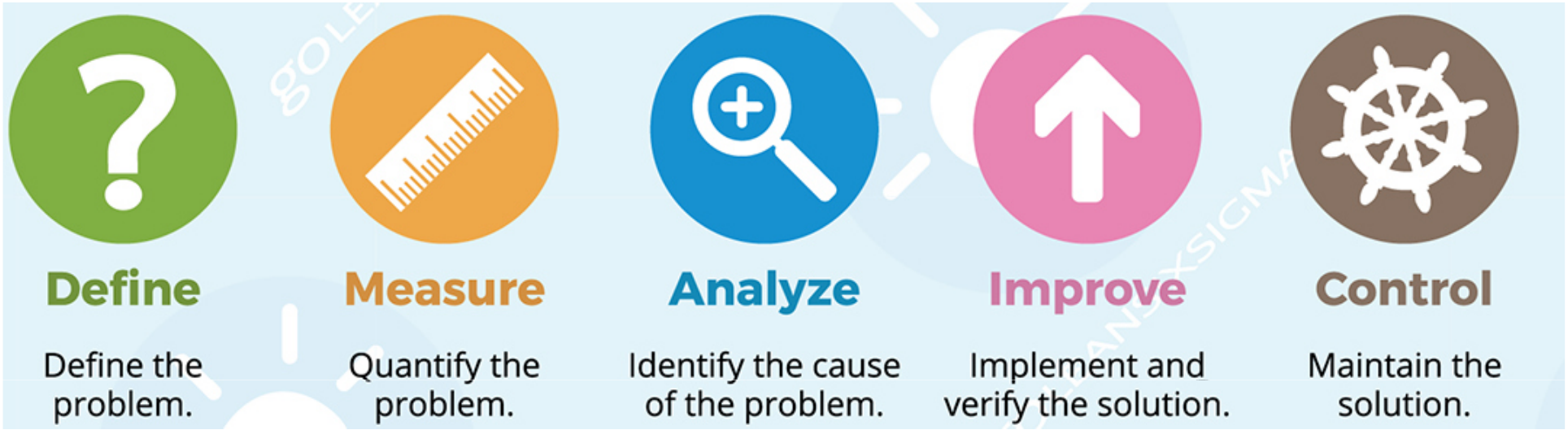
Sigismond Lasocki



Prevalence of pre and postoperative anaemia and incidence of perioperative anaemia treatment by site of surgery


terremoto in Centro Italia
disastro ferroviario in Puglia

Lean Six Sigma: DMAIC



Fattori di rischio prevedibili ed evitabili

lo storico dell'Hb drift rappresenta
la base di riferimento nell'ambito
della preparazione del paziente

Ann Lab Med 2013;33:116-120

Can Maximum Surgical Blood Order Schedule Be Used as a Predictor of Successful Completion of Bloodless Surgery?

Kyung Il Jo, M.D. and Jeong Won Shin, M.D.

Background: The Soonchunhyang University Hospital Bloodless Center was established in 2000, and more than 2,000 bloodless surgeries have been performed there since. In this study, the lowest postoperative Hb/preoperative Hb ($Hb_{low/pre}$) ratio and mortality rates of patients who underwent bloodless surgery were analyzed for each maximum surgical blood order schedule (MSBOS) category to assess whether MSBOS can be used as a predictor of successful completion of bloodless surgery.

Table 1. The MSBOS of elective surgeries included in this study

MSBOS category	Type of surgery	N of patients
T&S (N=701)	Hysterectomy*	140
	C-section	108
	Thyroidectomy*	56
	Partial dissectomy	45
	Mastectomy*	37
	Cholecystectomy*	30
	Appendectomy*	27
	Open reduction of fracture and internal fixation	22
	Removal of fixation device	21
	Excision and biopsy	19
	Ovarian cystectomy*	19
	Myolysis†	15
	Arthroscopy (knee)	13
	Closed reduction of fracture and internal fixation	12
	Salpingo-oophorectomy*	11
	Low anterior resection, laparoscopic	9
	Exploratory laparotomy	8
	Laparoscopic hemicolectomy	6
	Arthroscopy (shoulder)	6
	Gastrectomy, total	6
	Herniorrhaphy	6
	Partial resection of small intestine	4
	Transurethral resection of bladder or prostate	4
	Hemorrhoidectomy	3
	Other	74
1 (N=184)	Myomectomy	47
	Bipolar hemiarthroplasty	35
	Total knee replacement arthroplasty	35
	Gastrectomy, subtotal	24
	Whipple's operation	13
	Hemicolectomy	6
	Clipping of aneurysm (brain)	6
	Lobectomy of lung	5
	Superficial temporal artery-middle cerebral artery anastomosis	3
	Miles' operation	3
	Other	7
2 (N=64)	Removal of brain tumor	29
	Total hip replacement arthroplasty	25
	Liver segmentectomy	6
	Exploration and decompression of spinal cord	4
4 (N=22)	Hepatectomy, lobectomy	11
	Craniotomy for evacuation of hematoma	5
	Craniectomy	3
	Revision arthroplasty	3
Total		971

A T&S order is recommended for procedures that require, on average, <0.5 units of blood per patient per procedure [9].

Ann Lab Med 2013;33:116-120

Transfusion alternatives	MSBOS			
	T&S	1	2	4
Erythropoietin (EPO)	3 (0.4)†	2 (1.1)	0 (0.0)	0 (0.0)
Iron	63 (9.0)	12 (6.5)	4 (6.3)	3 (13.6)
EPO & iron	98 (14.0)	88 (47.8)	43 (67.2)	12 (54.5)
Hemostatics	19 (2.7)	2 (1.1)	4 (6.3)	2 (9.1)
ANH	67 (9.6)	36 (19.6)	33 (51.6)	12 (54.5)
Cell Saver	46 (6.6)	61 (33.2)	29 (45.3)	7 (31.8)
Any alternatives‡	203 (29.0)	113 (61.4)	62 (96.9)	19 (86.4)

Clinical Standards for Patient Blood Management and Perioperative Hemostasis and Coagulation Management

Position Paper of the Italian Society of Anesthesia, Analgesia, Resuscitation and Intensive Care (SIAARTI)

Cinnella G*, Pavesi M°, De Gasperi A^, Ranucci M§, Mirabella L*

CENTRO NAZIONALE SANGUE

ISTITUTO SUPERIORE DI SANITÀ

Ministero della Salute

PER TRATTARE L'ANEMIA NEL PAZIENTE STABILE NON EMORRAGICO:

1. Adotta il Patient Blood Management per gestire la risorsa sangue del tuo paziente
2. Quando c'è l'indicazione clinica trasfondi 1 sola unità per volta
3. Rivaluta il tuo paziente prima di trasfondere una seconda unità

UNA TRASFUSIONE
UNA DECISIONE CLINICA
INDIPENDENTE

PATIENT BLOOD MANAGEMENT ITALIA

ONLY ONE

TABLE 1. Hb thresholds above which a patient was considered to be: (A) inappropriately transfused (above the transfusion threshold) or (B) overtransfused (above the target posttransfusion Hb)

Transfusion Hb threshold (g/dL)	Appropriateness criteria
<7	1. Under 65 years old and no cardiovascular or cerebrovascular conditions.*
<8	2. 65 years of age or older and no cardiovascular or cerebrovascular conditions.
<9	3. Cardiovascular or cerebrovascular conditions.
<10	4. Documented evidence of ongoing significant bleeding at the time of transfusion or current or recent (within 3 months) marrow failure or chemotherapy and/or radiotherapy.

* Cardiovascular or cerebrovascular conditions, including, for example, myocardial infarction, hypertension, atrial fibrillation, heart failure, and stroke.

The Journal of Arthroplasty 30 (2015) 1868–1871

Perioperative Complications and Length of Stay After Revision Total Hip and Knee Arthroplasties

Emmanouil Liodakis, MD

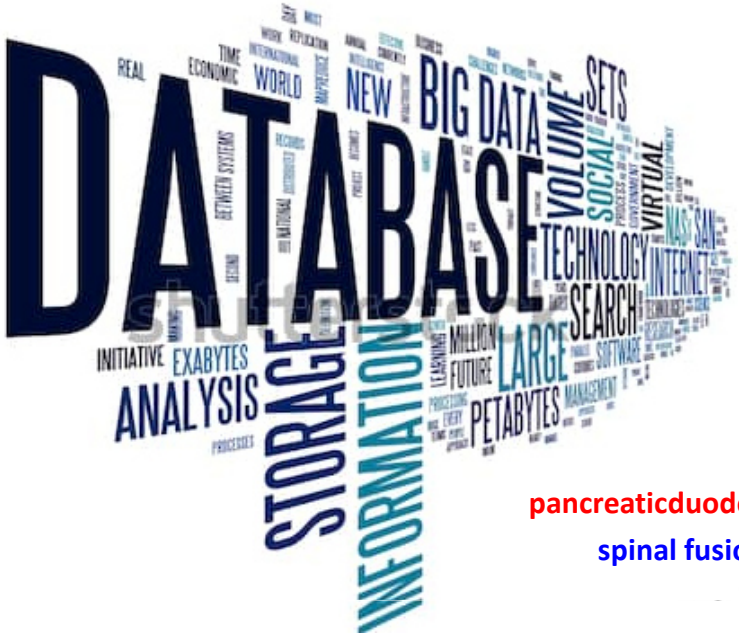
to identify modifiable and non-modifiable independent risk factors for complications

Multivariable Analysis

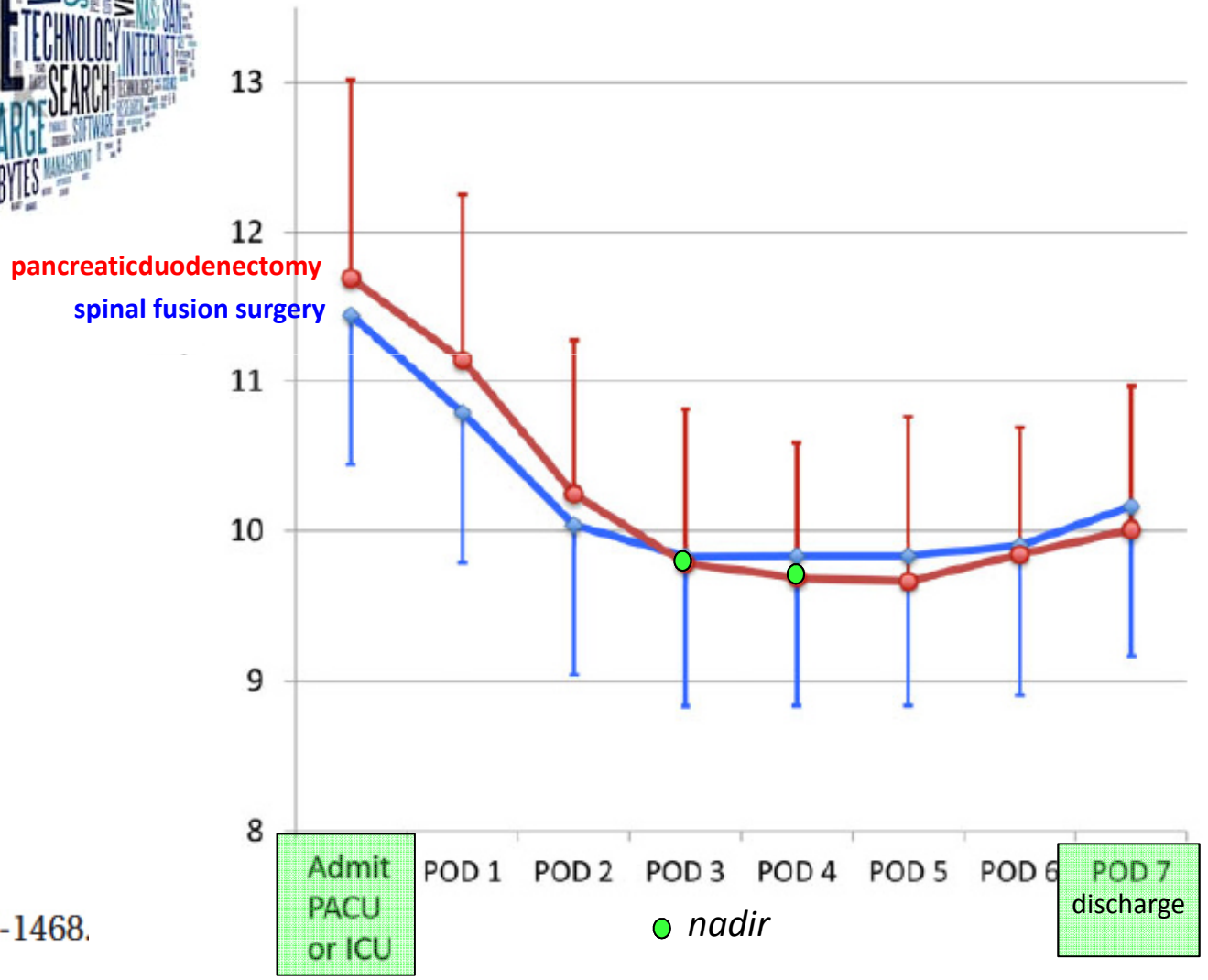
	P-Value
Male gender	0.294
Age >75	**0.047**
BMI >30	0.303
Smoking	-
ASA >2	0.118
Hematocrit <35	**0.002**
Bleeding disorder	0.267
Hypertension	**0.027**
Diabetes	0.459
Heart failure	-
COPD	**0.028**
Operation time >180 min	0.060
General anesthesia	**0.012**
Revision of 2 components	0.974

Revision Hip Arthroplasty
RHA (n = 2643)

Major complications: life threatening or death	3.0%
Sepsis	0.6%
Septic shock	0.1%
Acute renal failure	0.2%
Pulmonary embolism	0.3%
Occurrences ventilator >48 hours	0.3%
Occurrences unplanned intubation	0.4%
Myocardial infarction	0.5%
Cardiac arrest requiring CPR	0.3%
Stroke with neurological deficit	0.2%
Mortality	1.0%
Minor complications: not life threatening	5.1%
Urinary tract infection	1.9%
Pneumonia	0.6%
Superficial surgical site infection	1.3%
Wound dehiscence	0.3%
Peripheral nerve injury	0.1%
Deep wound infection	0.9%
DVT requiring therapy	0.4%
Overall complications rate	7.4%
Adverse events not included in the overall complication rate	
Intraop/postop transfusions	34.4%
Readmission	3.4%
Postop hospital stay (days)	4.1 ± 3.9
Postop hospital stay >7 days	10.4%



Previsione del fabbisogno – data-driven approach



TRANSFUSION 2014;54:1460-1468.
Michael C. Grant