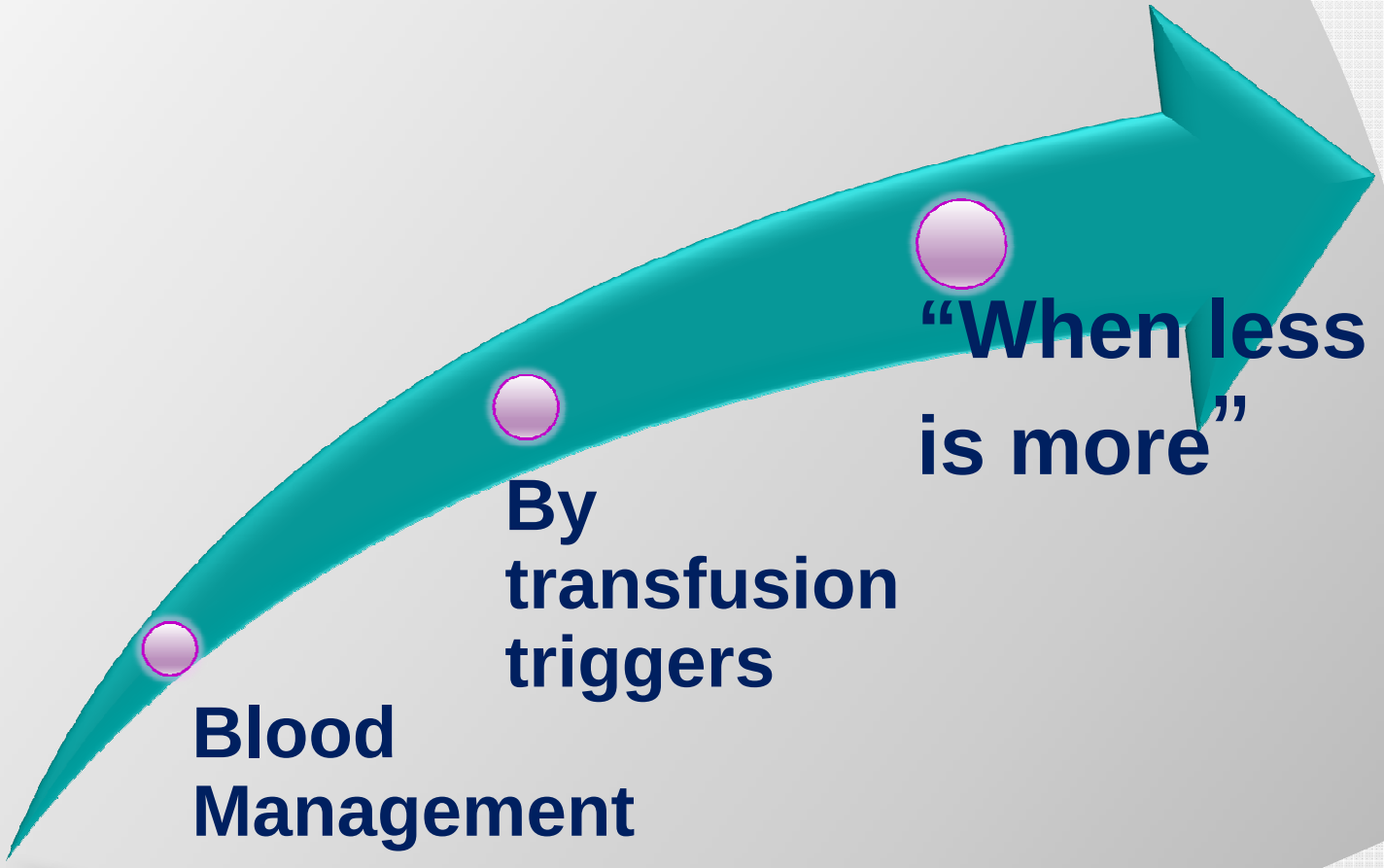
“ BLOOD MANAGEMENT PRE-OPERATORIO DEL PAZIENTE CHIRURGICO”

MARIA BEATRICE RONDINELLI

UOC MEDICINA TRASFUSIONALE

A.O. SAN CAMILLO-FORLANINI -ROMA

BLOOD TRANSFUSION 2011



Authors: Ansari ,Szllasi
Department of Pathology ,Monmouth Medical Center, USA.

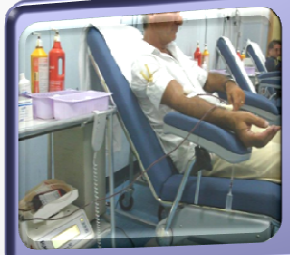
Citazioni letterarie.....

- "BLOOD TRANSFUSION SAVE LIFE"

  "the gift of life"

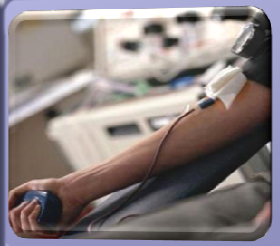
- "BLOOD STILL KILLS": six strategies to reduce allogeneic blood transfusion-relate mortality"

(Vamvakas EC et al. Transfusion medicine 2010)



“Evitare le trasfusioni inutili”

“ Misure preventive per Rischio TRALI



“ Prevenire Rischio immunoemolitico trasfusionale”

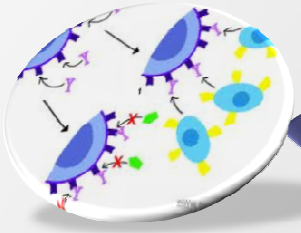
Misure preventive per riduzione rischio TTIs e TAS

”Utilizzare emocomponenti leucodepleti “

- “Misure preventive con l’inattivazione dei patogeni p er emocomponenti come plasma e piastrine

Blood still kills.....

Ed ancora....



Effetto TRIM

Anesthesiology 2004 Impact of alloantigens and storage-associated factors on stimulated cytokine response. Biedler A et al

Incidenza sul periodo di ospedalizzazione

Arch Surg 2006 Increased rate of infection associated with transfusion of old blood after severe injury. Offner et al

Incidenza outcome assistenziale

N Engl J Med 2008 "Duration of red cell storage and complications after cardiac surgery " Koch et al

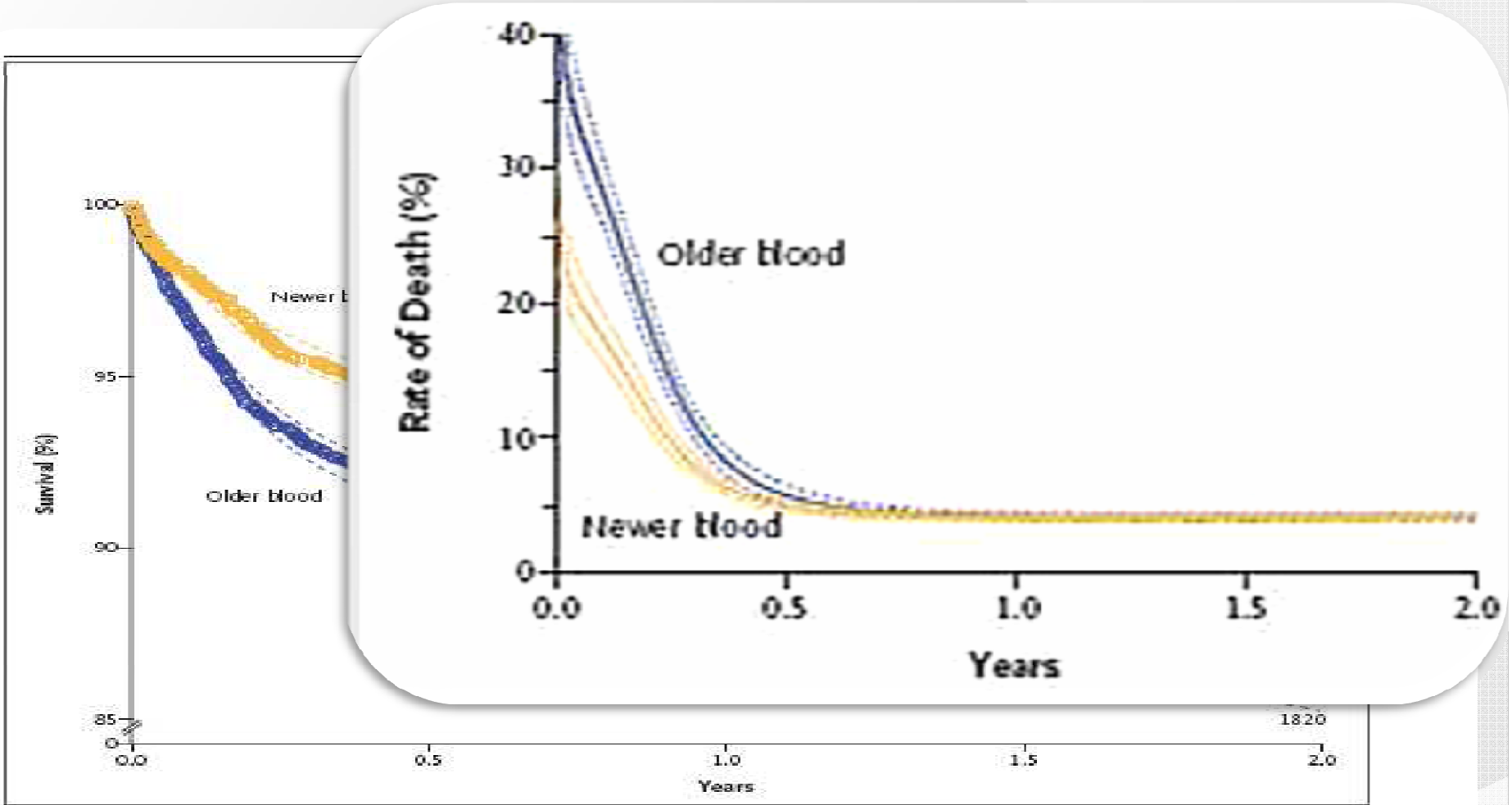
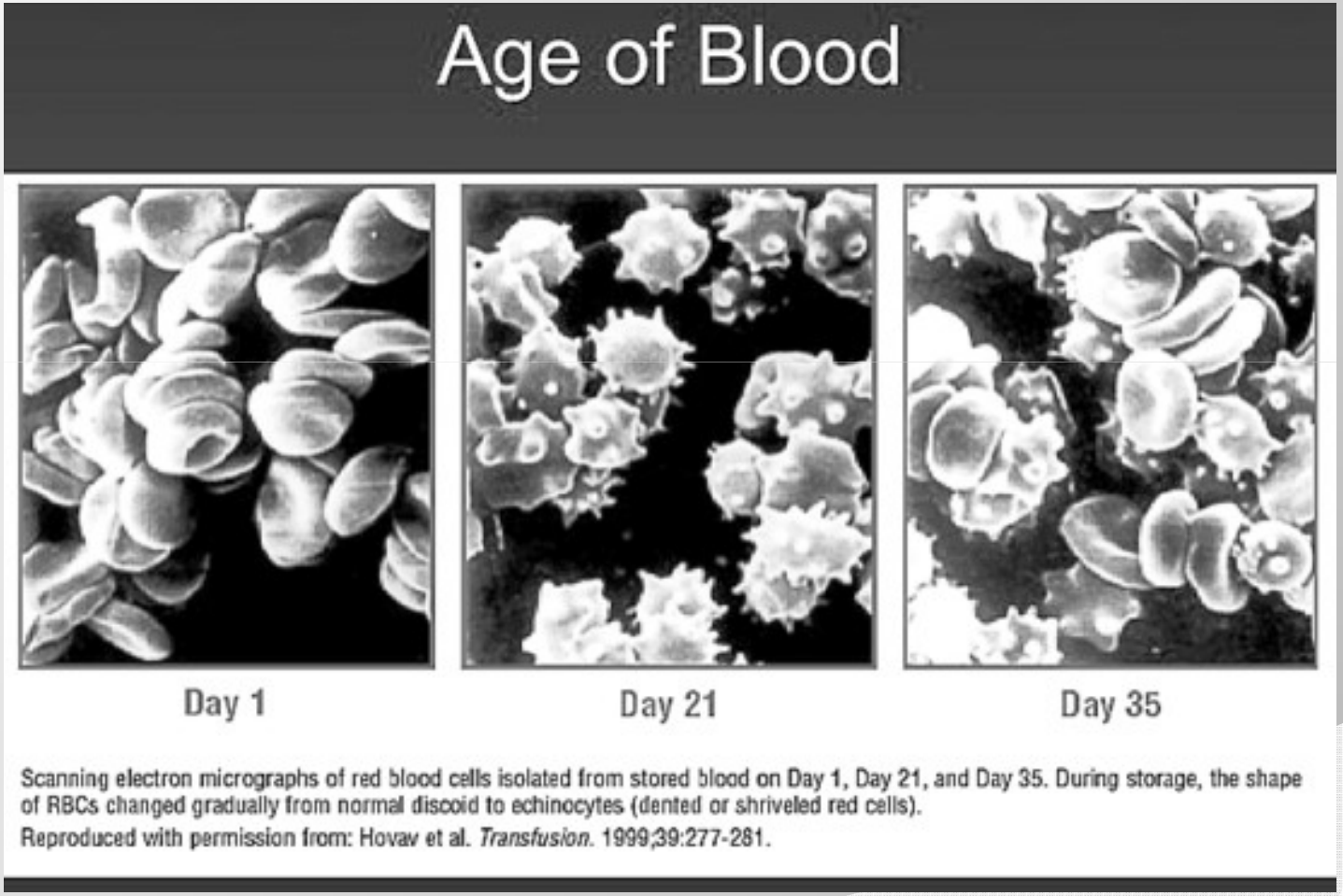


Figure 3. Kaplan–Meier Estimates of Survival and Death.

The curves show data from 2872 patients who were given exclusively newer blood (stored for 14 days or less) and 3130 patients given exclusively older blood (stored for more than 14 days). The numbers above and below the curves represent the numbers of patients who were alive and under follow-up observation in each group at that time. The solid lines of the same color represent estimated survival or the rate of death, and the dotted lines represent pointwise 95% confidence intervals. The nonparametric survival estimator (orange squares or blue circles), as determined by the Kaplan–Meier method, is superimposed on the parametric survival function estimator. In this unadjusted comparison, the percentage of patients receiving older blood who survived was lower than the percentage of those receiving newer blood who survived, especially during the initial follow-up period.

Integrita' di membrana



Damage pathways

Biochemical / Metabolic alterations

Oxidative Damage

Bio-mechanical changes

Hemolysis
Post-transfusion removal
TRALI

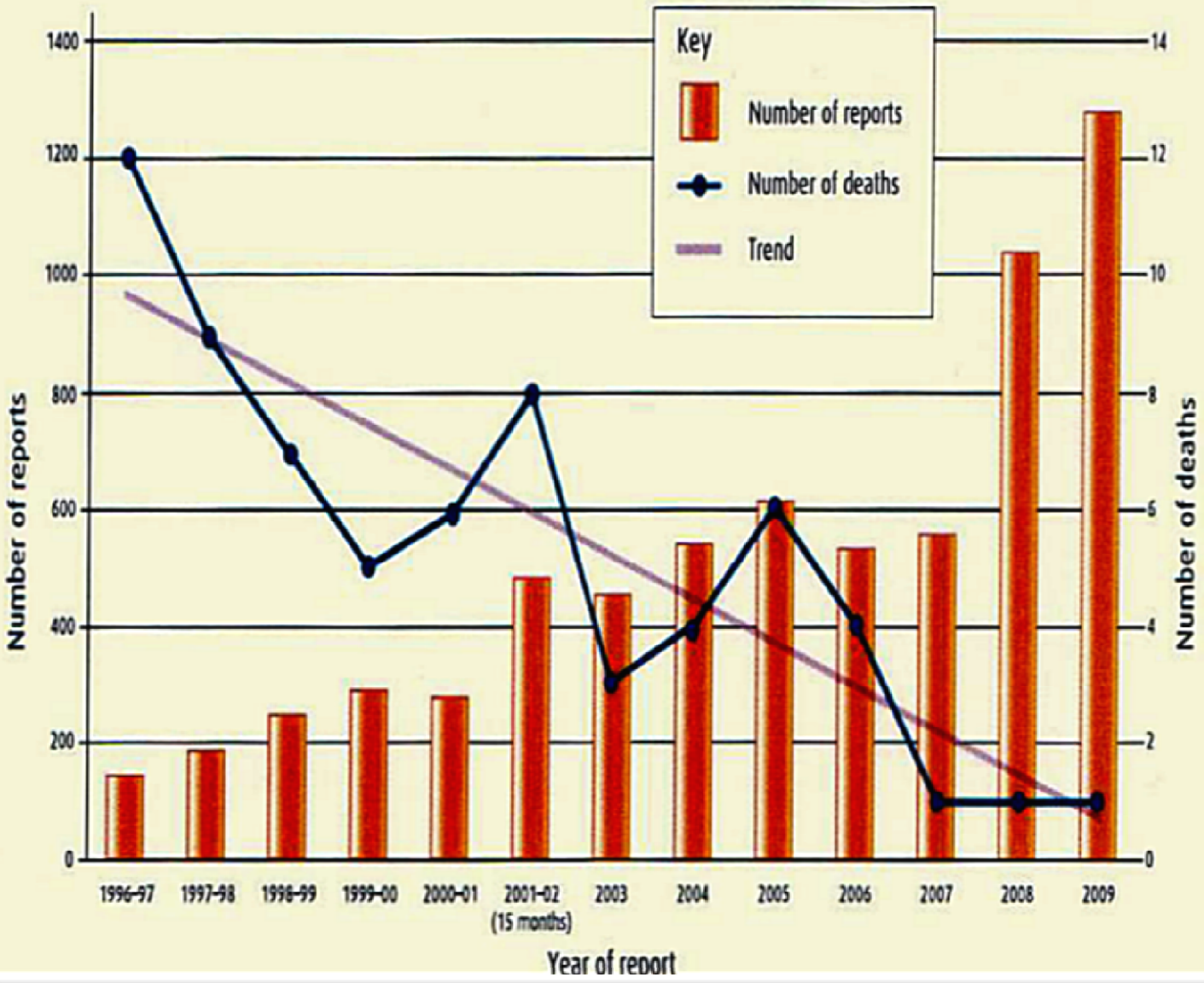
Sangue poco conservato vs sangue lungamente conservato : risultati dei RCT

Vamvakas EC Transfusion 2010; 50: 600-610

TABLE 1. RCTs investigating effects of prolonged RBC storage

RCT	Comparison arms	Sample size: patients included in the intention-to-treat vs. the as-treated analysis	Conclusions	Other findings or comments
Schulman et al.[35]	Trauma patients receiving at least 2 units of <11-day-old vs. >20-day-old WBC-reduced RBCs	24 vs. 17 (seven subjects received 0 or 1 RBC unit)	Conduct of an RCT is *not* feasible in a single-center US setting	Recipients of fresh RBCs received 9.3 units and had four deaths; recipients of old RBCs received 10.6 units and had two deaths ($p > 0.05$)
Hébert et al.[31]	Cardiac-surgery *or* ICU patients receiving <8-day-old vs. standard-issue RBCs (but randomized only when >15-day-old RBCs were available in the blood bank) after implementation of universal WBC reduction	66 vs. 57 (five and two subjects randomized to receive fresh or old RBCs, respectively, were not transfused; two patients allocated to receive fresh RBCs did not receive RBCs stored for <8 days and were also excluded)	Conduct of an RCT is feasible in a multicenter Canadian setting, since 1) the median storage time was 4 or 19 days, respectively, in recipients of <8- or >15-day-old RBCs, and 2) 59 and 91%, respectively, of the subjects allocated to receive <8- or >15-day-old RBCs received the appropriate component >90% of the time	Compared with the recipients of old RBCs, recipients of *fresh* RBCs had *more* in-hospital deaths (Fig. 1; $p = 0.45$), as well as more in-hospital deaths and life-threatening complications (27% vs. 12%; $p = 0.31$), but they were 5 years older on average as well as sicker (comorbid illness[es] present in 85% vs. 65%), and they thereby received a higher transfusion dose (5.5 vs. 3.3 units)
Mou et al.[37]	Infants with congenital heart disease undergoing circuit priming with *fresh* whole blood (stored for 45.8-50.7 hr) vs. RBCs stored for 117.0-162.7 hr and reconstituted with fresh-frozen plasma	205 vs. 200 (infants with a median age of 2.7 months and a median weight of 4.3 kg many of whom underwent the equivalent of a complete exchange transfusion with 1 whole-blood unit used for priming)	Based on intention-to-treat analysis, recipients of *fresh* whole blood had a *longer* LOS in the ICU and more generalized edema ($p < 0.05$); transfusion requirements, postoperative bleeding, and indicators of myocardial injury or systemic inflammation did not differ between the arms	Study excluded ex post facto from the meta-analysis, because 1) both arms had received RBCs <7 days old; 2) component allocation based on RBC length of storage was not maintained for the infants' further transfusion needs (mean of 2.25 additional donor exposures); and 3) CPD whole blood was compared to Adsol RBCs, which contain additional preservatives (adenine and mannitol)

Trends in total reports and total deaths definitely attributable to transfusion between 1996 and 2009



Riferimenti linee guida

- Blood- guide 16th edition 2010
- Recommendation N° R(95)15
- Manual Standard SIMTI Ed.2 (Giugno 2010)

Concetti consolidati

BLOOD MANAGEMENT -TRANSFUSION MEDICINE 2007

Lawrence Goodnough

Blood

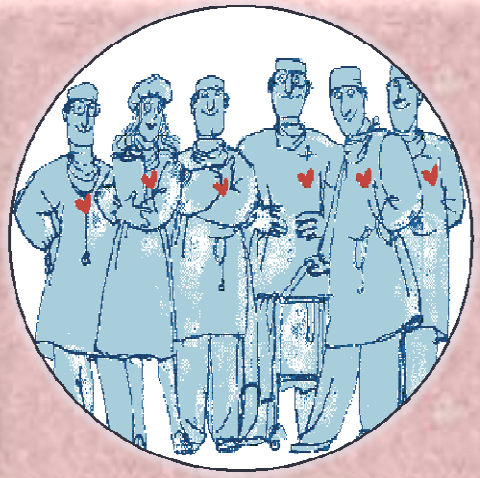
- Contestualizzazione dei percorsi applicativi

Governance

- Ruolo clinico dello specialista di medicina trasfusionale

- Condivisione delle strategie trasfusionali in ambito interdisciplinare

Nuovi scenari....



Confronto plurispecialistico

Network interattivo

Valutazione e scelta di percorsi contestuali e condivisi

VALORIZZAZIONE DELLA “GOVERNANCE” TRASFUSIONALE

GOVERNANCE TRASFUSIONALE.....

- Medicina Trasfusionale
- Medicina Perioperatoria

MEDICO TRASFUSIONISTA

CHIRURGO

ANESTESISTA

Medicina Perioperatoria

La consulenza di medicina trasfusionale....

Se Hb basale è <12-13 aumenta la probabilità di trasfusione omologa

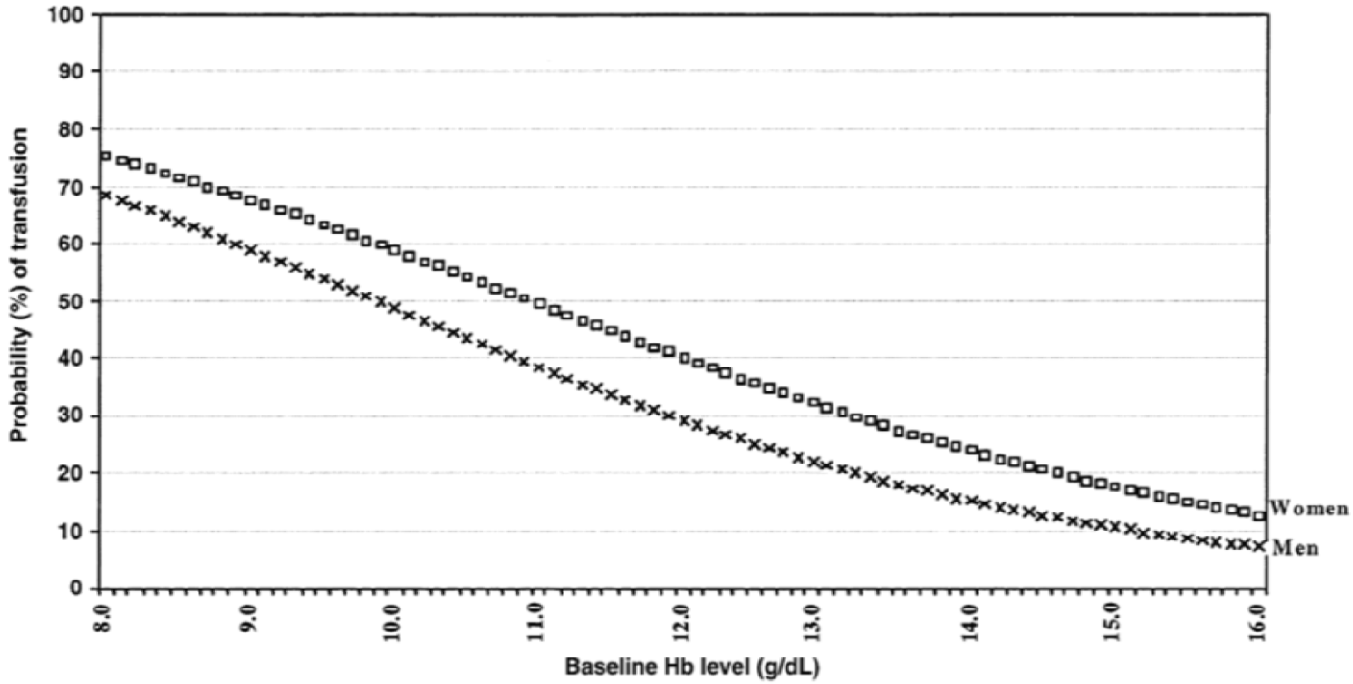


Fig. 2. Probability of allogeneic transfusion only in knee and hip replacements unilateral, nonrevision, no erythropoietin. (×) Men; (□) women.

Parametri che influenzano la trasfusione omologa

Table 1. Predictors of Likelihood for Allogeneic Blood Transfusion in Orthopedic Surgery Patients, From the Logistic Regression Analysis

	Value	Odds Ratio	95% CI	Point Score
Hemoglobin (g/L)	>130	1		0
	111-130	4.1	2.3-7.5	2
	≤110	12.0	3.4-42.3	3
Weight (kg)	>100	1		0
	81-100	2.4	0.6-9.2	1
	≤80	4.6	1.3-16.5	2
Surgery	Knee	1		0
	Hip	6.0	3.0-12.1	2
	Bilateral knee	13.2	5.4-32.2	3
	Bilateral hip	143.7	37.6-548.2	6
Primary or revision	Primary	1		0
	Revision	4.5	1.36-14.6	2

Le Anemie perichirurgiche (NATA 2011)

Evidenze letterarie

Terapie farmacologiche

Percorsi di predeposito autologo

Supporto anestesiologico

Outcome chirurgico

Valutazione multiparametrica NATA 2011

- Hb basale e valutazione MCV
- Bilancio marziale
  Proteina C Reattiva
- Creatinina Clearance

Valutazione multiparametrica (NATA 2011)

MCV<80fl	80<MCV<96	MCV>96fl
• Iron os/ev • rHuEPO	• Iron os/ev • rHuEPO	• Folate • B12
Iron deficiency ACD	**ACD Acute blood loss Anemia renal disease**	**B12,FA deficiency Chronic liver disease Myelodysplasia**

British Journal of Anaesthesia 106 (1): 13–22 (2011)
doi:10.1093/bja/aeq361

BJA

Detection, evaluation, and management of preoperative anaemia in the elective orthopaedic surgical patient: NATA guidelines

L. T. Goodnough[1*], A. Maniatis[2], P. Earnshaw[3], G. Benoni[4], P. Beris[5], E. Bisbe[6], D. A. Fergusson[7], H. Gombotz[8], O. Habler[9], T. G. Monk[10], Y. Ozier[11], R. Slappendel[12] and M. Szpalski[13]

[1]Department of Pathology and Medicine, Stanford University School of Medicine, Pasteur Dr., Room H-1402, 5626, Stanford, CA 94305, USA
[2]Hematology Division, Henry Dunant Hospital, Athens, Greece
[3]Department of Orthopaedics, Guy's and St Thomas' Hospital, London, UK
[4]Department of Orthopedics, Malmö University Hospital, Malmö, Sweden
[5]Department of Hematology, Geneva University Hospital, Geneva, Switzerland
[6]Department of Anesthesiology, University Hospital Mar-Esperança, Barcelona, Spain
[7]University of Ottawa Centre for Transfusion Research, Ottawa, Ontario, Canada
[8]Department of Anesthesiology and Intensive Care, General Hospital Linz, Linz, Austria
[9]Department of Anesthesiology, Surgical Intensive Care and Pain Control, Krankenhaus Nordwest GmbH, Frankfurt am Main, Germany
[10]Department of Anesthesiology, Duke University Medical Center, Durham, NC, USA
[11]Department of Anesthesiology and Intensive Care, Cochin Hospital, Paris Descartes University, Paris, France
[12]Perioperative Medicine Consultancy, Nijmegen, The Netherlands
[13]Department of Orthopedics, IRIS South Teaching Hospitals, Free University of Brussels, Brussels, Belgium

* Corresponding author. E-mail: ltgoodno@stanford.edu

Editor's key points

- Preoperative anaemia is a serious but treatable condition.
- Preoperative haemoglobin measurement (28 days) should allow time for treatment.
- Abnormalities should be investigated and treated before operation.
- An algorithm to guide management is proposed.

Summary. Previously undiagnosed anaemia is common in elective orthopaedic surgical patients and is associated with increased likelihood of blood transfusion and increased perioperative morbidity and mortality. A standardized approach for the detection, evaluation, and management of anaemia in this setting has been identified as an unmet medical need. A multidisciplinary panel of physicians was convened by the Network for Advancement of Transfusion Alternatives (NATA) with the aim of developing practice guidelines for the detection, evaluation, and management of preoperative anaemia in elective orthopaedic surgery. A systematic literature review and critical evaluation of the evidence was performed, and recommendations were formulated according to the method proposed by the Grades of Recommendation Assessment, Development and Evaluation (GRADE) Working Group. We recommend that elective orthopaedic surgical patients have a haemoglobin (Hb) level determination 28 days before the scheduled surgical procedure if possible (Grade 1C). We suggest that the patient's target Hb before elective surgery be within the normal range, according to the World Health Organization criteria (Grade 2C). We recommend further laboratory testing to evaluate anaemia for nutritional deficiencies, chronic renal insufficiency, and/or chronic inflammatory disease (Grade 1C). We recommend that nutritional deficiencies be treated (Grade 1C). We suggest that erythropoiesis-stimulating agents be used for anaemic patients in whom nutritional deficiencies have been ruled out, corrected, or both (Grade 2A). Anaemia should be viewed as a serious and treatable medical condition, rather than simply an abnormal laboratory value. Implementation of anaemia management in the elective orthopaedic surgery setting will improve patient outcomes.

Keywords: anaemia; blood transfusion; orthopaedic surgery; preoperative assessment; preoperative preparation

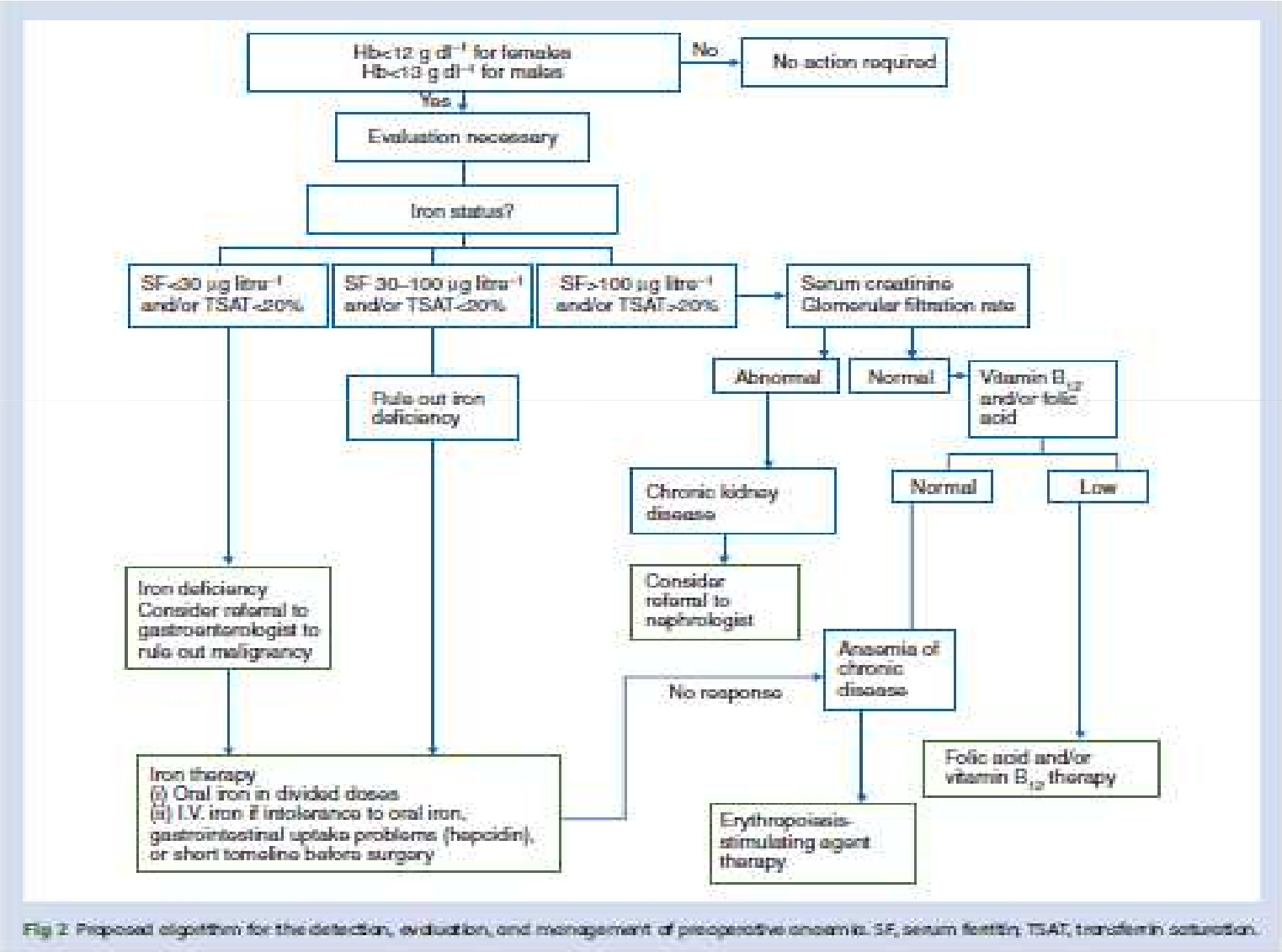


Fig 2 Proposed algorithm for the detection, evaluation, and management of preoperative anaemia. SF, serum ferritin; TSAT, transferrin saturation.

Annual NATA Symposium 2010
Transfusion Medicine 2009 Guidelines for policies on alternatives to allogenic blood transfusion.

Terapia marziale

Preparati a base di ferro per uso orale e/o endovenoso

Terapia con ematinici

Preparati farmacologici tipo Vit.C, Acido folico,vitamine del gruppo B

Agenti stimolanti eritropoiesi

Epoetine alfa

Eritropoietine beta

Darbepoetina alfa

Br.J. Anesth 2008: "Perioperative anemia management : consensus statement on the role of intravenous iron" Beris P.et al

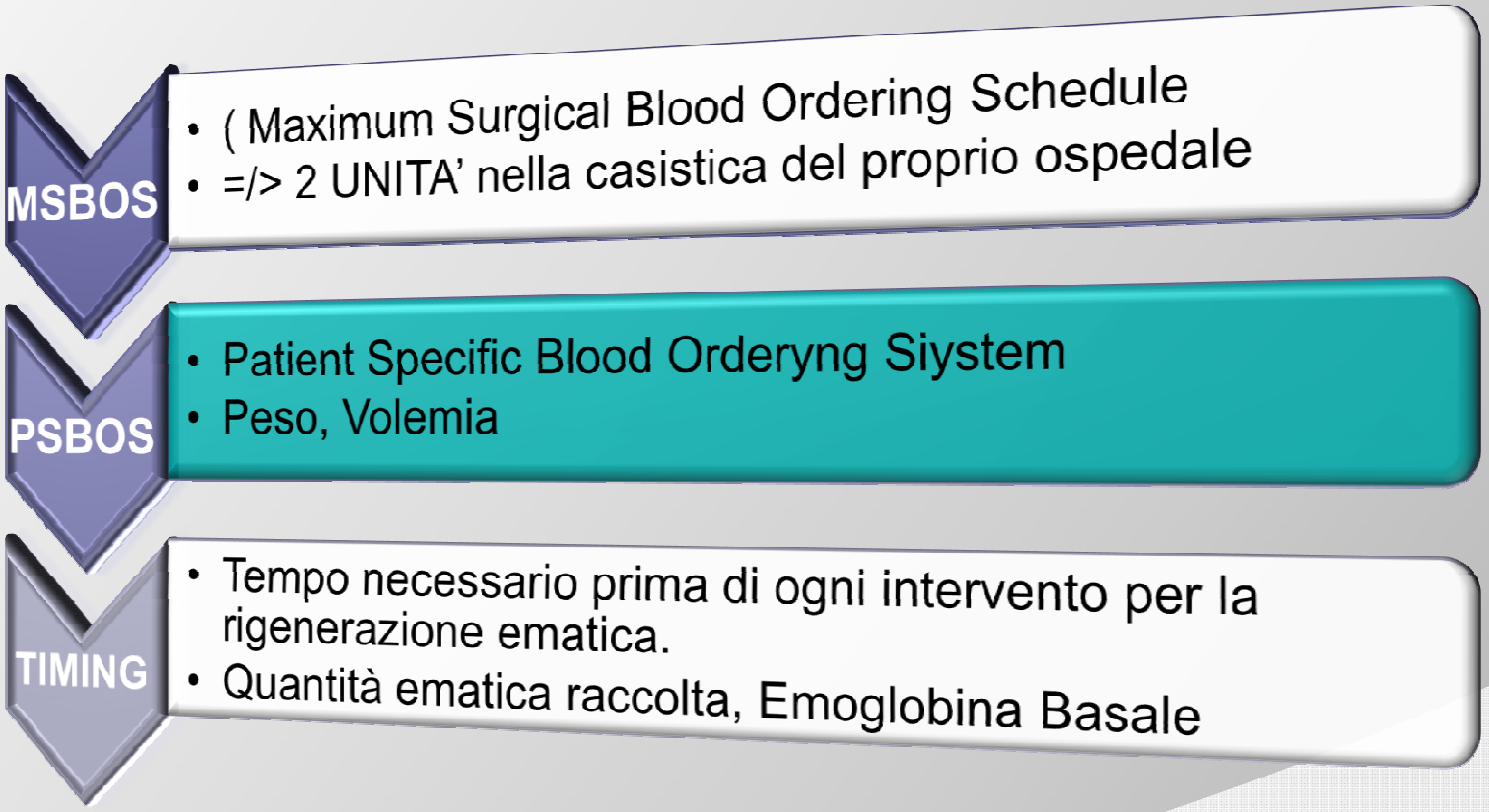
Valorizzazione della terapia farmacologica di supporto

Terapia marziale e con eritropoietina associati al predeposito autologo

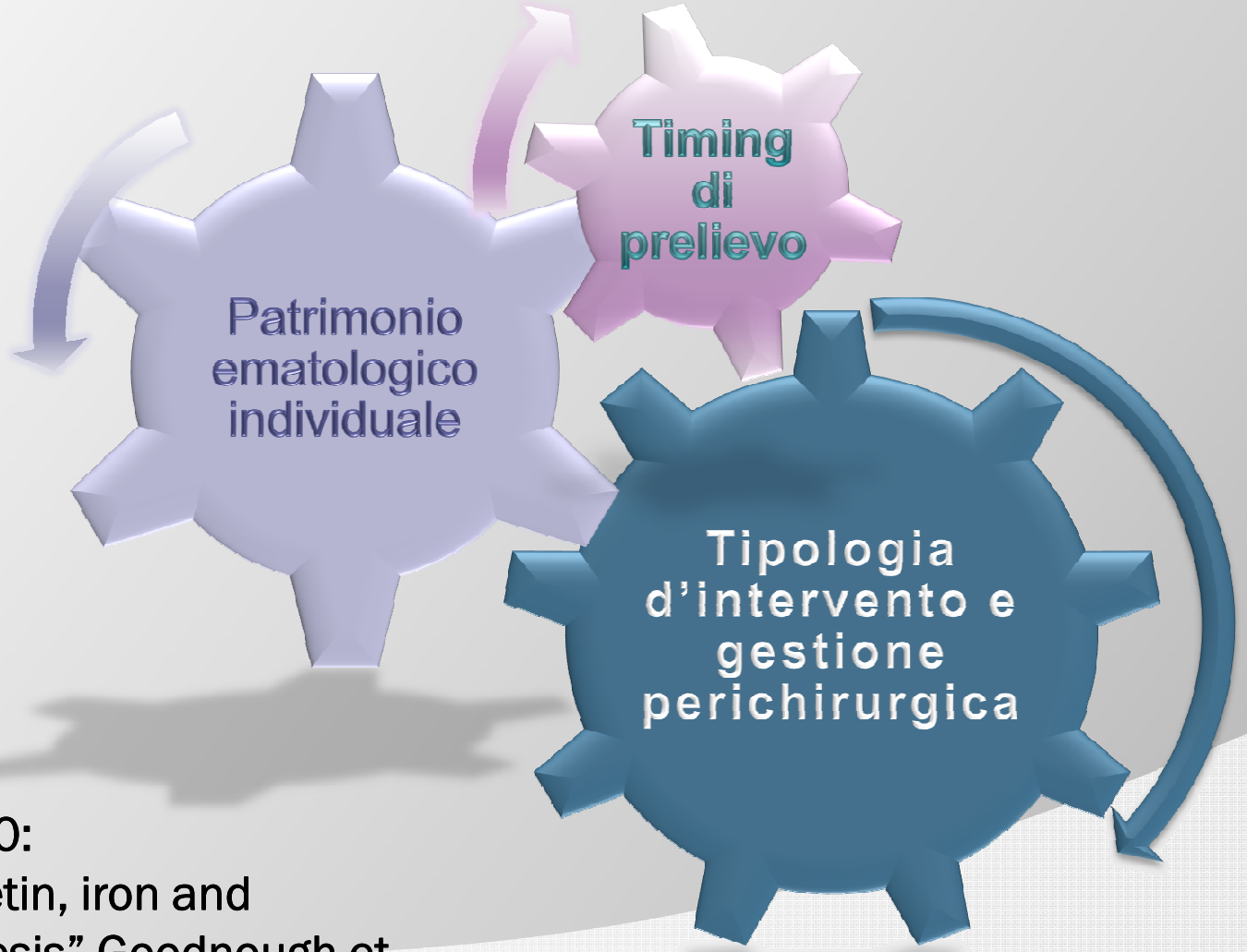
Terapia marziale per uso endovenoso senza associazione del predeposito autologo

Uso perichirurgico di eritropoietina

Razionale per la predonazione autologa

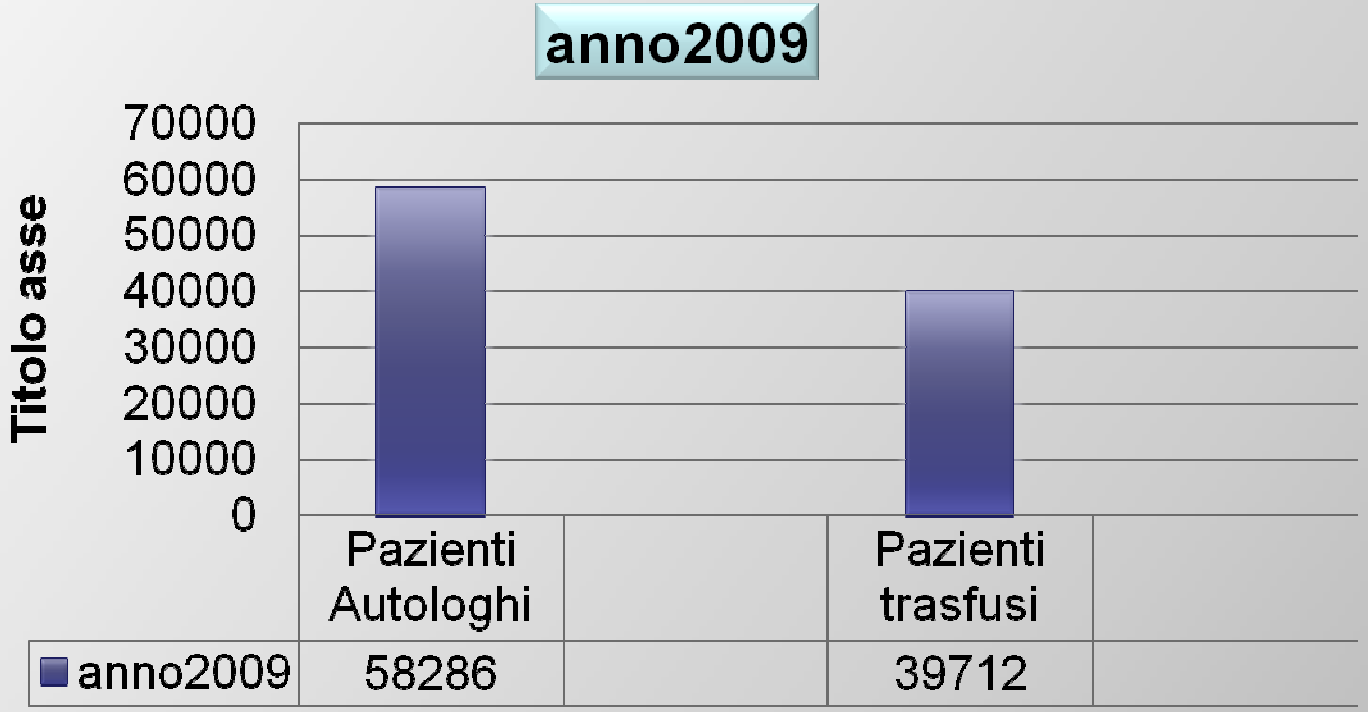


“Tecniche di blood conservation”: predonazione autologa



Blood 2000:
“Erytropoietin, iron and erythropoiesis” Goodnough et al.

DATI SISTRA 2009 -CNS

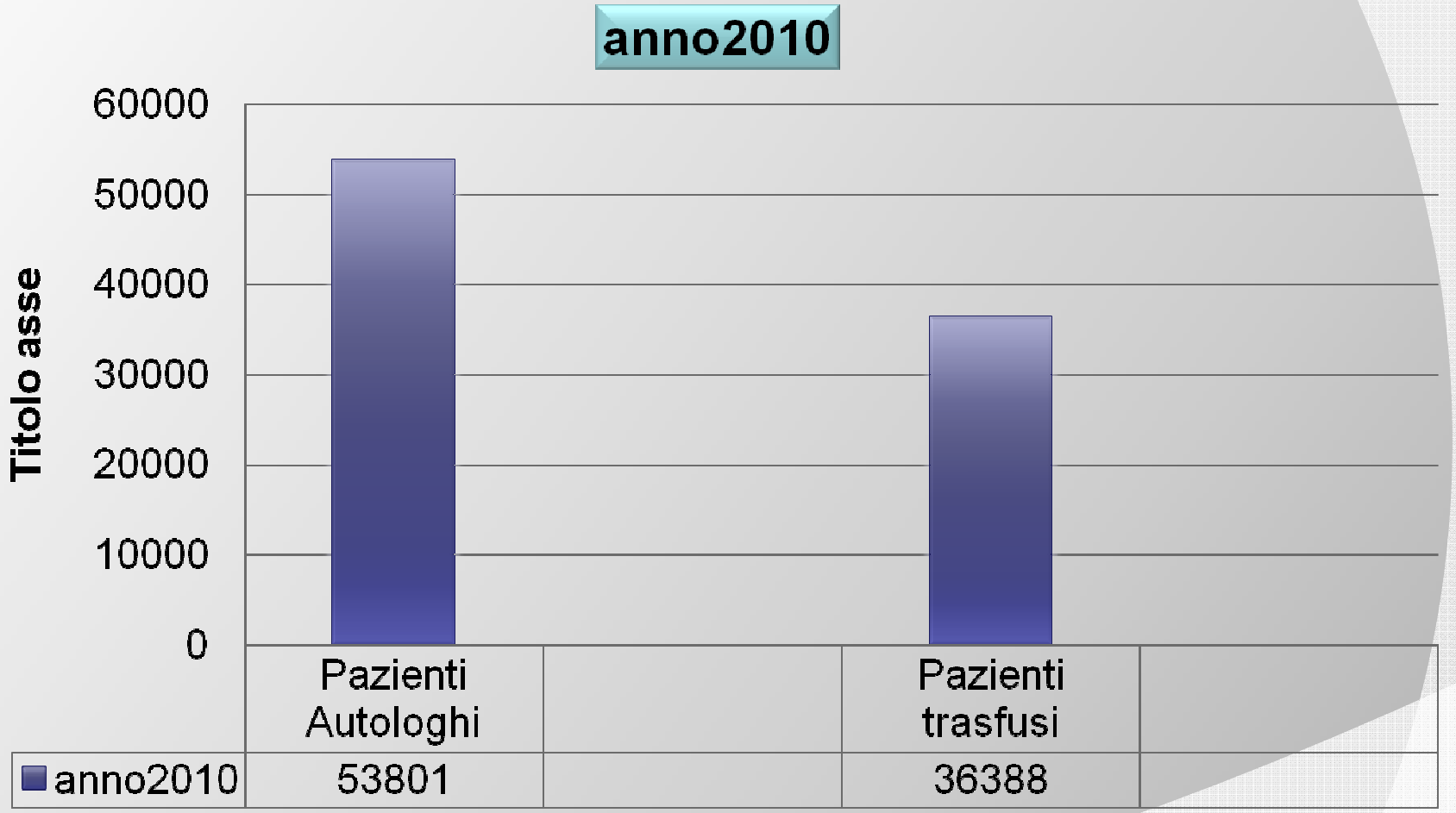


Ministero della Salute

SISTRA Sistema Informativo dei Servizi Trasfusionali

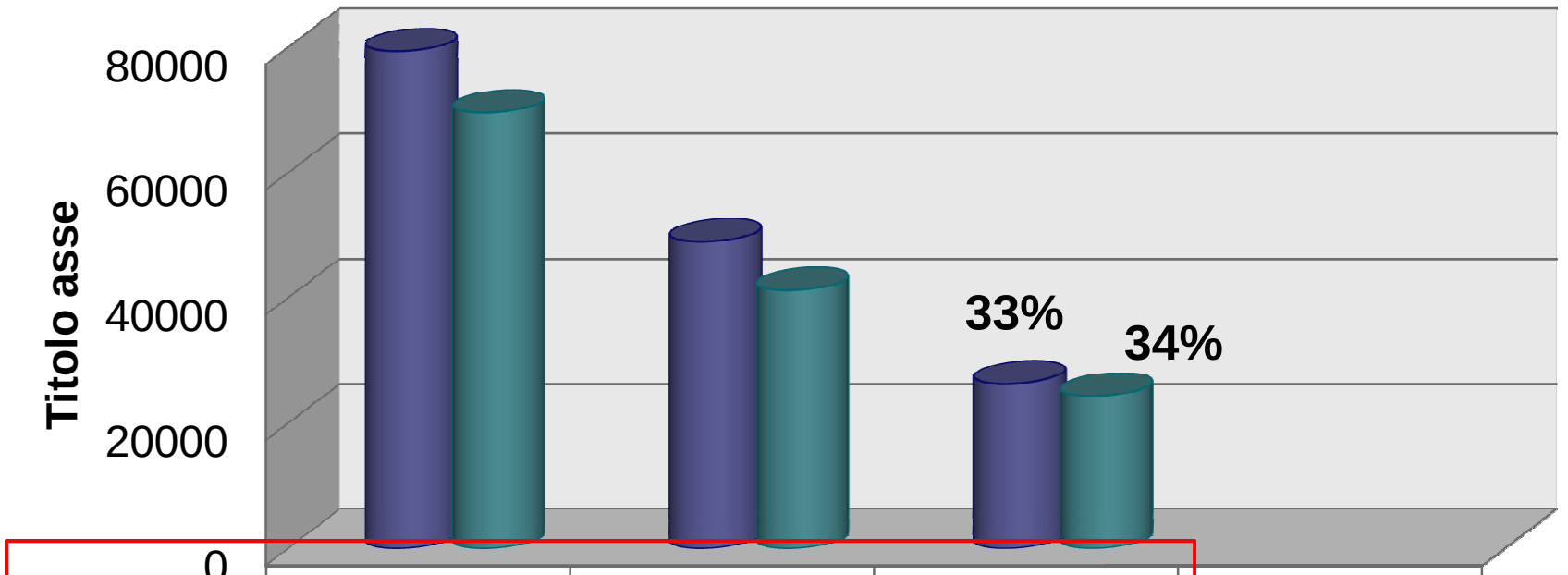
Coordinato a livello nazionale dal Centro Nazionale Sangue

DATI SISTRA 2010 -CNS



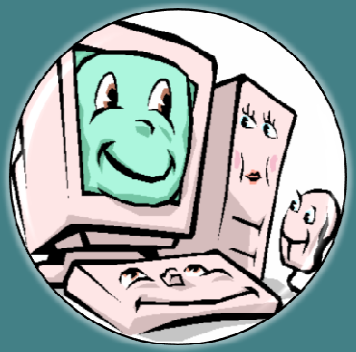
DATI SISTRA 2009-2010 -CNS

ANNI 2009-2010



	Unita' predepositate	Unita' trasfuse	Unità eliminate
anno 2009	79406	49013	26293
anno2010	69583	41190	24350

Dati statistici-A.O. San Camillo-Forlanini diRoma



Area Dedicata

Risorse umane e strumentali

Percorsi di formazione ed attività di auditing intraziendale

Attività di sinergia interdisciplinare con i servizi di preospedalizzazione

PROGETTAZIONE AZIENDALE ANNO 2008-2010

Contents lists available at SciVerse ScienceDirect

Transfusion and Apheresis Science

journal homepage: www.elsevier.com/locate/transci

Integrated strategies for allogeneic blood saving in major elective surgery

Q1 Maria Beatrice Rondinelli[a,*], Francesco Pallotta[b], Sandro Rossetti[b], Francesco Musumeci[c], Antonio Menichetti[c], Franco Bianco[d], Marco Gaffi[b], Luca Pierelli[a,e]

[a] Department of Transfusion Medicine, San Camillo Forlanini Hospital, Rome, Italy
[b] Department of General Surgery, San Camillo Forlanini Hospital, Rome, Italy
[c] Department of Cardiovascular Surgery, San Camillo Forlanini Hospital, Rome, Italy
[d] Department of Anaesthesiology Surgery, San Camillo Forlanini Hospital, Rome, Italy
[e] Department of Experimental Medicine, La Sapienza University, Rome, Italy

ARTICLE INFO

Article history:
Available online xxxx

Keywords:
Autologous blood
Red blood cell storage
Peri-surgical blood transfusions
Blood-saving

ABSTRACT

Background: Large use of allogeneic red blood cell concentrates (RBCc), albeit necessary in major surgery, may influence patients' outcome.
Design and methods: We introduced an integrated strategy including patients' evaluation and supplementation associated with autologous blood collection and saving to support major elective surgery at our hospital since 2008. After 2 years of stabilization of this approach, we analyzed the results obtained in 2010 in terms of allogeneic blood usage and reduction of transfusion of stored RBCc.
Results: Analyzing 2010 results we found that usage of total autologous RBCc units was increased by 2.2 folds, of "not stored" autologous RBCc units by 2.4 folds and of allogeneic RBCc unit transfusion reduced by 65%. The significant reduction in the number of transfused allogeneic RBCc units associated with the use of "fresher" blood could prevent patients' complications due to immunomodulation and biologic/metabolic disregulation.

1. Introduction

The current use of red blood cell concentrates (RBCc) in transfusion support of patients undergoing major surgery

hemoglobin (Hb) concentration is maintained around the value of 10 g/dL; when acute blood loss determines an Hb decrease below 10 to 9 g/dL, tissue oxygenation decreases without increase in tissue perfusion and in the

Dati statistici 2008-2010

TOTALE
4150

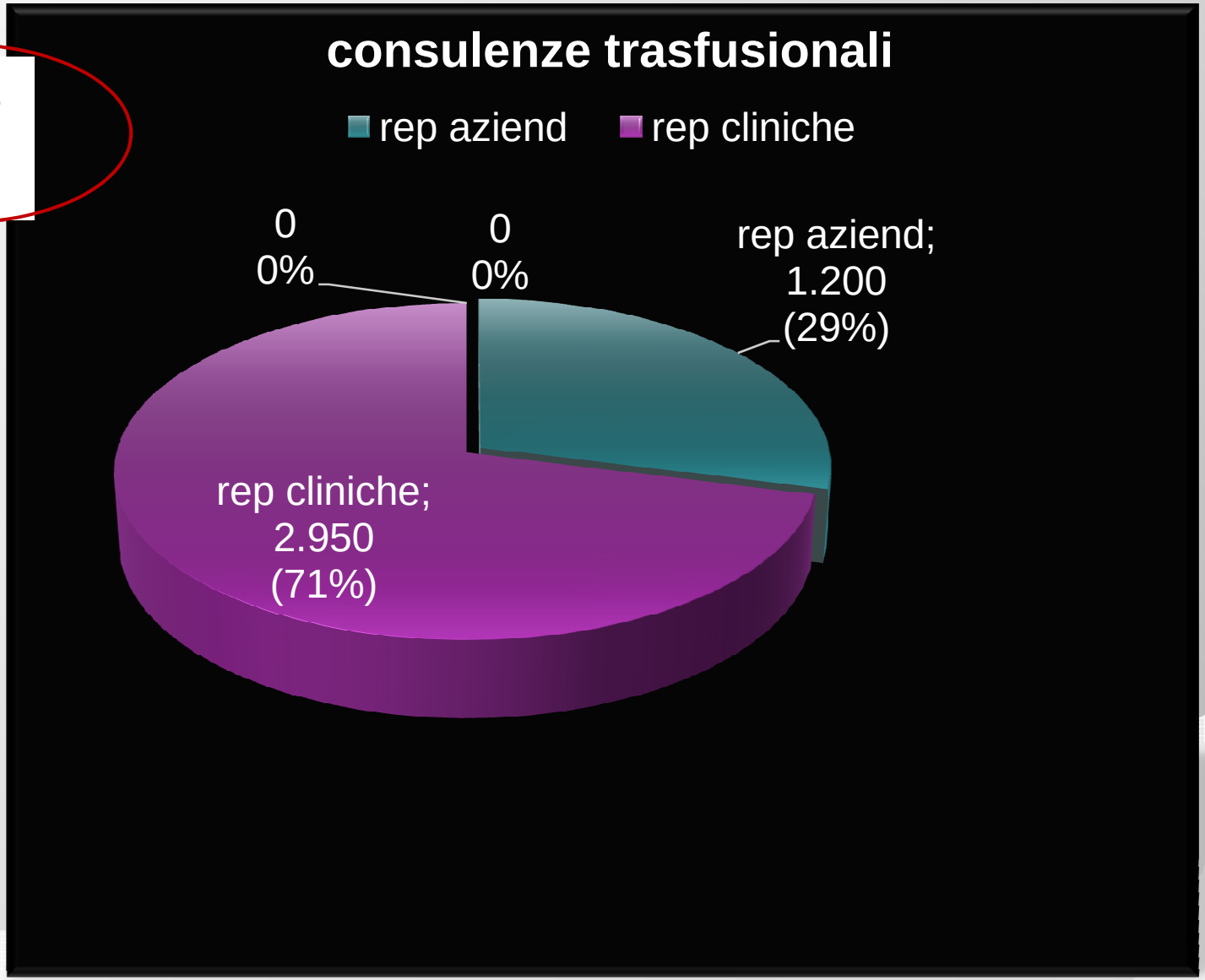


Table 1

Characteristics of RBCc support for elective major surgery prior to the systematic introduction of the integrated approach for allogeneic blood alternatives (started from January 2008): results o[illegible] the year 2007.

Surgical setting	EPO administration	PABD[a]	ANH[a]	PBC[a]	Total autologous RBCc[b]	Total "non stored" autologous RBCc[b]	Allogeneic RBCc -median no. of units
Hip replacement (98 patients)	No	Yes (2; 0–2)	No	No	2 (0–2)	0	2 (0–3) 90%
Knee replacement (110 patients)	No	Yes (1; 0–2)	No	No	1 (0–2)	0	3 (0–3) 80%
Laparotomic nefrectomy (77 patients)	No	No	No	No	0	0	3 (0–4) 90%
Thoracic aortic surgery (61 patients)	No	No	No	Yes IBS (2.5) range 1–3, 5	2.5 (1–3.5)	2.5 (1–3.5)	2 (0–4) 70%
Aortic dissection (44 patients)	No	No	No	Yes IBS (4.5) range 2–6	4.5 (2–6)	4.5 (2–6)	3 (1–4) 100%

RBCc, red blood cell concentrate; EPO, erythropoietin; PABD, pre-surgical autologous blood donation; PBC, peri-surgical blood collection; ANH, acute normovolemic hemodilution; IBS, intra-surgical blood salvage.

[a] Median no. of RBCc units.

[b] Median no. of units.

[c] % Of patients transfused with allogeneic RBCc.

Table 2

Characteristics of RBCc support for elective major surgery after 2 years of the systematic introduction of the integrated approach for allogeneic blood alternatives: results observed in the year 2010.

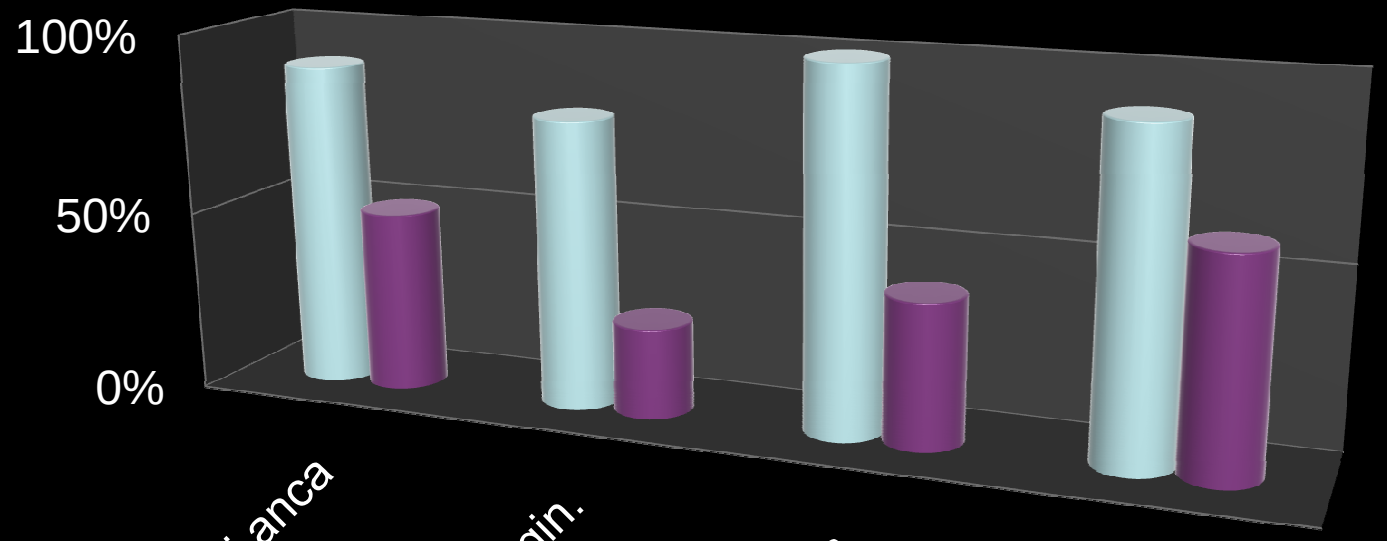
Surgical setting	EPO administration	PABD[a]	ANH[a]	PBC[a]	Total autologous RBCc[b]	Total "non stored" autologous RBCc[b]	Allogeneic RBCc -median no. of units[b]
Hip replacement (100 patients)	Yes (120,000 IU)	Yes (2; 0–2)	No	Yes IBS (1) range (0–3)	3 (0–4)	1 (0–3)	1 (0–1) 55%
Knee replacement (130 patients)	Yes (80,000 IU)	Yes (1; 0–2)	No	Yes PBS (3) range (1–3)	4 (1–5)	3 (1–3)	0 (0–1) 25%
Laparotomic nefrectomy (80 patients)	Yes (120,000 IU)	Yes (2; 0–2)	No	Yes IBS (2) range (1–3)	4 (1–5)	2 (1–3)	0.5 (0–1) 40%
Thoracic aortic surgery (60 patients)	No	No	Yes (2) range (0–2)	Yes IBS (2.5) range (1–3, 5)	4 (1–5)	4 (1–5)	1 (0–2) 70%
Aortic dissection (45 patients)	No	No	Yes (2) (0–2)	Yes IBS (4.5) range (2–6)	6 (2–7)	6 (2–7)	2 (1–4) 100%

RBCc, red blood cell concentrate; EPO, erythropoietin; PABD, pre-surgical autologous blood donation; PBC, peri-surgical blood collection; ANH, acute normovolemic hemodilution; IBS, intra-surgical blood salvage.

[a] Median no. of RBCc units.

[b] Median no. of units.

[c] % Of patients transfused with allogeneic RBCc.



	Protesi anca	Protesi gin.	Nefrectomia	Cardiovascolare
2008	90%	80%	100%	90%
2010	50%	25%	40%	60%

Risultati 2008-2010

The present and future of Transfusion Medicine

Erhard Seifried, Markus M. Mueller

Institute for Transfusion Medicine and Immunohematology, Clinics of the Johann Wolfgang Goethe-University Frankfurt am Main; German Red Cross. Blood Transfusion Service Baden-Wuerttemberg, Hessen, Germany

Current status of haemotherapy

Today's sources of blood components worldwide

Precisely aimed promotion and information, targeted motivation and selection of non-remunerated, healthy volunteer repeat donors form the foundation of a safe and secure blood product supply in highly developed countries. In most developing and transitional countries, by contrast, family, replacement and paid blood donors are still a significant source of blood components for transfusion according to the World Health Organization (WHO). Apart from the fact that the risk of transmitting blood-borne pathogens from these blood products is also higher, such sources of safe blood can only be assured by regular donations from unpaid, voluntary blood donors. In addition, less than half of the 85 million annual blood donations worldwide each year are from the less developed regions where more than 75 percent of the world's population live. A donation rate of less than 10 per 1,000 of the population per year is considered insufficient for the development of modern medicine. In developing and transitional countries, most blood components are used for obstetric complications and maternal and infant anaemia; in contrast, in developed countries, most blood components are destined to older patients undergoing complex cardiovascular surgery, or who have trauma or sepsis, or require supportive treatment because of malignancies.

Standards in procurement of safe blood products

A structured history of each blood donor, a medical interview and examination by a physician are not only helpful in excluding potential risks for recipients, but also serve to protect the health and well-being of donors. In addition to these important safety measures, laboratory tests play an integral part in ensuring blood safety. The laboratory work-up includes searches for blood-borne pathogens, which will be discussed later on, precise determination of blood groups (e.g. ABO, Rh and Kell systems) and demonstration of the absence of clinically relevant antibodies in donors' plasma.

European harmonisation of quality standards for blood donations, testing and component production, adequate use of blood components in clinical haemotherapy as well as increasing cost pressures in clinical care are aspects currently receiving great attention.

The safe and sufficient supply of blood that highly developed countries currently enjoy could be endangered by factors such as the aging of the population in Europe, globalisation, increased international travel, and the proposed establishment of a "blood market" in Europe. Novel approaches to advertising as well as donor marketing and efforts to foster altruistic attitudes in society are required to combat these trends. A sufficient supply of safe blood components is vital for modern societies and it remains to be seen whether this major requirement current supportive medical care can best be achieved by national Red Cross organisations, hospitals, private pharmaceutical companies, governmental organisations or, possibly, a combination of these. The question has arisen as to whether it is better to establish smaller, hospital-based blood donor services that can work closely with hospital staff or bigger entities that function like pharmaceutical companies and that are able to reduce costs through economies of scale.

Ensuring safe blood components by testing for pathogens and pathogen reduction

Blood-borne pathogens have been a challenge for transfusion medicine since the beginning of haemotherapy. Direct transfusion of whole blood was recognised early on as a potential cause of transmission

Presented in part at the XXXIX Convegno Nazionale di Studi di Medicina Trasfusionale (Milan, Italy, 9-12 June 2010).

Blood Transfus 2011;9:371-6 DOI 10.2450/2011.0097-10

THE PRESENT AND FUTURE OF TRANSFUSION MEDICINE.....BLOOD LESS MEDICINE....

"Bloodless medicine" and growth factors: reasonable aims in modern medicine?

Many experts are calling for a shift towards "bloodless medicine". Differences in utilisation rates for blood components in various European countries are not correlated with significant differences in either clinical care or mortality rates. In contrast to developing countries, higher usage of blood components in Europe does not necessarily translate into higher quality supportive care. However, evidence of any true benefit from "bloodless medicine" is lacking.

Appropriate use of blood products is a goal worth aiming for, as discussed above. Nevertheless, the risk of under-transfusion in some patients exists. Furthermore, in some European countries, policies of reducing allogeneic blood transfusion led to less advertising for and mobilising of healthy volunteer blood donors which then resulted in a dramatic drop in blood donations that endangers the blood supply in these countries.

Growth factors such as erythropoietin have been successfully used in patients with erythropoietin-deficient chronic renal diseases, but adverse events such as a potential increase in tumour growth and

GRAZIE PER L'ATTENZIONE

Staff Medici

Staff Infermieri Professionali

Staff tecnici recupero sangue