

Transfusion medicine and anaemia clinics: does all end here?

Stefania Vaglio



Special Conference

Il Patient Blood Management: non solo una questione di ferro e anemia

Roma, 15 ottobre 2015

La sottoscritta, Stefania Vaglio, in qualità di Relatore

dichiara che

nell'esercizio della Sua funzione e per l'evento in oggetto, NON E' in alcun modo portatore di interessi commerciali propri o di terzi; e che gli eventuali rapporti avuti negli ultimi due anni con soggetti portatori di interessi commerciali non sono tali da permettere a tali soggetti di influenzare le proprie funzioni al fine di trarne vantaggio.

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Il Patient Blood Management: non solo una questione di ferro e anemia

Roma, 15 ottobre 2015

Patient blood management: l'obiettivo

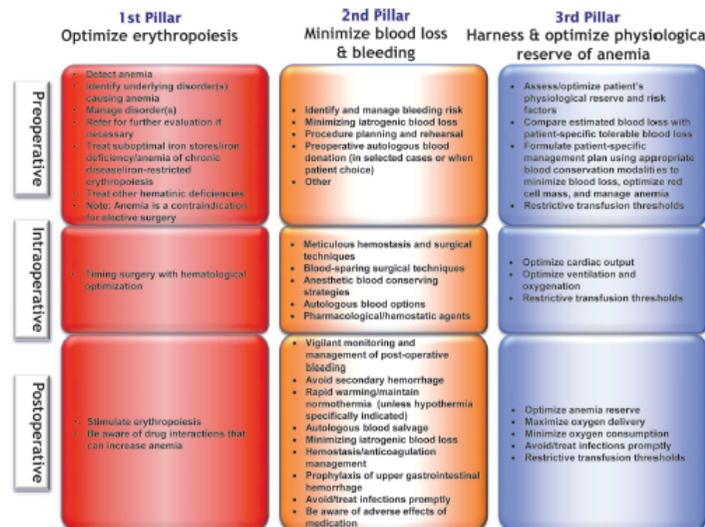
Prevenire o ridurre in modo significativo l'utilizzo di emocomponenti e di medicinali plasmaderivati, gestendo tutti i fattori di rischio modificabili che possono comportare la trasfusione, in tempo utile.

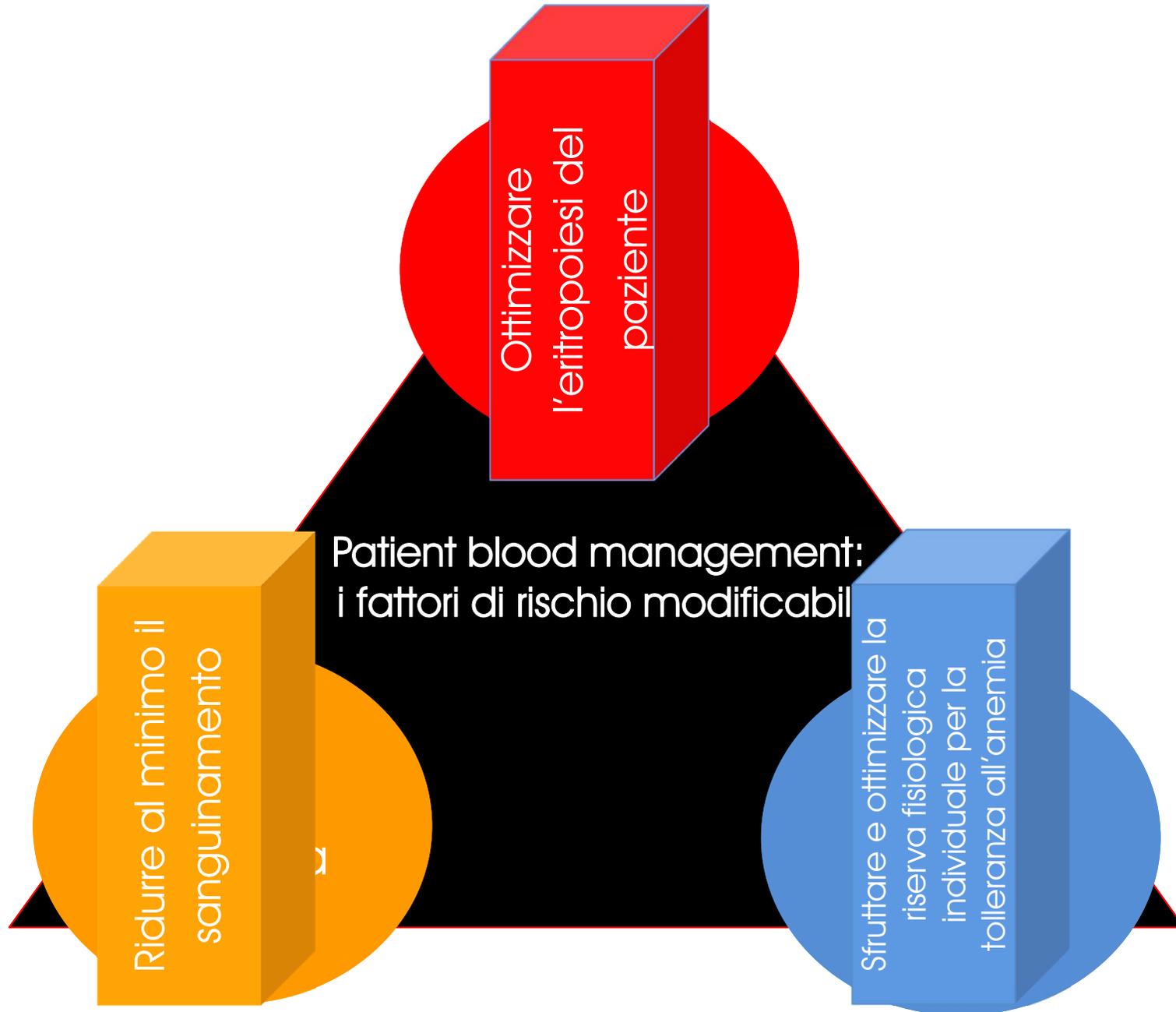


Patient blood management: i fattori di rischio modificabili

Quadri clinici che possono causare *outcome* avversi e il ricorso alla terapia trasfusionale allogenica.

Anemia Perdita ematica Ipossia





Patient blood management: l'Anaemia Clinic

Struttura ambulatoriale multidisciplinare che assume il ruolo di *case manager*.

Gli specialisti dell'*Anemia Clinic* (anestesista, chirurgo, specialista in medicina trasfusionale, esperto di emostasi e trombosi, ematologo clinico, cardiologo, o altro specialista), hanno il compito di impostare il programma multidisciplinare di interventi coordinati, finalizzato alla gestione peri-operatoria della risorsa "sangue del paziente".



Patient blood management: gestire i fattori di rischio modificabili in tempo utile

La valutazione pre-operatoria del paziente, finalizzata a rilevare un'eventuale anemia e a ottimizzare l'eritropoiesi, a identificare e gestire il rischio emorragico nonché a valutare e ottimizzare la riserva fisiologica individuale per la tolleranza all'anemia e i fattori di rischio deve essere eseguita almeno 30 giorni prima della data programmata dell'intervento, in modo da consentire un approfondimento diagnostico e/o la pianificazione di adeguate misure terapeutiche.



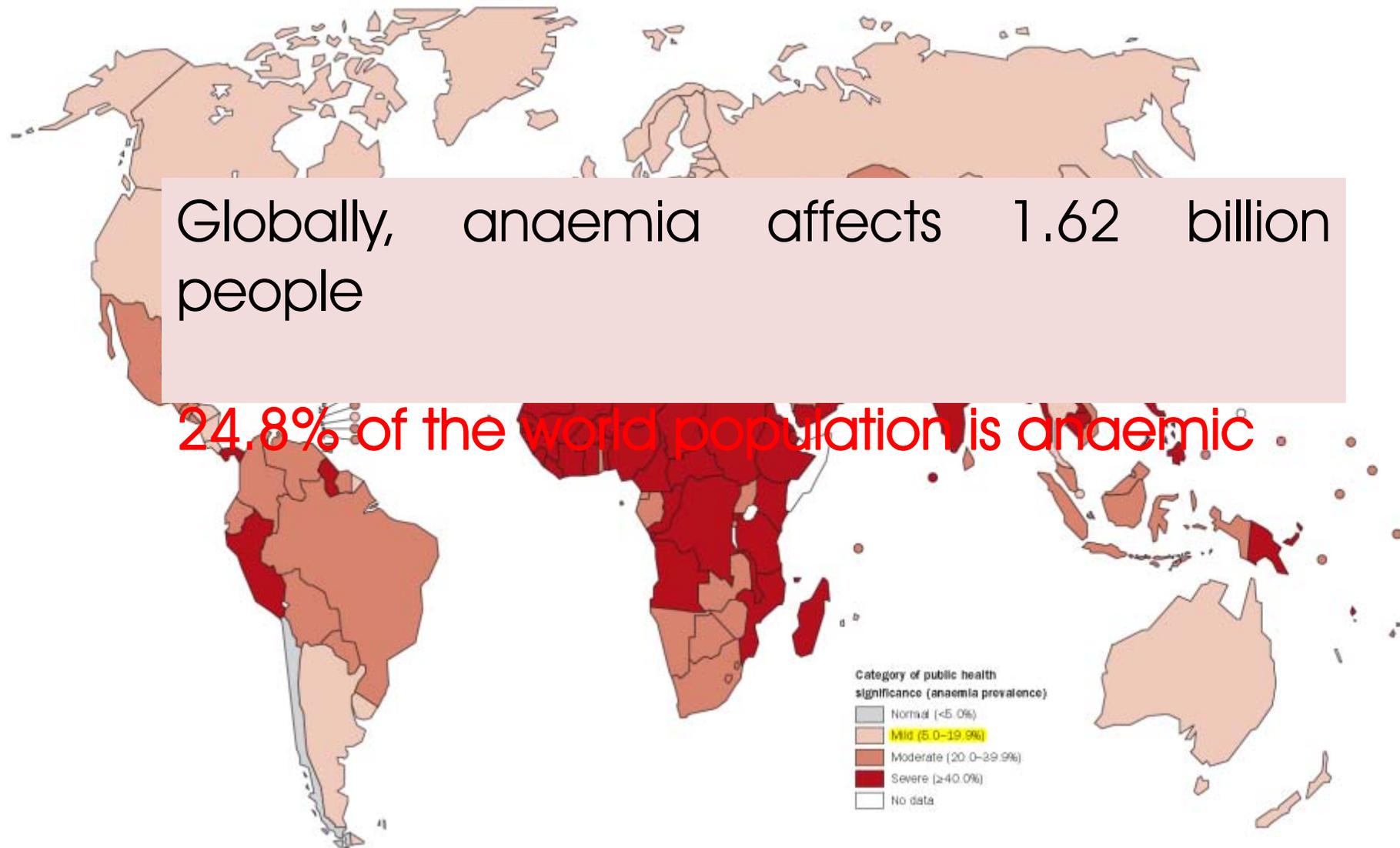
L'anemia è spesso "accettata", come se facesse inevitabilmente parte delle "regole del gioco"

"Tradizionalmente" l'anemia è considerata (e accettata) come un problema di poco conto che può essere facilmente corretto con la trasfusione.

Per la comunità medica la terapia trasfusionale è la posizione di default nel trattamento dell'anemia e/o del sanguinamento

Il nuovo paradigma: l'anemia è un fattore di rischio indipendente di morbilità (e mortalità)

Global anaemia prevalence





Preoperative anaemia is common in patients undergoing major gynaecological surgery and is associated with a fivefold increased risk of transfusion

Roger M. BROWNING,¹ Kevin TRENTINO,² Elizabeth A. NATHAN,³ Navid HASHEMI¹ and On behalf of the Western Australian Patient Blood Management Program

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L'anemia pre-operatoria è comune nelle pazienti candidate a chirurgia ginecologica maggiore ed è associato ad un incremento di 5 volte del rischio di trasfusione

843 pazienti da sottoporre a chirurgia maggiore ginecologica in un biennio

Anemia pre-op: nel 18,1% delle pazienti

L'anemia era associata ad un rischio significativamente maggiore di ricevere supporto trasfusionale (OR: 5,74 – p < 0,001)

E' necessario implementare una modalità per rilevare e trattare l'anemia in queste pazienti prima dell'intervento chirurgico; le azioni attuate dovrebbero essere valutate per verificarne l'efficacia

Assessment of anaemia in elective pre-operative orthopaedic patients

Audit di "NHS Blood and Transplant" e "Royal College of Physicians" (2007)
valutare la pratica trasfusionale ospedaliera rispetto agli standard
223 ospedali – 7.752 interventi (protesi totale di anca in elezione)

Hb non valutata nel pre-operatorio nel **29%** dei pazienti

Il **15%** dei pazienti ricoverato per intervento con Hb < 120 g/L

Pazienti trasfusi: **57%** con Hb pre-op < 120 g/L vs **20%** con Hb pre-op > 120 g/L

BJA

British Journal of Anaesthesia, 2015, 1–3

doi: 10.1093/bja/aev099

Editorial

Editorial

Non-treatment of preoperative anaemia is substandard clinical practice

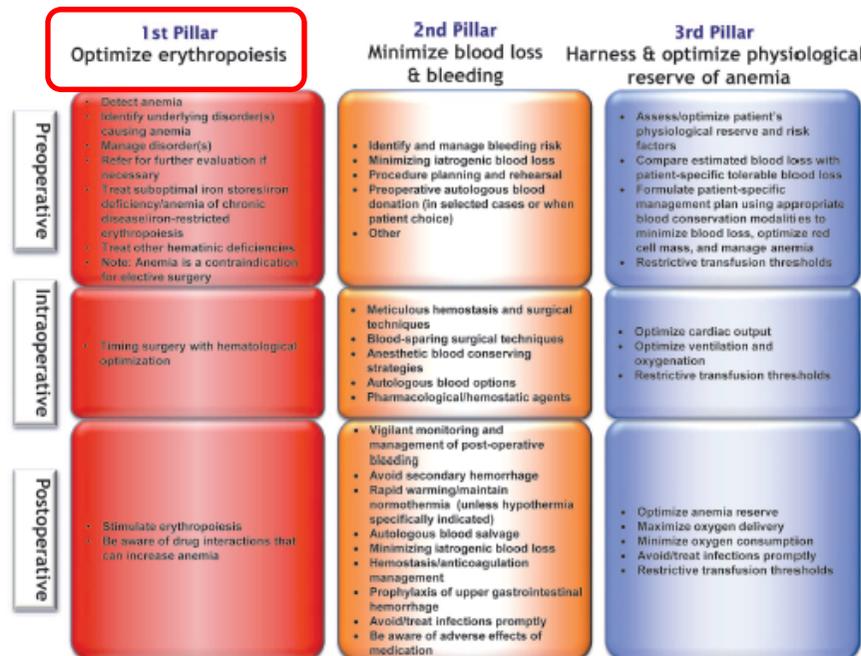
Therefore, we conclude that there is no reason why treatment of preoperative anaemia should not be widely practised. Untreated preoperative anaemia is indeed a contraindication for elective surgery, and failure to treat preoperative anaemia is substandard clinical practice.



Patient blood management: gestire i fattori di rischio modificabili

- Rilevare l'anemia
- Identificare e trattare la patologia di base che causa l'anemia
- Trattare le carenze e le anemie delle malattie croniche
- Rivalutare il paziente

Anemia



Patient blood management: gestire i fattori di rischio modificabili

- Identificare e gestire il rischio emorragico
- Contenere il sanguinamento iatrogeno
- Effettuare un'attenta pianificazione e preparazione della procedura
- Prevedere il predeposito

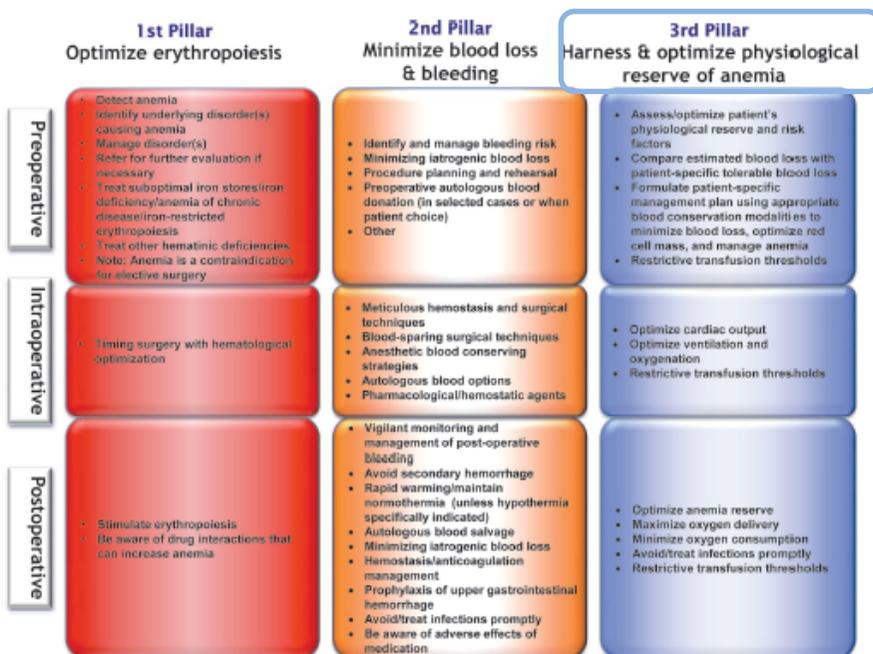
Perdita ematica



Patient blood management: gestire i fattori di rischio modificabili

- Valutare e ottimizzare la riserva fisiologica individuale per la tolleranza all'anemia e i fattori di rischio
- Confrontare la perdita di sangue stimata con quella tollerabile dal singolo paziente
- Realizzare programmi che includano tecniche di risparmio del sangue
- Indicare l'adozione di soglie trasfusionali restrittive

Ipossia



Predeposito

L'autotrasfusione mediante predeposito consiste nella raccolta di unità di sangue da un paziente (predeposito), nella loro conservazione (senza frazionamento) e nell'utilizzo esclusivo per il paziente-donatore.

L'autotrasfusione mediante predeposito è utilizzata nei casi riconosciuti appropriati dalla letteratura scientifica.

- Ad oggi risulta indicata per i pazienti con fenotipo eritrocitario raro
- con alloimmunizzazioni complesse per i quali è impossibile reperire emocomponenti compatibili
- per il donatore di cellule staminali emopoietiche midollari

Non vi è, comunque, indicazione al ricorso ad un programma di raccolta autologa se l'emoglobina del paziente ha un valore basale tale che, considerate le perdite peri-operatorie attese, possa prevedersi un valore di emoglobina stabilizzato post-intervento pari o superiore a 100 gr/L.





Predeposito

Non è dimostrato che il predeposito diminuisca il rischio di ricevere supporto trasfusionale allogenico, anzi...

Objectives

To examine the evidence for the efficacy of pre-operative autologous blood donation (PAD) in reducing the need for perioperative allogeneic red blood cell (RBC) transfusion.

Authors' conclusions

Although the trials of PAD showed a reduction in the need for allogeneic blood, the methodological quality of the trials was poor and the overall transfusion rates (allogeneic and/or autologous) in these trials were high, and were increased by recruitment into the PAD arms of the trials. This raises questions about the true benefit of PAD. In the absence of large, high quality trials using clinical endpoints, it is not possible to say whether the benefits of PAD outweigh the harms.

People often give their own blood before surgery for use if transfusion is needed (autologous donation). However, the review of trials found that it is not certain that people benefit. While pre-operative donation may reduce the chances of needing someone else's blood, it increases the chances of transfusion overall. It may be that donation causes some anaemia (low red blood cells), or surgeons are more likely to transfuse if autologous blood is available. Over-transfusion has risks, especially for older people.





Recupero intra-operatorio

Le meta-analisi attualmente disponibili dimostrano che il RIO riduce in modo significativo il fabbisogno trasfusionale di emazie allogeneiche negli interventi di chirurgia elettiva.

Uno studio del 2013 sulla valutazione dell'efficacia delle tecniche di autotrasfusione, basato su modelli matematici, lo indica come la tecnica più efficace ed efficiente.

BLOOD MANAGEMENT

Ranking the effectiveness of autologous blood conservation measures through validated modeling of independent clinical data

Günter Singbartl, Anna-Lena Held, and Kai Singbartl



Recupero intra-operatorio

Patient Blood Management in Elective Total Hip- and Knee-replacement Surgery (Part 2)

A Randomized Controlled Trial on Blood Salvage as Transfusion Alternative Using a Restrictive Transfusion Policy in Patients with a Preoperative Hemoglobin above 13 g/dl

Cynthia So-Osman, M.D., Ph.D., M.Sc., Rob G. H. H. Nelissen, M.D., Ph.D., Ankie W. M. M. Koopman-van Gemert, M.D., Ph.D., Ewoud Kluyver, M.D., Ruud G. Pöll, M.D., Ph.D., Ron Onstenk, M.D., Joost A. Van Hilten, Ph.D., Thekla M. Jansen-Werkhoven, Ph.D., Wilbert B. van den Hout, Ph.D., Ronald Brand, Ph.D., Anneke Brand, M.D., Ph.D.

Tuttavia, un recente studio randomizzato controllato condotto nello specifico setting della chirurgia protesica in elezione degli arti inferiori, in pazienti con valori di Hb pre-operatoria superiori a 130 g/dL, ha dimostrato che il RIO, analogamente al recupero post-operatorio, non solo non è in grado di contenere il fabbisogno trasfusionale, ma aumenta i costi.



Tecniche chirurgiche di risparmio del sangue

Quanto più è elevata la perdita di sangue prevista, tanto più è consigliato l'uso di tecniche multiple di riduzione del sanguinamento che siano adatte alle circostanze cliniche.

Devono essere applicate un'emostasi e una tecnica operatoria meticolose.

L'emostasi deve essere raggiunta con una combinazione di metodi, già a partire dall'approccio chirurgico, che deve avere minimo impatto traumatico, con esposizione operatoria ben pianificata attraverso piani tissutali meno vascolarizzati e con un trattamento atraumatico dei tessuti.



Tecniche chirurgiche di risparmio del sangue

Immediatamente prima dell'incisione chirurgica può essere iniettata localmente una dose di anestetico locale e adrenalina, così da ottenere una rapida e localizzata vasocostrizione.

La durata dell'intervento deve essere ridotta al minimo ed eventualmente, nei casi di procedure complesse per le quali siano pianificati reinterventi, soprattutto in pazienti politraumatizzati, si deve ricorrere a una chirurgia frazionata per stadi.

Per alcune tipologie di intervento nella fase intra-operatoria il chirurgo, per ottenere una perfetta emostasi, ha a disposizione strumenti chirurgici emostatici (bisturi mono o bipolare, bisturi a ultrasuoni o il coagulatore ad argon).

Per la chirurgia protesica di ginocchio, sebbene di recente introduzione, è ormai assodato l'utilizzo di tecniche operatorie e strumentazione "dedicata".





The Journal of Thoracic and Cardiovascular Surgery

Available online 7 September 2015

In Press, Corrected Proof — Note to users



Expert opinion

Fit the operation to the patient, not the patient to the operation

Joseph F. Sabik III, MD  



A Comparison of Neuraxial Block Versus General Anesthesia for Elective Total Hip Replacement: A Meta-Analysis

William J. Mauermann, MD
Ashley M. Shilling, MD
Zhiyi Zuo, MD, PhD

BACKGROUND: A recent meta-analysis showed that compared with general anesthesia (GA), neuraxial block reduced many serious complications in going various types of surgeries. It is not known whether this finding in studying heterogeneous patient groups is applicable to a particular population. We performed the present meta-analysis to determine whether this choice affected the outcome after elective total hip replacement.

Anesthesiology
2000; 93:115-21
© 2000 American Society of Anesthesiologists, Inc.
Lippincott Williams & Wilkins, Inc.

Lumbar Plexus Block Reduces Pain and Blood Loss Associated with Total Hip Arthroplasty

Robert D. Stevens, M.D.,* Elisabeth Van Gessel, M.D.,† Nicolas Flory, M.D.,‡ Roxane Fournier, M.D.,‡ Zdravko Gamulin, M.D.†

Tecniche anestesilogiche di risparmio del sangue

Diversi studi hanno dimostrato come il ricorso a tecniche di anestesia neuroassiale (epidurale e subaracnoidea), specialmente se applicate a interventi ortopedici, possa associarsi a una riduzione significativa del sanguinamento.

Oltre all'anestesia neuroassiale, anche il blocco del plesso lombare può associarsi a una riduzione delle perdite ematiche sia intra-operatorie (22%, 310 mL rispetto a 617 mL) sia totali (45%, 712 mL rispetto a 1074 mL), quando impiegato in pazienti sottoposti a chirurgia protesica dell'anca.

BLOOD LOSS REDUCED DURING HIP ARTHROPLASTY BY LUMBAR PLEXUS BLOCK

R. TWYMAN, T. KIRWAN, M. FENNELLY

From Westminster Hospital, London

EDITORIAL



Patient blood management: from blood-sparing techniques to the rationale use of blood products

Jens Meier, Dirk Meininger, and Kai Zacharowski

The term 'blood sparing' is misleading and even connected to negative associations. It suggests that the aim of the measures used is mainly to save blood, and consequently to save money.

The term 'sparing' suggests inferiority and connects all associated measures to this attribute.

The rationale use of blood products is not driven by rationalization but by the wish to improve perioperative patient care.

Diagnostica point-of-care

Il monitoraggio con strumenti POC può essere effettuato in pronto soccorso, in sala operatoria, nelle strutture trasfusionali in laboratorio, o nelle terapie intensive post-operatorie, garantendo tempistiche di esecuzione ridotte rispetto ai test di laboratorio standard.



Thrombelastography/thromboelastometry

R. J. LUDDINGTON *Haematology Department, Addenbrooke's Hospital, Cambridge, UK*

Diagnostica point-of-care

I principali strumenti POC impiegabili per il monitoraggio globale dell'emostasi sono il tromboelastografo (TEG) e il tromboelastometro (ROTEM).

Essi producono risultati rapidi, sia numerici sia grafici, e sono in grado di rilevare l'effetto anticoagulante dell'acidosi o dell'ipo- e ipertermia, poiché possono essere utilizzati in un range di temperatura corporea compreso tra 22 e 42 °C; inoltre, consentono di rilevare e quantificare la piastrinopenia, i deficit fattoriali, l'effetto dell'eparina, l'ipofibrinogenemia e l'iperfibrinolisi.



Diagnostica point-of-care

EJA

Eur J Anaesthesiol 2013; **30**:270–382

GUIDELINES

Management of severe perioperative bleeding

Guidelines from the European Society of Anaesthesiology

Sibylle A. Kozek-Langenecker, Arash Afshari, Pierre Albaladejo, Cesar Aldecoa Alvarez Santullano, Edoardo De Robertis, Daniela C. Filipescu, Dietmar Fries, Klaus Görlinger, Thorsten Haas, Georgina Imberger, Matthias Jacob, Marcus Lancé, Juan Llau, Sue Mallett, Jens Meier, Niels Rahe-Meyer, Charles Marc Samama, Andrew Smith, Cristina Solomon, Philippe Van der Linden, Anne Juul Wikkelsø, Patrick Wouters and Piet Wyffels

Implementation of transfusion and coagulation management algorithms (based on ROTEM/TEG) can reduce transfusion-associated costs in trauma, cardiac surgery and liver transplantation. **B**



Thrombelastography (TEG) or thromboelastometry (ROTEM) to monitor haemotherapy versus usual care in patients with massive transfusion (Review)

Afshari A, Wikkelso A, Brok J, Moller AM, Wetterslev J

Diagnostica point-of-care



Una recente revisione sistematica Cochrane ha evidenziato che l'impiego di TEG e ROTEM, per monitorare l'emostasi nei pazienti con sanguinamento massivo, non determina vantaggi significativi in termini di morbilità e mortalità rispetto ai test standard di laboratorio.

Sono, invece, diffusamente impiegati in chirurgia di elezione, negli interventi di cardiocirurgia e, in particolare, in trapiantologia epatica e nella chirurgia ortopedica maggiore, soprattutto per guidare la terapia sostitutiva dei fattori della coagulazione (con plasma o concentrato di fibrinogeno) oppure per monitorare l'iperfibrinolisi e valutare l'eventuale impiego di TXA.



Detecting, managing and monitoring haemostasis: viscoelastometric point-of-care testing (ROTEM, TEG and Sonoclot systems)

Issued: August 2014

NICE diagnostics guidance 13
www.nice.org.uk/dg13



1 Recommendations

Cardiac surgery

- 1.1 The ROTEM system and the TEG system are recommended to help detect, manage and monitor haemostasis during and after cardiac surgery.
- 1.2 The Sonoclot system is only recommended for use in research to help detect, manage and monitor haemostasis during and after cardiac surgery. Research is recommended into the clinical benefits and cost effectiveness of using the Sonoclot system during and after cardiac surgery (see [section 7.1](#)).
- 1.3 Healthcare professionals using the ROTEM system and the TEG system during cardiac surgery should have appropriate training and experience with these devices.

Emergency control of bleeding

- 1.4 There is currently insufficient evidence to recommend the routine adoption of viscoelastometric point-of-care testing (ROTEM, TEG and Sonoclot systems) in the NHS to help detect, manage and monitor haemostasis in the emergency control of bleeding after trauma and during postpartum haemorrhage.
Research is recommended into the clinical benefits and cost effectiveness of using viscoelastometric point-of-care testing to help in the emergency control of bleeding after trauma or during postpartum haemorrhage (see [section 7.2](#)).

Diagnostica point-of-care

La decisione di trasfondere emazie concentrate nel periodo peri-operatorio si basa anche sulla valutazione della concentrazione di Hb attuale del paziente.

La disponibilità di una misurazione affidabile, rapida e dinamica di tale parametro con strumenti *Point-of-care* incrementa la sicurezza e ottimizza l'intervento trasfusionale.



GUIDELINES

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Due to low sensitivity and specificity, haematocrit and haemoglobin concentration should not be used as exclusive measures to monitor the extent of acute blood loss.^{304,305} However, since haemoglobin concentration is one important determinant of systemic oxygen delivery, it should be monitored regularly.



Impact of Continuous and Noninvasive Hemoglobin Monitoring on Intraoperative Blood Transfusions

Ehrenfeld J.M., Henneman J.P., Sandberg W.S. *Proceedings of the 2010 Annual Meeting of the American Society Anesthesiologists*. 2010; LB05 (abstract).

Background

Blood transfusions continue to pose real patient risk in the form of adverse outcomes, such as postoperative infection, cancer recurrence, impaired pulmonary function, as well as increased length of stay and mortality.¹⁻⁹ Additionally, transfusion is a costly and significant contributor to the expense of surgical care.¹⁰ Laboratory hemoglobin (Hb) values are a primary indicator of the need for blood transfusion, but testing is intermittent and results are often delayed. Continuous, noninvasive hemoglobin (SpHb) monitoring is now possible with a pulse CO-Oximeter and multi-wavelength adhesive sensor. **We hypothesized that SpHb monitoring could reduce intraoperative blood transfusions.**

Results

A total of **327 patients** were enrolled (157 standard care, 170 SpHb). Procedures included hip replacement (31%), knee replacement (29%), and spinal surgery (14%). There were no differences between the standard care and SpHb groups in ASA physical status (2.2 vs 2.2), age (60.8 vs 61.9 yrs), male gender (54 vs 48%), preoperative lab hemoglobin (13.6 vs 13.5 g/dL), surgical duration (127 vs 114 minutes), or surgical type. **More patients received intraoperative transfusions in the standard care group compared to the SpHb group (4.5 vs 0.6%, $p=0.03$). The mean number of units of blood transfused was also higher in the standard care group compared to the SpHb group (0.10 vs 0.01, $p=0.0001$).** No patient from either group received a transfusion during the immediate 12-hour post operative period. The frequency of patients receiving intraoperative Hb testing and the mean number of Hb tests performed were similar in the standard care and SpHb groups (16.3 vs 11.8%, $p=ns$, and 0.21 vs 0.24 tests per case, $p=ns$, respectively). Intraoperative SpHb and laboratory Hb values showed good agreement (mean difference 1.1 ± 0.68 g/dL). **There was no difference between groups in 30-day complication rates.**

Transfusions by Group

	Standard Care Group (n=157)	SpHb Group (n=170)	p Value
Patients Receiving a Transfusion, n (%)	7 (4.5%)	1 (0.6%)	0.03
Total Units Transfused, n (mean)	15 (0.10)	2 (0.01)	0.0001

Conclusion

Use of SpHb monitoring resulted in fewer intraoperative blood transfusions.

RESEARCH ARTICLE

Open Access

Tranexamic acid and the reduction of blood loss in total knee and hip arthroplasty: a meta-analysis

Rajiv Gandhi^{1*}, Heather MK Evans², Safiyah R Mahomed³ and Nizar N Mahomed⁴

Abstract

Background: Tranexamic acid (TXA) is an antifibrinolytic drug used as a blood-sparing technique in many surgical specialties. The principal objective of our meta-analysis was to review randomized, controlled trials (RCT) comparing total blood loss and the number of patients receiving allogeneic blood transfusions with and without the use of TXA for knee (TKA) and hip (THA) arthroplasty.

Methods: Studies were included if patients underwent primary unilateral TKA or THA; the study involved the comparison of a TXA treatment group to a control group who received either a placebo or no treatment at all; outcome measures included total blood loss TBL, number of patients receiving allogeneic blood transfusions, and/or incidence of thromboembolic complications; the study was a published or unpublished RCT from 1995 – July 2012.

Results: Data were tested for publication bias and statistical heterogeneity. Combined weighted mean differences in blood loss favoured TXA over control for TKA and THA patients respectively [-1.149 ($p < 0.001$; 95% CI -1.298, -1.000), -0.504 ($p < 0.001$; 95% CI, -0.672, -0.336)]. Combined odds ratios favoured fewer patients requiring allogeneic transfusions for TKA and THA with the use of TXA respectively [0.145 ($p < 0.001$; 95% CI, 0.094, 0.223), 0.327 ($p < 0.001$; 95% CI, 0.208, 0.515)]. Combined odds ratios indicated no increased incidence of DVT with TXA use in TKA and THA respectively [1.030 ($p = 0.946$; 95% CI, 0.439, 2.420), 1.070 ($p = 0.895$; 95% CI, 0.393, 2.911)].

Conclusions: TXA should be considered for routine use in primary knee and hip arthroplasty to decrease blood loss.

Keywords: Tranexamic acid, Antifibrinolytic, Allogeneic transfusions, Joint replacement



■ INSTRUCTIONAL REVIEW

A systematic review and meta-analysis of the topical administration of tranexamic acid in total hip and knee replacement

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J. Blenkinsopp,
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Intravenous tranexamic acid (TXA) has been shown to be effective in reducing blood loss and the need for transfusion after joint replacement. Recently, there has been interest in applying it topically before the closure of surgical wounds. This has the advantages of ease of application, maximum concentration at the site of bleeding, minimising its systemic absorption and, consequently, concerns about possible side-effects.

We conducted a systematic review and meta-analysis which included 14 randomised controlled trials (11 in knee replacement, two in hip replacement and one in both) which investigated the effect of topical TXA on blood loss and rates of transfusion. Topical TXA significantly reduced the rate of blood transfusion (total knee replacement: risk ratio (RR) 4.51; 95% confidence interval (CI): 3.02 to 6.72; $p < 0.001$ (nine trials, $I^2 = 0\%$); total hip replacement: RR 2.56; 95% CI: 1.32 to 4.97, $p = 0.004$ (one trial)). The rate of thromboembolic events with topical TXA were similar to those found with a placebo. Indirect comparison of placebo-controlled trials of topical and intravenous TXA indicates that topical administration is superior to the intravenous route.

In conclusion, topical TXA is an effective and safe method of reducing the need for blood transfusion after total knee and hip replacement. Further research is required to find its optimum dose for topical use.

Cite this article: *Bone Joint J* 2014;96-B:1005–15.



GUIDELINES

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Particularly urgent is the need to assess the mounting evidence in support of restrictive transfusion strategies as being not only safe but also potentially beneficial in terms of mortality, morbidity, postoperative outcomes and long-term survival in both cardiac and non-cardiac surgery patients.^{2–9} This evidence is challenged by the widespread practice of perioperative allogeneic blood transfusion, especially in cardiac surgery, where 40–90% of patients receive blood transfusions, using approximately 10–15% of the national supply of blood.^{10–14} There is also an urgent need to consider potential resource utilisation issues associated with aggressive use of blood products, as their preparation and storage are expensive.^{15,16}



Adozione di soglie trasfusionali restrittive

Diversi studi hanno dimostrato che l'adozione di soglie trasfusionali restrittive (Hb = 70-80 g/L) garantisce sicurezza per il paziente e contenimento del fabbisogno trasfusionale.





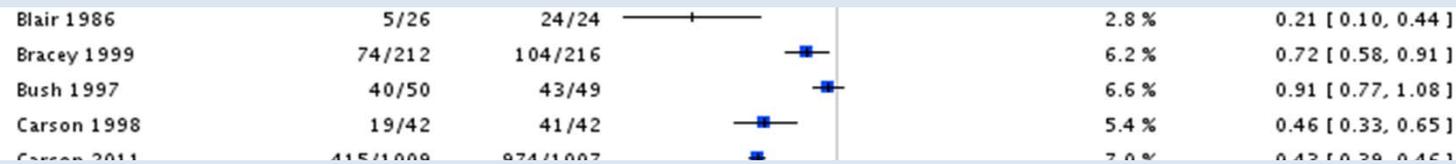
Transfusion thresholds and other strategies for guiding allogeneic red blood cell transfusion (Review)

Cochrane Database Syst Rev. 2012 Apr 19; Issue 4:CD002042

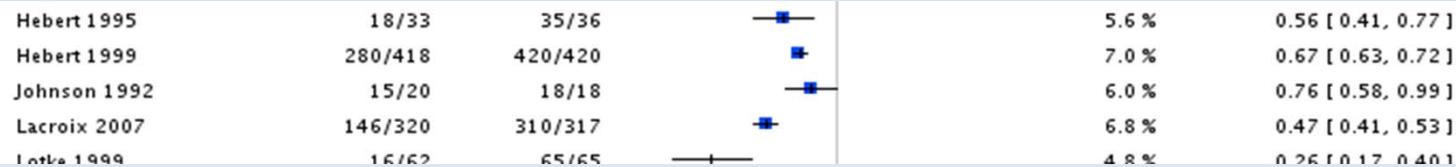
Carson JL, Carless PA, Hebert PC

Review: Transfusion thresholds and other strategies for guiding allogeneic red blood cell transfusion
 Comparison: 1 Blood transfusions
 Outcome: 1 Patients exposed to blood transfusion (all studies)

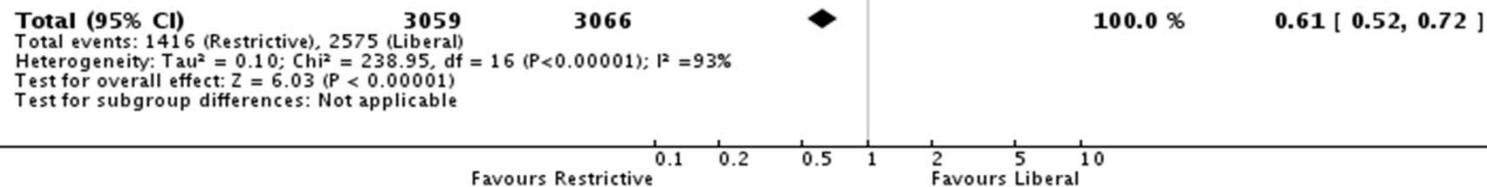
Restrictive transfusion strategies reduced the risk of receiving a RBC transfusion by 39%.



Restrictive transfusion strategies did not appear to impact the rate of adverse events compared to liberal transfusion strategies and were associated with a statistically significant reduction in hospital mortality but not 30 day mortality.



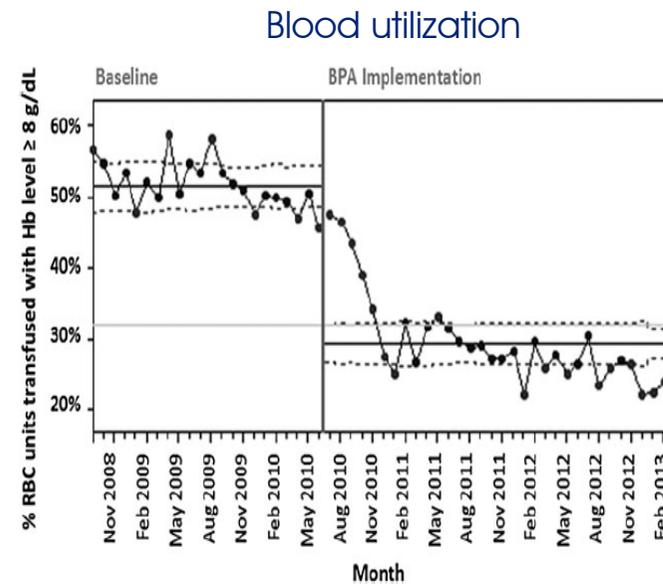
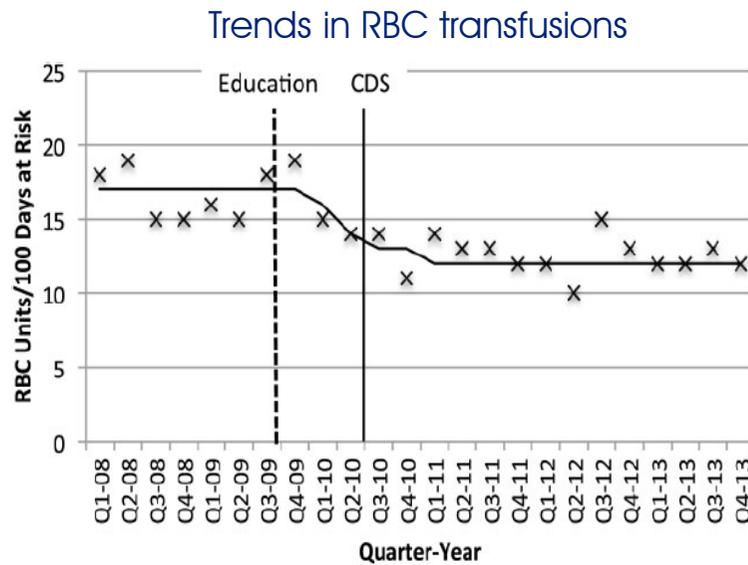
The existing evidence supports the use of restrictive transfusion triggers in most patients including those with pre-existing cardiovascular disease.



TRANSFUSION PRACTICE

Restrictive blood transfusion practices are associated with improved patient outcomes

Lawrence T. Goodnough,^{1,2} Paul Maggio,³ Eric Hadhazy,⁴ Lisa Shieh,⁵ Tina Hernandez-Boussard,³ Paul Khari,⁴ and Neil Shah¹



RBC units transfused per 100 patient-days-at-risk, in 3-month intervals from Jan 2008 through Dec 2013.

The percentage of stable patients transfused with RBCs whose last recorded Hb level was more than 8 g/dL, from Sep 2008 through Mar 2013.

TRANSFUSION PRACTICE

Restrictive blood transfusion practices are associated with improved patient outcomes

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Acquisition costs of RBC units per 1000 patient discharges decreased from \$283,130 in 2009 to \$205,050 in 2013 with total estimated savings of \$6.4 million and likely far greater impact on total transfusion-related costs.

TABLE 3. Demographic profile and clinical outcomes in stable* patients transfused RBCs

Encounters	Before BPA†	After BPA*	p value
Number	3,622	10,528	
Age (years)	59.7 (17.4)	59.8 (17)	0.76
% Female‡	54.3	50.2	<0.001
Case-mix index	2.78	2.86	<0.001
RBCs transfused	3.6 (4.1)	2.7 (3.0)	<0.001
LOS (days)	10.1 (13.3)	6.2 (10.2)	<0.001
Mortality§	5.5	3.3	<0.001
30-day readmission§	13.7	8.5	<0.001
Discharge Hb (g/dL)	9.9 (1.4)	9.0 (1.6)	<0.001

Activity-based costs of blood transfusions in surgical patients at four hospitals

Aryeh Shander, Axel Hofmann, Sherri Ozawa, Oliver M. Theusinger, Hans Gombotz, and Donat R. Spahn from the Society for the Advancement of Blood Management (SABM) and the Medical Society for Blood Management (MSBM)

Volume 50, April 2010 TRANSFUSION 753

STUDY DESIGN AND METHODS: To accurately determine the cost of blood in a surgical population from a health system perspective, an activity-based cost (ABC) model was constructed. This model accounted for consumption (materials, labor, and overhead) related to blood administration. Data were captured retrospectively from each hospital and used to populate the ABC model.

RESULTS: All major process steps, staff, and consumables to provide red blood cell (RBC) transfusions to surgical patients contributed to per-unit costs. Annual expenditures on blood and transfusion-related activities, limited to surgical patients, ranged from \$1.62 to \$6.03 million per hospital and were largely related to the transfusion rate.

410 – 420 €

Total estimated cost of blood

Using the ABC model to account for acquisition costs, all process steps, and all direct and indirect overhead costs, the total cost per RBC unit was $\$760.82 \pm \293.74 (mean \pm SD). As reflected in the SD, these costs vary widely among the participating hospitals. EHMC had the highest mean cost per unit of RBCs transfused at \$1183.32, followed by RIH at \$726.05, CHUV at \$611.44, and AKH at \$522.45. Figure 2 displays the ABC model estimate of the



An initiative of the ABIM Foundation



Five Things Physicians and Patients Should Question

2

Don't transfuse red blood cells for iron deficiency without hemodynamic instability.

Blood transfusion has become a routine medical response despite cheaper and safer alternatives in some settings. Pre-operative patients with iron deficiency and patients with chronic iron deficiency without hemodynamic instability (even with low hemoglobin levels) should be given oral and/or intravenous iron.

3

Don't routinely use blood products to reverse warfarin.

Patients requiring reversal of warfarin can often be reversed with vitamin K alone. Prothrombin complex concentrates or plasma should only be used for patients with serious bleeding or requiring emergency surgery.

4

Don't perform serial blood counts on clinically stable patients.

Transfusion of red blood cells or platelets should be based on the first laboratory value of the day unless the patient is bleeding or otherwise unstable. Multiple blood draws to recheck whether a patient's parameter has fallen below the transfusion threshold (or unnecessary blood draws for other laboratory tests) can lead to excessive phlebotomy and unnecessary transfusions.

5

Don't transfuse O negative blood except to O negative patients and in emergencies for women of child bearing potential with unknown blood group.

O negative blood units are in chronic short supply due in part to overutilization for patients who are not O negative. O negative red blood cells should be restricted to: (1) O negative patients; or (2) women of childbearing potential with unknown blood group who require emergency transfusion before blood group testing can be performed.

Single Unit Blood Transfusion

Only **ONE unit of blood** should be ordered if the inpatient does not have clinically significant bleeding

Each unit transfused is an independent clinical decision

Second unit can be requested after patient has been assessed and remains symptomatic

Indications for a second unit:

- ◆ Active blood loss
- ◆ Ongoing symptoms of anaemia



For more information on patient blood management visit www.blood.gov.au/pbm-guidelines to access the latest guidelines.

Single Unit Blood Transfusions

In accordance with the Patient Blood Management Guidelines:



- Prescribe **ONE** unit only for the symptomatic, non-bleeding patient
- Reassess the patient before requesting a second unit
- Each unit transfused is an independent clinical decision

Every **ONE** matters

For more information on patient blood management visit www.blood.gov.au/pbm-guidelines to access the latest guidelines.

Single Unit Blood Transfusions

In accordance with the Patient Blood Management Guidelines:



- Prescribe **ONE** unit only for the symptomatic, non-bleeding patient
- Reassess the patient before requesting second unit
- Each unit transfused is an independent clinical decision

Transfusion risks may be dose dependent

ONE bag is best - then reassess

For more information on patient blood management visit www.blood.gov.au/pbm-guidelines to access the latest guidelines.

Why does transfusion practice need to change?

It is important to ensure that practice aligns with the national Patient Blood Management Guidelines (Module 2 – Perioperative, Module 3 - Medical and Module 4 - Critical Care) that support a single unit transfusion.

Historically, two unit red blood cell transfusions were common practice as a single unit was not considered sufficient to correct anaemia.^{8,9} Single unit transfusions currently represent only a small proportion of all transfusion.

Red blood cell transfusion also poses on going challenges in balancing supply and demand due to the increasing age of the population: demand for blood will increase but the available donor pool will decrease.

Although the blood supply in Australia is extremely safe from the currently known infectious agents, the potential threat from as yet unknown, or re-emerging pathogens deserves cautious consideration.¹³



The [National Safety and Quality Health Service Standard 7: Blood and Blood Products](#) requires blood and blood product policies and procedures to be consistent with national evidence based guidelines for pre-transfusion practices, prescribing and clinical use of blood and blood products.¹⁴

- 7.1.1 Blood & blood product policies, procedures and/or protocols are **consistent with national evidence based guidelines** for pre-transfusion practices, prescribing & clinical use of blood & blood products
- 7.1.3 Action is taken to **increase the safety & appropriateness** of prescribing & clinically using blood & blood products
- 7.2.2 Action is taken to **reduce the risks** associated with transfusion practices & the clinical use of blood and blood products
- 7.4.1 Quality improvement activities are undertaken to **reduce the risks** of patient harm from transfusion practices & the clinical use of blood & blood products. Resources to support Single Unit Transfusion



Key Principles:

Informed consent must be obtained from the patient or responsible person / guardian.

Ensure the safety and efficacy of red blood cell transfusion by confirming every unit transfused is a clinical decision where the expected benefit outweighs the risks.

Each red blood cell transfusion should be an independent clinical decision based on the risk, benefits and alternatives. Where indicated, transfuse a single unit of red blood cells, then clinically reassess the patient to determine if further transfusion is required. Transfusion should not be based on haemoglobin level alone but should also be based on assessment of the patient's clinical status.¹³ For haemoglobin thresholds refer to the national Patient Blood Management Guidelines, Module 3 – Medical practice point 3 (PP3) and Module 4 – Critical Care practice point 4 (PP4).



Transfuse one unit at a time and only when clinically indicated, based on the need to relieve clinical signs and symptoms of anaemia.¹³ Symptoms may include dyspnoea, tachycardia, chest pain, hypotension, increased heart rate and decreased oxygen saturation.⁵⁻⁷

Single unit red blood cell transfusion reduces the patient's exposure to allogeneic blood.^{8,9}

Transfusion is a live tissue transplant and not without associated risks.

Optimising patient tolerance of anaemia is one of the three pillars of patient blood management.¹⁻³

Consider early haematological advice about anaemia management.

Risks associated with transfusion are dose dependent.^{10,11}

Red blood cell transfusion may be associated with a dose-dependent increased risk of nosocomial infection and other morbidities.^{10,11} For further information on transfusion risks see Appendix B of the national Patient Blood Management Guidelines.1-3

If one unit has achieved the stated outcome for the red blood cell transfusion, for example improvement in clinical signs and symptoms of anaemia, further units will only increase the risks.



SINGLE Unit Blood Transfusions
reduce the risk of an adverse reaction

**Don't give two
without review**



THINK!

- Is your patient symptomatic?
- Is the transfusion appropriate?
- What is the haemoglobin trigger level?
- What is the patient's target haemoglobin level?

**Each unit transfused is an
independent clinical decision**

DO!

- ✓ Clinically re-assess the patient after each unit transfused.
- ✓ Only one unit should be ordered for non-bleeding patients.
- ✓ Document the reason for Transfusion.¹

Further copies available from NHSBT.CustomerService@nhsbt.nhs.uk

¹ British Committee for Standards in Haematology: Addendum to Administration of Blood Components. 2012

Transfusion medicine and anaemia clinics: does all end here?

Stefania Vaglio

Grazie dell'attenzione!



Special Conference

Il Patient Blood Management: non solo una questione di ferro e anemia

Roma, 15 ottobre 2015