REGIONE AUTONOMA FRIULI VENEZIA GIULIA
Azienda Sanitaria Universitaria Integrata di Trieste

Implicazioni clinico-economiche di una gestione non ottimale dell'anemia

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Dipartimento di Medicina Trasfusionale
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Evento Regionale Patient Blood Management
Udine, 15 novembre 2019

Indice

- Tre domande
- Appropriatezza
- Costi della trasfusione
- Costo-efficacia dei programmi di PBM
- L’esperienza Australiana
- Riflessioni

A quanto ammontava il Prodotto Interno Lordo Italiano nel 2018?

- ❑ 1040 miliardi di Euro
- ❑ 1753 miliardi di Euro
- ❑ 2316 miliardi di Euro

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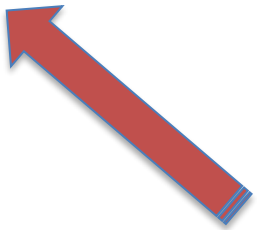

Questo è il debito pubblico!

Nel 2018, qual è stata la spesa sanitaria pubblica corrente?

- ❑ 352 miliardi di Euro
- ❑ 151 miliardi di Euro
- ❑ 115 miliardi di Euro

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Rispetto agli altri paesi Europei (nordici), quanto spende l'Italia per il proprio sistema sanitario?

- ❑ di meno
- ❑ uguale
- ❑ molto di più

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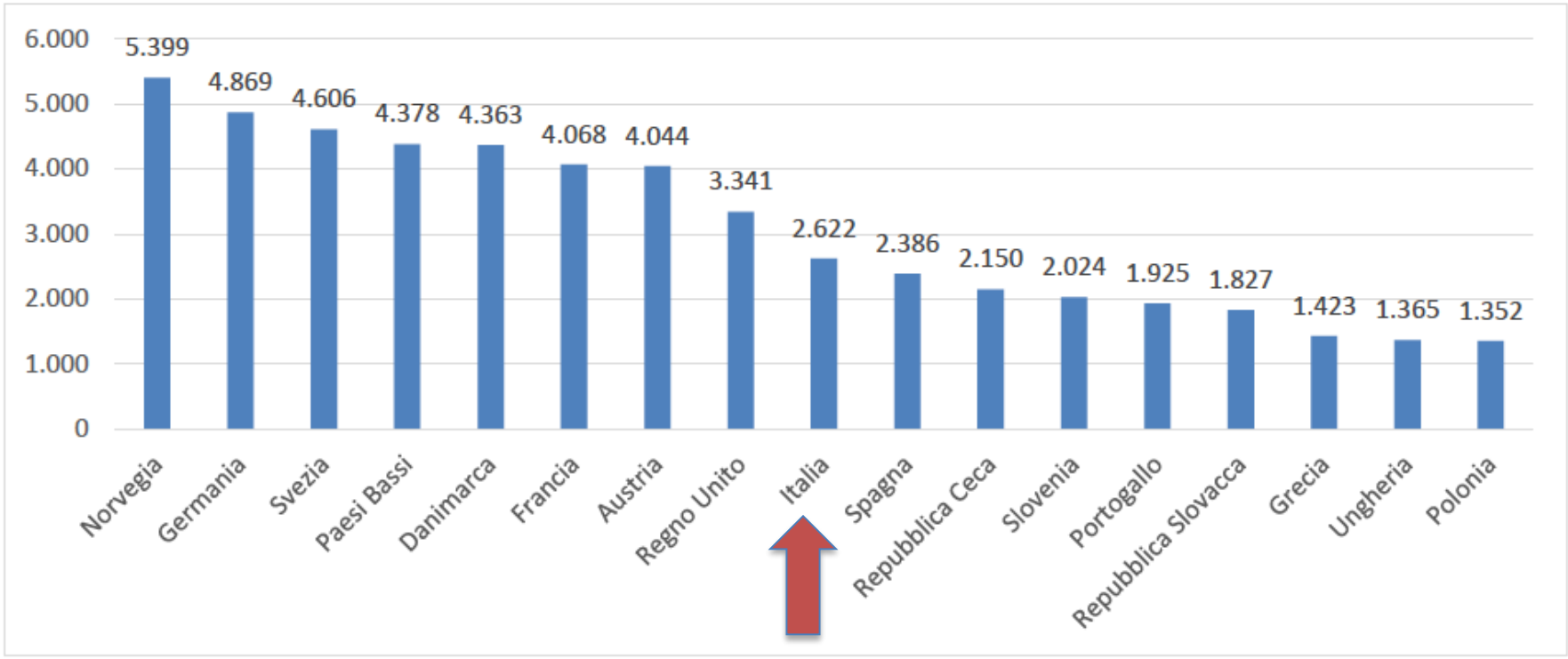
Grafico 9 Spesa *pro capite* sanitaria pubblica a parità di potere di acquisto (in USD) anno 2017



Fonte: Banca dati OCSE, estrazione dati: dicembre 2018

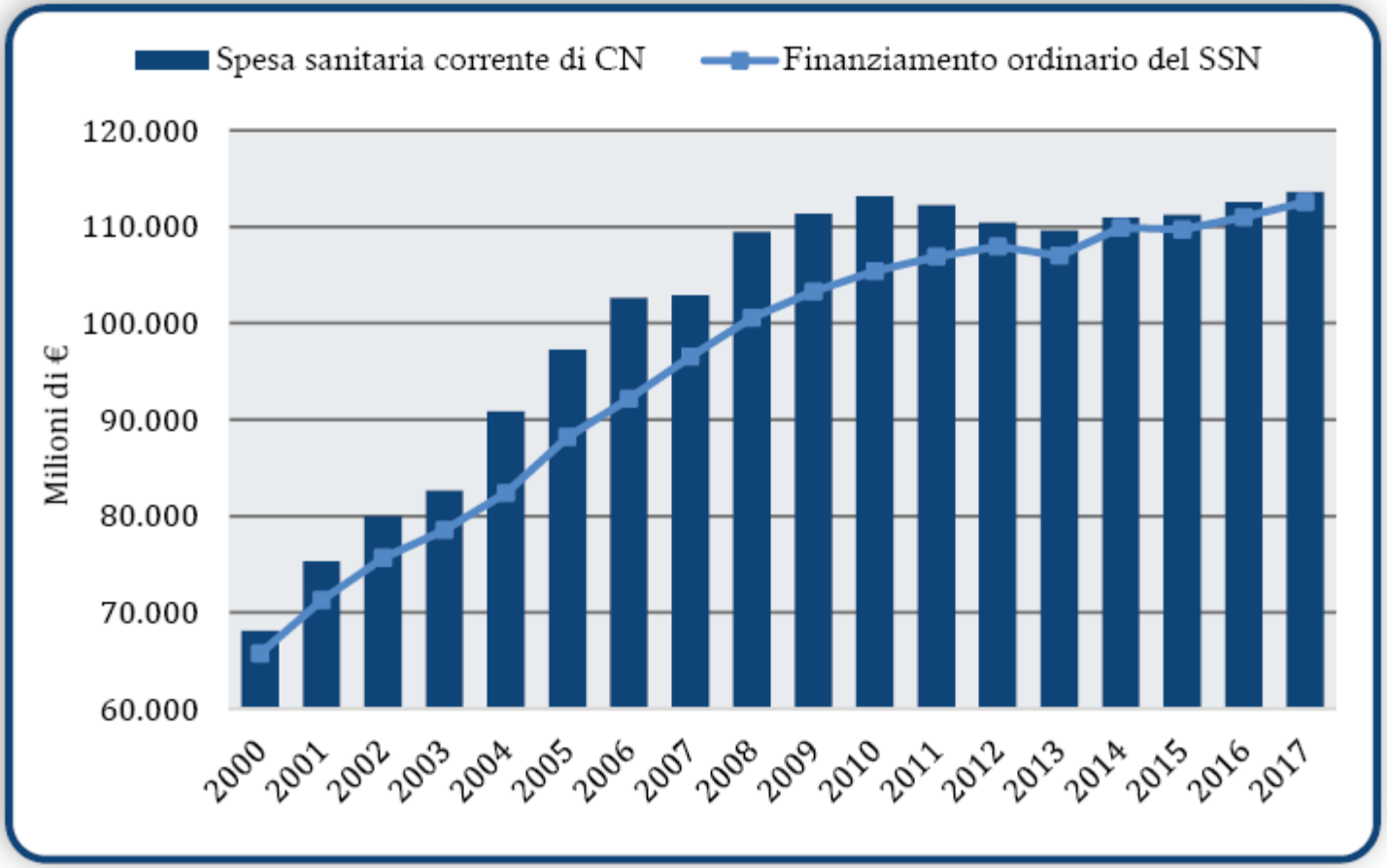


Figura 2.5. Trend spesa sanitaria corrente vs finanziamento ordinario del SSN 2000-2017 (dati da[47])

Appropriatezza in sanità

L'appropriatezza definisce un intervento sanitario (preventivo, diagnostico, terapeutico, riabilitativo) correlato al bisogno del paziente (o della collettività), fornito nei modi e nei tempi adeguati, sulla base di standard riconosciuti, con un bilancio positivo tra benefici, rischi e costi

- *Piano Sanitario Nazionale 1998-2000*
- *Livelli Essenziali di Assistenza (D.Lgs 229/99)*

The NEW ENGLAND JOURNAL of MEDICINE

REVIEW ARTICLE

Dan L. Longo, M.D., *Editor*

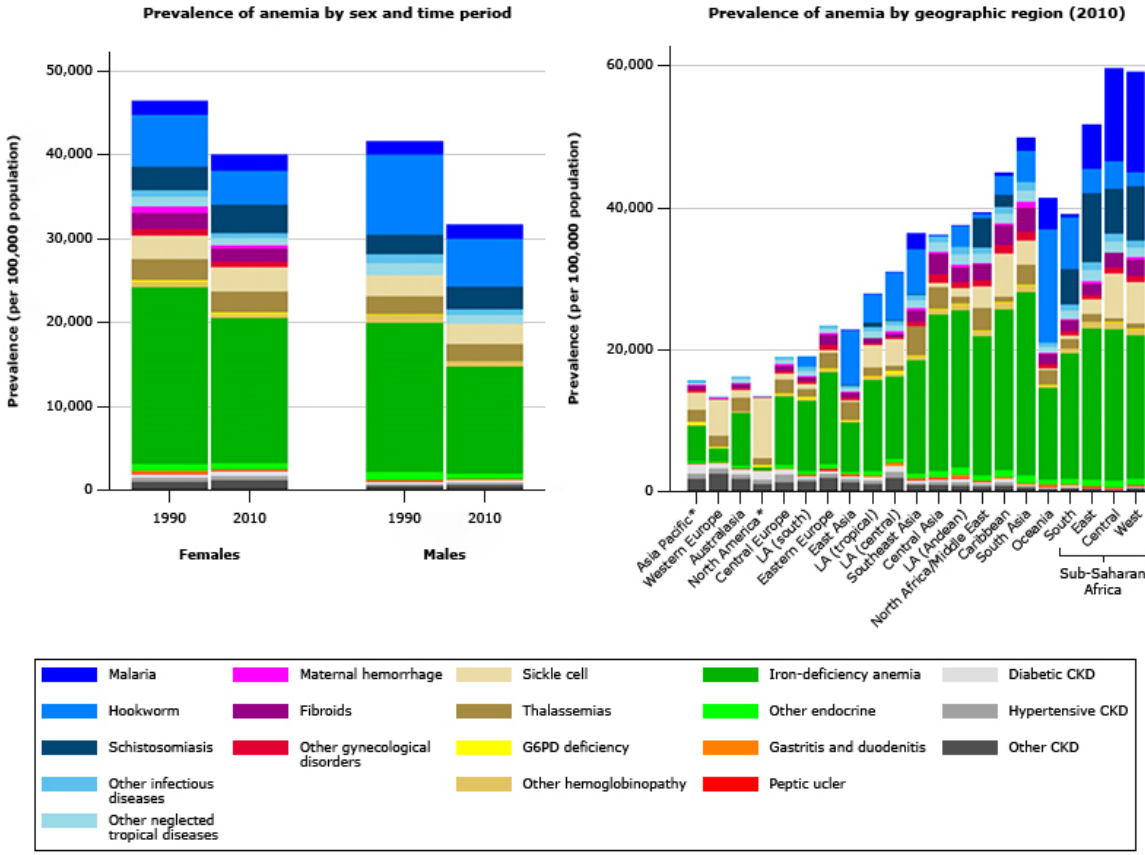
Iron-Deficiency Anemia

Clara Camaschella, M.D.

N Engl J Med 2015;372:1832-43.
DOI: 10.1056/NEJMra1401038

IRON DEFICIENCY AND IRON-DEFICIENCY ANEMIA ARE GLOBAL HEALTH problems and common medical conditions seen in everyday clinical practice. Although the prevalence of iron-deficiency anemia has recently declined somewhat, iron deficiency continues to be the top-ranking cause of anemia worldwide, and iron-deficiency anemia has a substantial effect on the lives of young children and premenopausal women in both low-income and developed countries.[1] The diagnosis and treatment of this condition could clearly be improved.

Graphs showing the prevalence of anemia according to sex, year, and geographic region, classified by underlying cause



The prevalence of anemia per 100,000 population is shown for males and females in two time periods, 1990 and 2010 (left panel), and according to geographic region in 2010 (right panel). Causes of anemia are classified by the colored bars. Iron deficiency accounted for the largest proportion of cases in almost every category. The overall prevalence decreased during the study period, with the largest improvements in iron deficiency and hookworm (for males) and in iron deficiency and maternal hemorrhage (for females). Malaria was a major cause of anemia in many regions, especially West sub-Saharan Africa. South and East Asia had more than half the world's anemia cases.

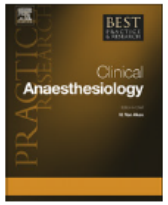
LA: Latin America; CKD: chronic kidney disease; G6PD: glucose-6-phosphate dehydrogenase.
* Applies to resource-rich countries in this region.

Best Practice & Research Clinical Anaesthesiology 27 (2013) 59–68

Contents lists available at SciVerse ScienceDirect

Best Practice & Research Clinical Anaesthesiology

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



6

Economic considerations on transfusion medicine and patient blood management

Axel Hofmann, MD, ME [a,b,c,d,*], Sherri Ozawa, RN [e,j], Albert Farrugia, BSc, PhD [b,i], Shannon L. Farmer, Research Fellow [b,c,d,k], Aryeh Shander, MD, FCCM, FCCP [e,f,g,h]

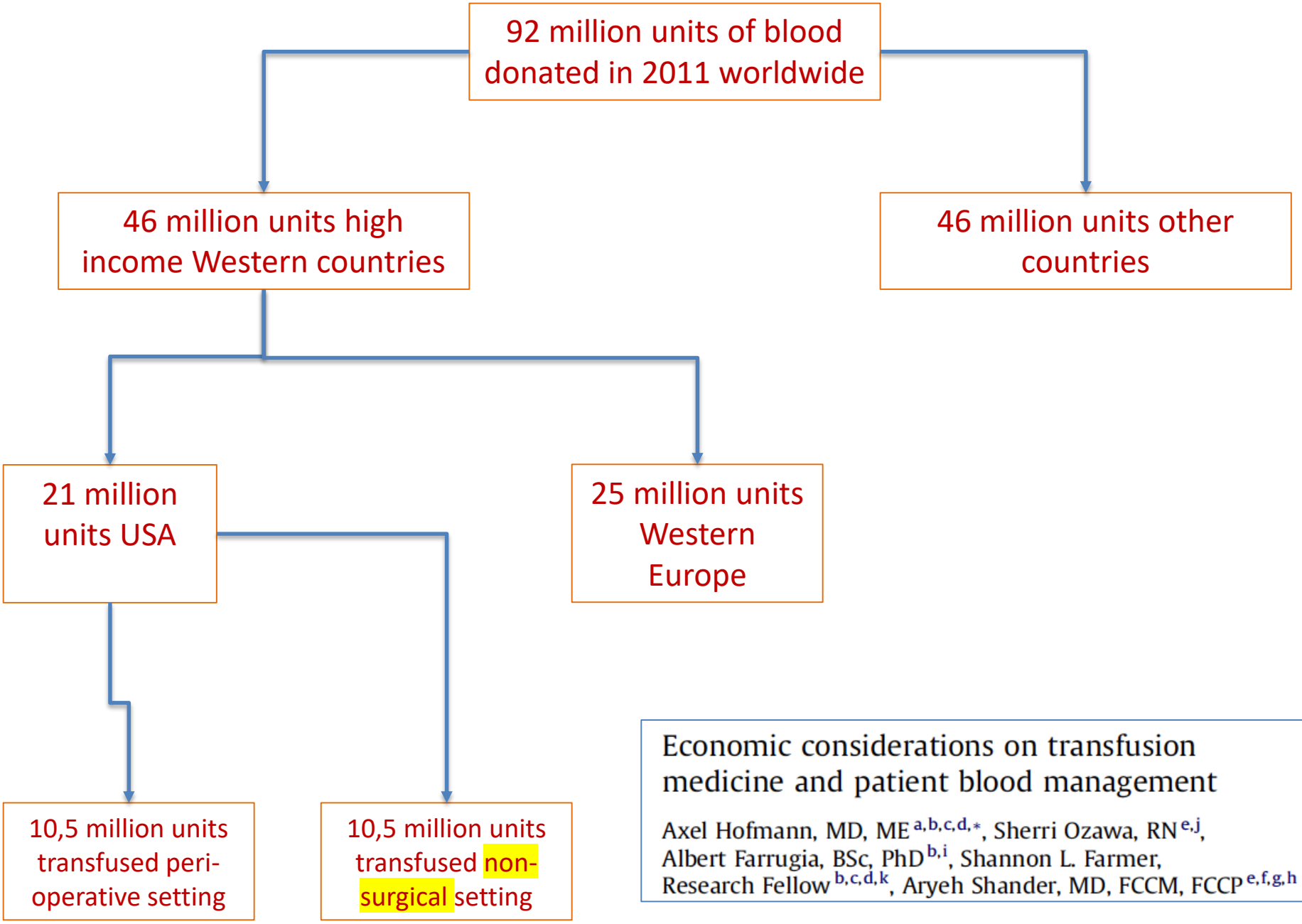
A long-standing and common clinical practice that has been underestimated in cost and overestimated in effectiveness is the transfusion of allogeneic blood products. Studies show that this intervention comes with largely underestimated service cost and unacceptably high utilisation variability for matched patients, thus adding billions of unnecessary dollars to the health-care expenditure each year. Moreover, a large and increasing body of literature points to a dose-dependent increase of morbidity and mortality and adverse long-term outcomes associated with transfusion whereas published evidence for benefit is extremely limited.

WHA63.12 Availability, safety and quality of blood products[1,2]

The Sixty-third World Health Assembly,

Having considered the report on availability, safety and quality of blood products;[3]

Recalling resolution WHA58.13 on blood safety: proposal to establish World Blood Donor Day and preceding related resolutions since resolution WHA28.72 on utilization and supply of human blood and blood products, which urged Member States to promote the full implementation of well-organized, nationally coordinated and sustainable blood programmes with appropriate regulatory systems and to enact effective legislation governing the operation of blood services;



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Mean hospital acquisition cost RBC unit in 2009

US$ 223
USA (2008 dollars)

AUD$ 339
Australia (2010)

Presidenza del Consiglio dei Ministri

CONFERENZA PERMANENTE PER I RAPPORTI TRA LO STATO, LE REGIONI E LE PROVINCE AUTONOME DI TRENTO E BOLZANO

Accordo, ai sensi degli articoli 2, comma1, lett. b) e 4 del decreto legislativo 28 agosto 1997, n. 281, tra il Governo, le Regioni e le Province autonome di Trento e di Bolzano concernente "Indicazioni in merito al prezzo unitario di cessione, tra aziende sanitarie e tra Regioni e Province autonome, delle unità di sangue, dei suoi componenti e dei farmaci plasmaderivati prodotti in convenzione, nonché azioni di incentivazione dell'interscambio tra le aziende sanitarie all'interno della Regione e tra le Regioni" in attuazione degli articoli 12, comma 4 e 14, comma 3 della legge 21 ottobre 2005, n. 219.

Rep. Atti n. 168/CSR del 22 ottobre 2015

ALLEGATO 1

Prezzounitariodicessione delsanguee degliemocomponentitrastrutturesanitariepubblichee private e traRegioni e Province autonome

Emocomponenti(unità)*	Tariffa(€)
Concentratoeritrocitarioprivatodelbuffy-coate risospesoin soluzioneadditiva	136
Concentratoeritrocitarioleucodepletomediantefiltrazioneinlinea	181
Concentratoeritrocitarioleucodepletodaaferesi	187
Plasmafrescocongelatoaduso trasfusionale da frazionamento delsangueintero	21
Plasmafrescocongelatoentro24oredalprelievodalqualepossonoesserererecuperateleproteinelabili, dafrazionamento delsangueintero	21
Plasmafrescocongelatoentro72oredalprelievodalqualepossonoesserererecuperateleproteinenonlabili,dafrazionamentodelsangueintero	17
Plasma da aferesi	172
Plasma da prelievomulticomponente	54
Singolaunità dibuffy-coat	7
Concentratopiastrinicodasingolobuffy-coat	19
Concentratopiastrinicodapooldibuffy-coatprodottocon metodicamanuale	97
Concentratopiastrinicodapooldibuffy-coatprodottocon metodicaautomatizzata	207
Concentratopiastrinicodaaferesileucodepletoinlinea	418
Concentratopiastrinicodaprelievomulticomponenteleucodepletoinlinea	256
Concentratogranulocitarioda aferesi	547

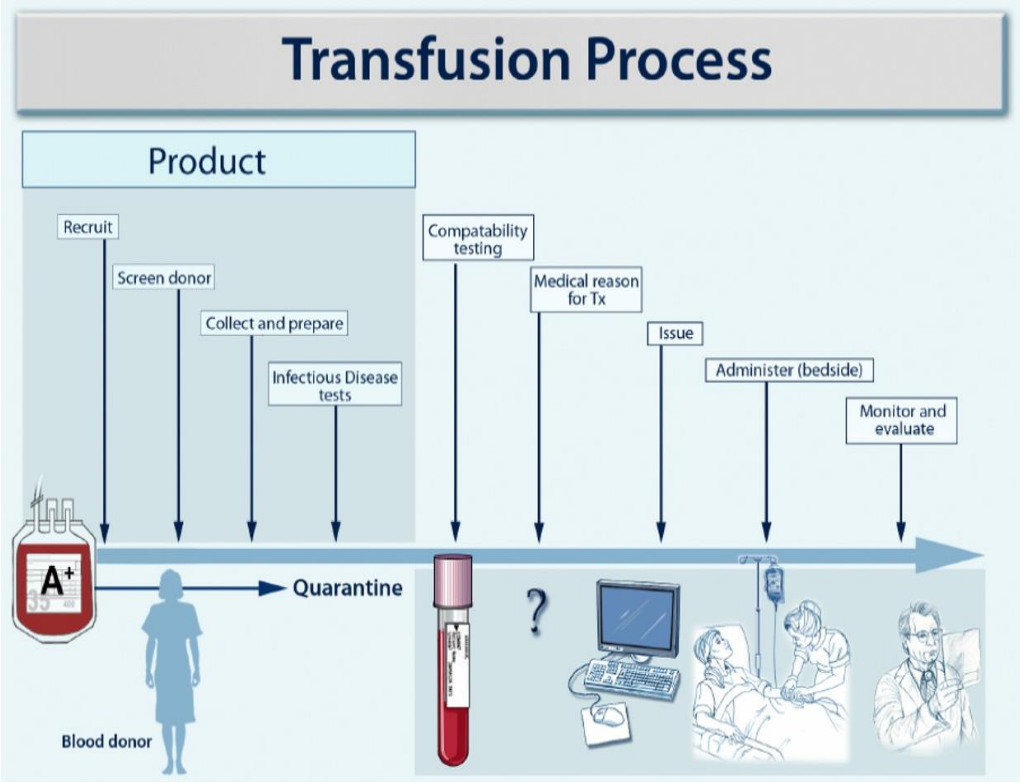
Costi trasfusionali: impatto economico

Costo della trasfusione di sangue

E' il **costo totale di un evento trasfusionale**, tenendo conto di tutti i processi coinvolti nella trasfusione di una unità di sangue, oltre al costo dell'emocomponente:

- Richiesta trasfusionale, raccolta del consenso informato, raccolta dei campioni di sangue, test pre-trasfusionali, consegna e trasporto dell'unità, somministrazione dell'unità e gestione degli eventi avversi.

Valutazione **molta complessa e richiede metodologie complesse (activity-based costs; microcosting, etc).**



Costi trasfusionali : impatto economico

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

TRANSFUSION 2010;50:753-765.

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)

- Englewood Hospital Medical Center (EHMC; Englewood, NJ),
- Rhode Island Hospital (RIH; Providence, RI),
- Centre Hospitalier Universitaire Vaudois (CHUV; Lausanne, Switzerland),
- General Hospital Linz (AKH; Linz, Austria),

Mean total cost per RBC unit was $760.82 ± 293.74

3.2- to 4.8-fold higher than blood product acquisition costs.

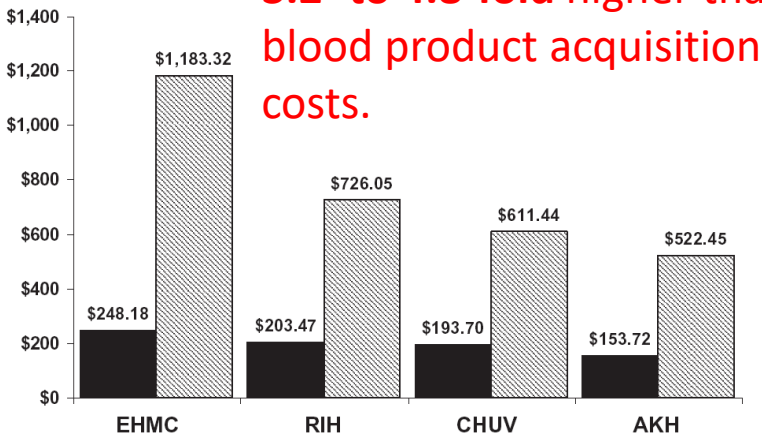


Fig. 2. Mean acquisition costs (■) and total ABC model costs (▨) per unit of blood. Mean per-unit acquisition costs included units that were wasted and additional services provided (e.g., irradiation, washing, cytomegalovirus testing) as described in the text. European currencies converted from the 1-year mean beginning May 2008 (CHUV conversion of $1 = SFr 1.12; AKH conversion of $1 = € 0.72).

Dr. Giovanni Inghilleri, ASST Bergamo Est

Economic considerations on transfusion medicine and patient blood management

Axel Hofmann, MD, ME [a,b,c,d,*], Sherri Ozawa, RN [e,j], Albert Farrugia, BSc, PhD [b,i], Shannon L. Farmer, Research Fellow [b,c,d,k], Aryeh Shander, MD, FCCM, FCCP [e,f,g,h]

- Activity-based costing (ABC) is an appropriate methodology to capture the cost of complex processes
- Study results showed that the mean total cost of administering a single unit of RBCs to surgical patients was:
  - between $726 and $1183 in the USA
  - between $522 and $611 in Europe (2007 dollars)
- The total number of RBC units transfused in the USA in 2009 was 14.9 million

- The total annual RBC transfusion costs are somewhere around US$14 billion (12,700,000,000 Euro)

E in Italia?

- Non risultano analisi dei costi della trasfusione in Italia con la metodologia ABC;
- Il numero di concentrati eritrocitari trasfusi in Italia all'anno (2016) è pari a 2.471.000;
- Se utilizziamo il moltiplicatore più basso dello studio di Shander (3,2) , possiamo ipotizzare che il costo di una trasfusione sia

  181 * 3,2 = 580 Euro
- Il costo associato alla trasfusione di concentrati eritrocitari in Italia sarebbe pari a

580 * 2.471.000 = 1.430.000.000 Euro

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- The cost of adverse transfusion outcomes

A large number of observational studies and some meta-analyses and systematic reviews and randomised controlled trials (RCTs) have linked transfusion of RBCs with increased morbidity and mortality, whereas evidence for benefit is scant.

- The cost of transfusion variability

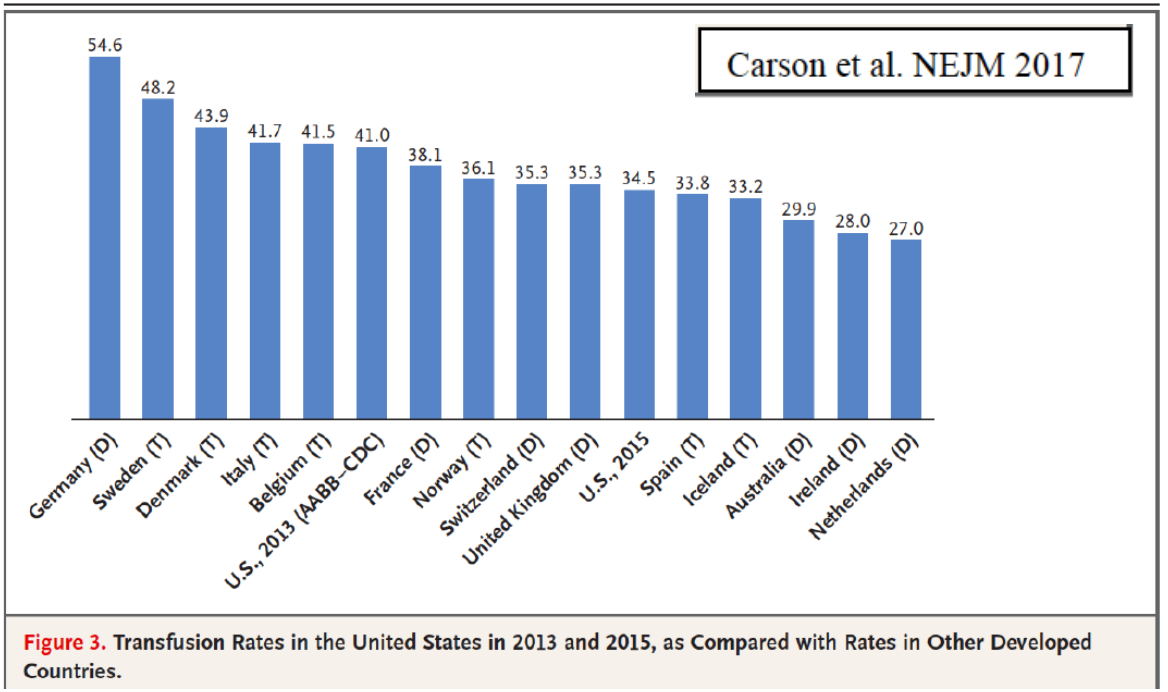


Figure 3. Transfusion Rates in the United States in 2013 and 2015, as Compared with Rates in Other Developed Countries.

Cost-effectiveness of PBM programmes

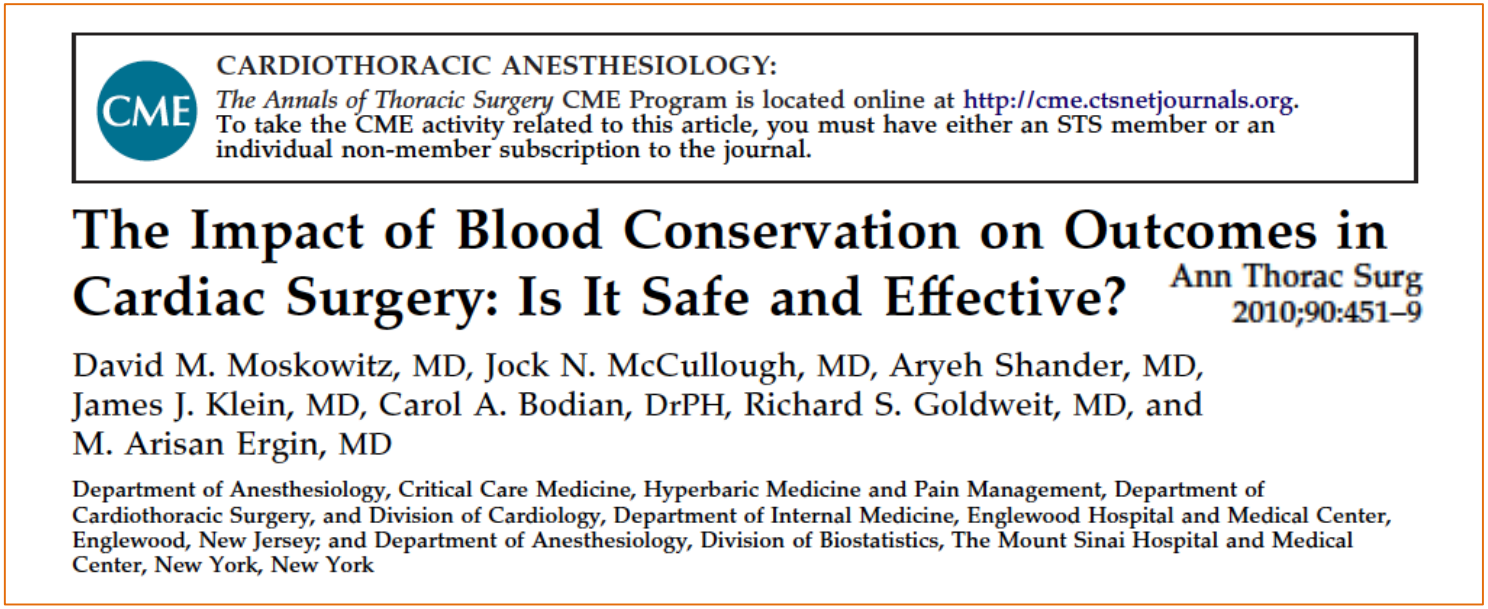
Economic considerations on transfusion medicine and patient blood management

Axel Hofmann, MD, ME [a,b,c,d,*], Sherri Ozawa, RN [e,j], Albert Farrugia, BSc, PhD [b,i], Shannon L. Farmer, Research Fellow [b,c,d,k], Aryeh Shander, MD, FCCM, FCCP [e,f,g,h]

- PBM modalities are evidence-based interventions to pre-empt transfusions through identifying and, where possible, correcting the causes of anaemia, minimising blood loss and bleeding and harnessing the physiological tolerance of anaemia;
- This concept significantly reduces serious complications, morbidity and mortality when compared to transfusion therapies and therefore reduces resource consuming hospital length of stay (LOS) and hospital and ICU re-admissions.

Frequency and Outcomes of Blood Products Transfusion Across Procedures and Clinical Conditions Warranting Inpatient Care: An Analysis of the 2004 Healthcare Cost and Utilization Project Nationwide Inpatient Sample Database: J. Morton et al, 2010

- Length of stay (LOS), postoperative infections, noninfectious transfusion-related complications, in-hospital mortality, and total charges were evaluated for transfused and nontransfused cohorts;
- Of the estimated 38.66 million discharges in the United States in 2004, 5.8% (2.33 million) were associated with blood products transfusion;
- Average LOS was 2.5 days longer, and charges were $17 194 higher for the transfused cohort ($P < .0001$);
- Odds of death were 1.7 times higher ($P < .0001$) and odds of infection 1.9 times higher ($P < .0001$) for the transfused cohort.



CARDIOTHORACIC ANESTHESIOLOGY:

The Annals of Thoracic Surgery CME Program is located online at http://cme.ctsnetjournals.org. To take the CME activity related to this article, you must have either an STS member or an individual non-member subscription to the journal.

The Impact of Blood Conservation on Outcomes in Cardiac Surgery: Is It Safe and Effective?

Ann Thorac Surg
2010;90:451–9

David M. Moskowitz, MD, Jock N. McCullough, MD, Aryeh Shander, MD, James J. Klein, MD, Carol A. Bodian, DrPH, Richard S. Goldweit, MD, and M. Arisan Ergin, MD

Department of Anesthesiology, Critical Care Medicine, Hyperbaric Medicine and Pain Management, Department of Cardiothoracic Surgery, and Division of Cardiology, Department of Internal Medicine, Englewood Hospital and Medical Center, Englewood, New Jersey; and Department of Anesthesiology, Division of Biostatistics, The Mount Sinai Hospital and Medical Center, New York, New York

Comparison of outcomes between:

- 586 coronary artery bypass graft surgery patients in PBM programme
- score-matched cohort of 586 patients NOT in PBM programme.

In the PBM cohort:

- transfusion rate was four times lower (10.6% vs. 42.5%, $P < 0.0001$)
- mortality rate was more than three times lower (0.8% vs. 2.5%, $P < 0.02$)
- rate of serious complications, including pneumonia, sternal wound infection and septicaemia, was significantly lower.

British Journal of Anaesthesia **108** (6): 943–52 (2012)
doi:10.1093/bja/aes135

BJA

CLINICAL PRACTICE

Effect of a patient blood management programme on preoperative anaemia, transfusion rate, and outcome after primary hip or knee arthroplasty: a quality improvement cycle†‡

A. Kotzé[1]*, L. A. Carter[1] and A. J. Scally[2]

[1] Airedale NHS Foundation Trust, Steeton, UK
[2] School of Health Studies, University of Bradford, Bradford, UK

* Corresponding author: Department of Anaesthesia, Leeds General Infirmary, Great George Street, Leeds LS1 3EX, UK.
E-mail: alwynkotze@doctors.net.uk

Methods. We retrospectively audited 717 primary hip or knee arthroplasties in a UK general hospital and conducted regression analyses to identify outcome predictors. We used these data to modify previously published algorithms for UK practice and audited its introduction prospectively. The retrospective audit group served as a control.

Results. Preoperative haemoglobin (Hb) concentration predicted ABT (odds ratio 0.25 per 1 g dl^{-1}, $P<0.001$). It also predicted the length of stay (LOS, effect size −0.7 days per 1 g dl^{-1}, $P=0.004$) independently of ABT, including in non-anaemic patients. Patient blood management implementation was associated with lower ABT rates for hip (23–7%, $P<0.001$) and knee (7–0%, $P=0.001$) arthroplasty. LOS for total hip replacement and total knee replacement decreased from 6 (5–8) days to 5 (3–7) and 4 (3–6) days, respectively, after algorithm implementation ($P<0.001$). The all-cause re-admission rate within 90 days decreased from 13.5% (97/717) before to 8.2% (23/281) after algorithm implementation ($P=0.02$).

Valutazione economica del PBM e dei costi trasfusionali

Implementation of a patient blood management monitoring and feedback program significantly reduces transfusions and costs

TRANSFUSION 2015;55;2807–2815

Tarun Mehra,[1] Burkhardt Seifert,[2] Silvina Bravo-Reiter,[1] Guido Wanner,[3] Philipp Dutkowski,[4] Tomas Holubec,[5] Rudolf M. Moos,[1] Jörk Volbracht,[1] Markus G. Manz,[6] and Donat R. Spahn[7]

- N = 101.794 pazienti sottoposti a diverse tipologie di interventi (ortopedici, cardichirurgici, ostetrico-ginecologici, etc) c/o Ospedale Universitario di Zurigo (CH)
- N° medio di unità trasfuse/1000 pazienti ridotto del 27% ($p < 0.001$)
- **Riduzione dei costi diretti di acquisto di emocomponenti per paziente da 333 CHF to 249 CHF (1CHF = 1US$).**
- Numero medio di unità trasfuse per paziente ridotto da 9 ± 19 a 7 ± 14 ($p < 0.001$)
- PBM altamente efficace nel ridurre l'utilizzo di sangue allogenico e i costi correlati alla trasfusione.

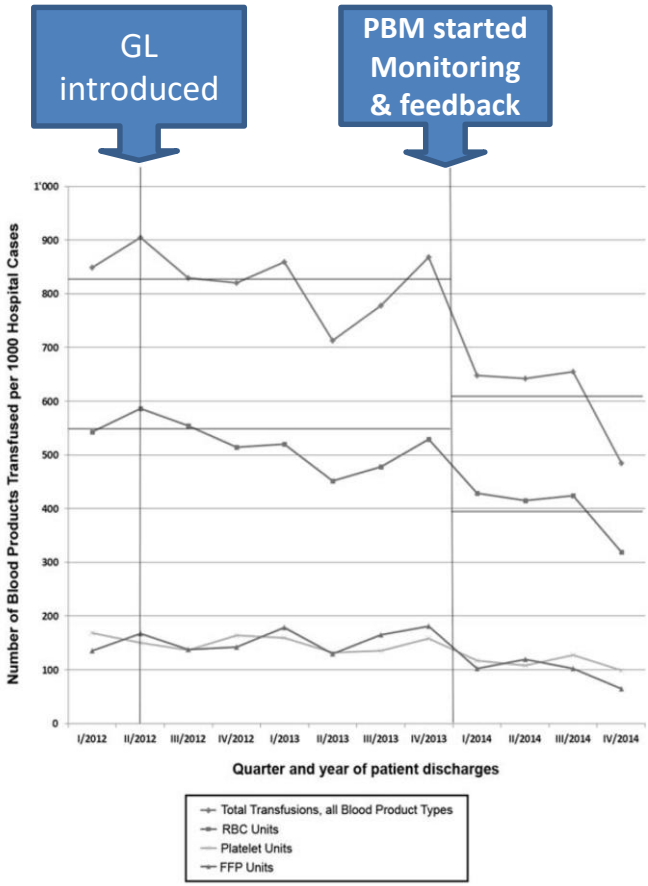


Fig. 2. Transfusion trend before and after introduction of PBM monitoring and feedback program for allogeneic blood prod-

Dr. Giovanni Inghilleri, ASST Bergamo Est

Transfusion and Apheresis Science 50 (2014) 32–36

Contents lists available at ScienceDirect

Transfusion and Apheresis Science

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

Review

The ONTraC Ontario program in blood conservation

John Freedman *

Laboratory Medicine & Pathobiology, University of Toronto, St. Michael's Hospital, 30 Bond Street, Room 2-006, Shuter Wing, Toronto, Ontario M5B 1W8, Canada

- **25 Hospitals Province of Ontario**
- **Reducing transfusion rates:**

  Knee surgery tx rates from 24.5% to10.1%

  Primary CABG from 41 to 25.2% in 2011
- **Reductions in LOS and infections**
- **PBM Cost savings 2002-2011:**
  - $10,521,450 for red cell purchase saved
  - $39,467,900 for the health care system
- **Cost of the program**
  - $ 3,257,000

Courtesy of Dr A. Hofmann

Dr. Giovanni Inghilleri, ASST Bergamo Est

https://www.ontracprogram.com/Public_Article.aspx?id=639

ONTraC
Ontario Transfusion Coordinators

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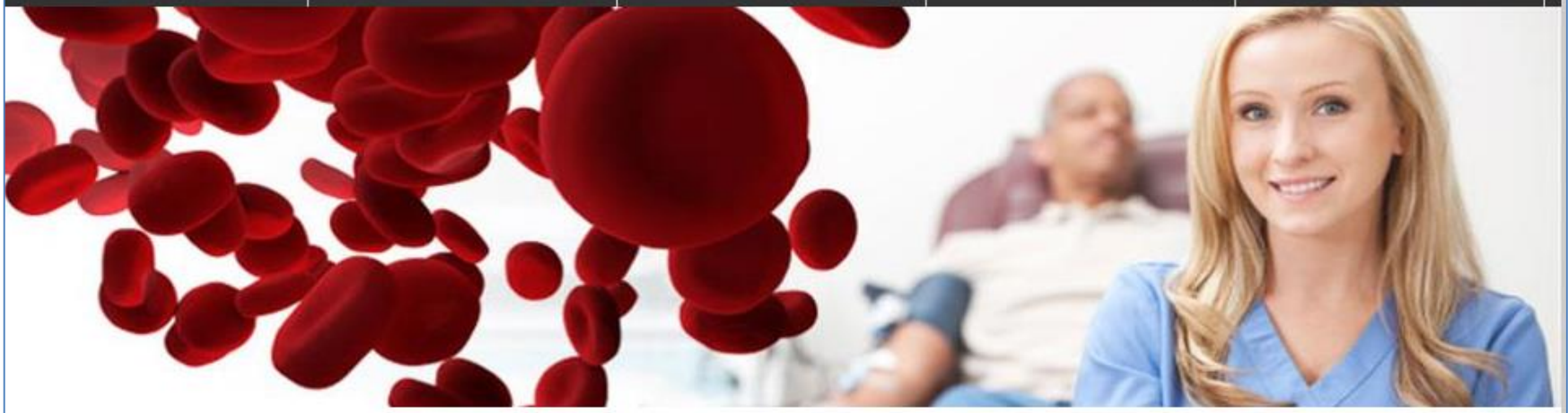

Home | Patient Blood Management

What is Patient Blood Management?

Patient Blod Management (PBM) also known as Blood Conservation is an evidence-based, multidisciplinary approach aimed at optimizing the care of patients who might need transfusion. It puts the patient at the heart of decisions made around blood transfusion, promoting appropriate use of blood and blood components and blood products, and the timely use of alternatives where available. PBM represents an international initiative in best practice for transfusion medicine.and is endorsed by the World Health Organization (WHO)

SABM

https://www.ontracprogram.com/Login.aspx?company=&ReturnUrl=%2fdefault.aspx

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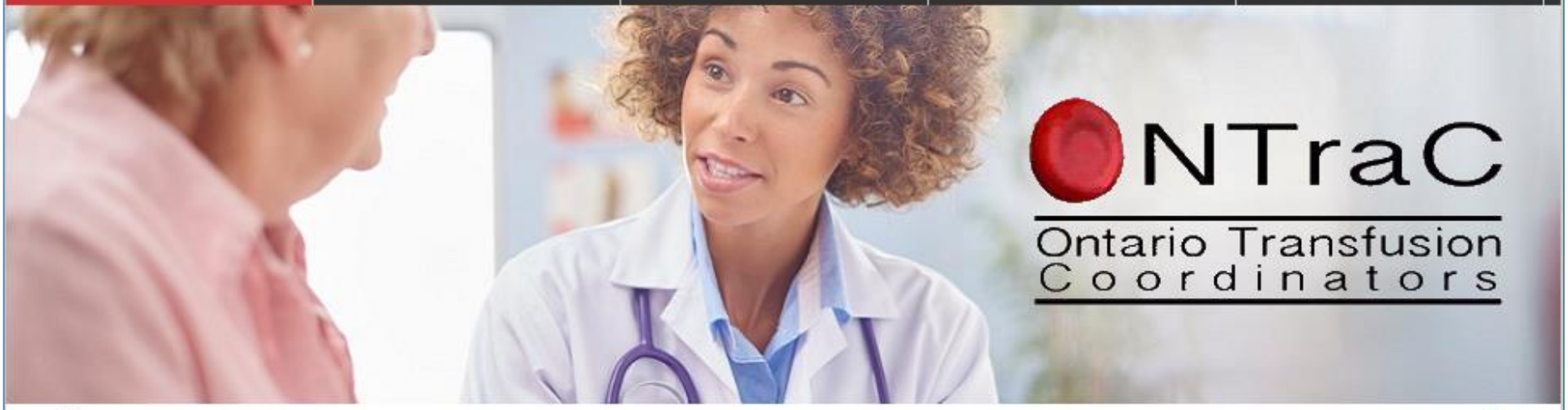

Home

Ontario Nurse Transfusion Coordinators (ONTraC)
A Provincial Patient Blood Management Program

The Ontario Nurse Transfusion Coordinators (ONTraC) Program is a Provincial Patient Blood Management (PBM) or Blood Conservation Program (BCP) that attempts to enhance transfusion practice by promoting alternatives to donor or allogeneic blood transfusion in surgical patients, improving patient care and well-being in a cost-effective manner.

BLOOD MANAGEMENT

Volume 57, June 2017 TRANSFUSION 1347

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

Michael F. Leahy,[1,2,3] Axel Hofmann,[4,5,6] Simon Towler,[7] Kevin M. Trentino,[8] Sally A. Burrows,[1] Stuart G. Swain,[8] Jeffrey Hamdorf,[9,10] Trudi Gallagher,[11,12] Audrey Koay,[11] Gary C. Geelhoed,[11,13] and Shannon L. Farmer[9,14]

- Retrospective study of **605,046 patients** admitted to four major adult tertiary-care hospitals between July 2008 and June 2014
- Comparing final year with baseline, units of RBCs, FFP, and Plt transfused per admission **decreased by 41%** ($p<0.001$)
- There were **risk-adjusted reductions in hospital mortality** (odds ratio [OR], 0.72; $p<0.001$), **length of stay** (incidence rate ratio, 0.85; $p<0.001$), hospital acquired infections (OR, 0.79; $p<0.001$), and acute myocardial infarction-stroke (OR, 0.69; $p<0.001$).
- Based on product-acquisition cost, the calculated savings from this reduction was **US$18,078,258**
- Activity-based savings were estimated between **US$ 78 to 97 million**

Michael F. Leahy et al

MATERIALS AND METHODS

Program design

Details of program structure, rationale, and implementation are discussed elsewhere.[6,27] The program incorporated principles of the Kotter model[35,36] for successful change management, including: motivation for change, executive and clinical leadership, multidisciplinary clinical team engagement, clinical strategies, education and communication initiatives for clinicians and patients, feedback on practice change and embedding the changes with policies and procedures (see Appendix S1, Summary Table).[6] A literature review identified a triad of independent but modifiable risk factors for adverse patient outcomes: namely, anemia, blood loss, and blood transfusion.[6] Mitigation of these risk factors by the application of the three-pillar concept of PBM

Michael F. Leahy et al

A one-time investment of AU$4.5M was made to cover the health-system–wide, 5-year change management and implementation process. This included funds for external PBM experts to plan, coordinate, and guide the project; a state PBM Medical Director (0.1 full-time equivalent); a state PBM Clinical Nurse Coordinator (0.5 full-time equivalent); Department of Health project officers (providing administrative and data support, including creating a sustainable PBM data and reporting system); and honoraria and travel support for national and international key opinion leaders in PBM to clinically support the implementation process.

Riflessioni (1)

- Gli studi illustrati, sembrano molto convincenti nel dimostrare l'efficacia dei programmi di PBM:
  - nel migliorare l'outcome dei pazienti
  - nel ridurre i costi della gestione dell'anemia
- Gli studi a maggior impatto, sono quelli che coinvolgono ampie aree con più ospedali, e nelle quali il PBM è stato applicato in modo strategico
- In alcuni casi, sono stati fatti ingenti investimenti in termine di formazione, assunzione di coordinatori PBM medici e infermieri

Riflessioni (2)

- Il modello Italiano del PBM, è legato a iniziative delle Strutture Trasfusionali delle singole Aziende Ospedaliere

- Agisce sulla formazione e sul cambiamento delle modalità operative dei trasfusionisti e dei clinici prescrittori

- Probabilmente, l'efficacia dei programmi PBM Italiani si apprezzerà nel tempo, quando la loro efficacia e sicurezza sarà definitivamente riconosciuta

Grazie a tutti per l’attenzione