مدیریت خون بیمار انقلابی در طب انتقال خون

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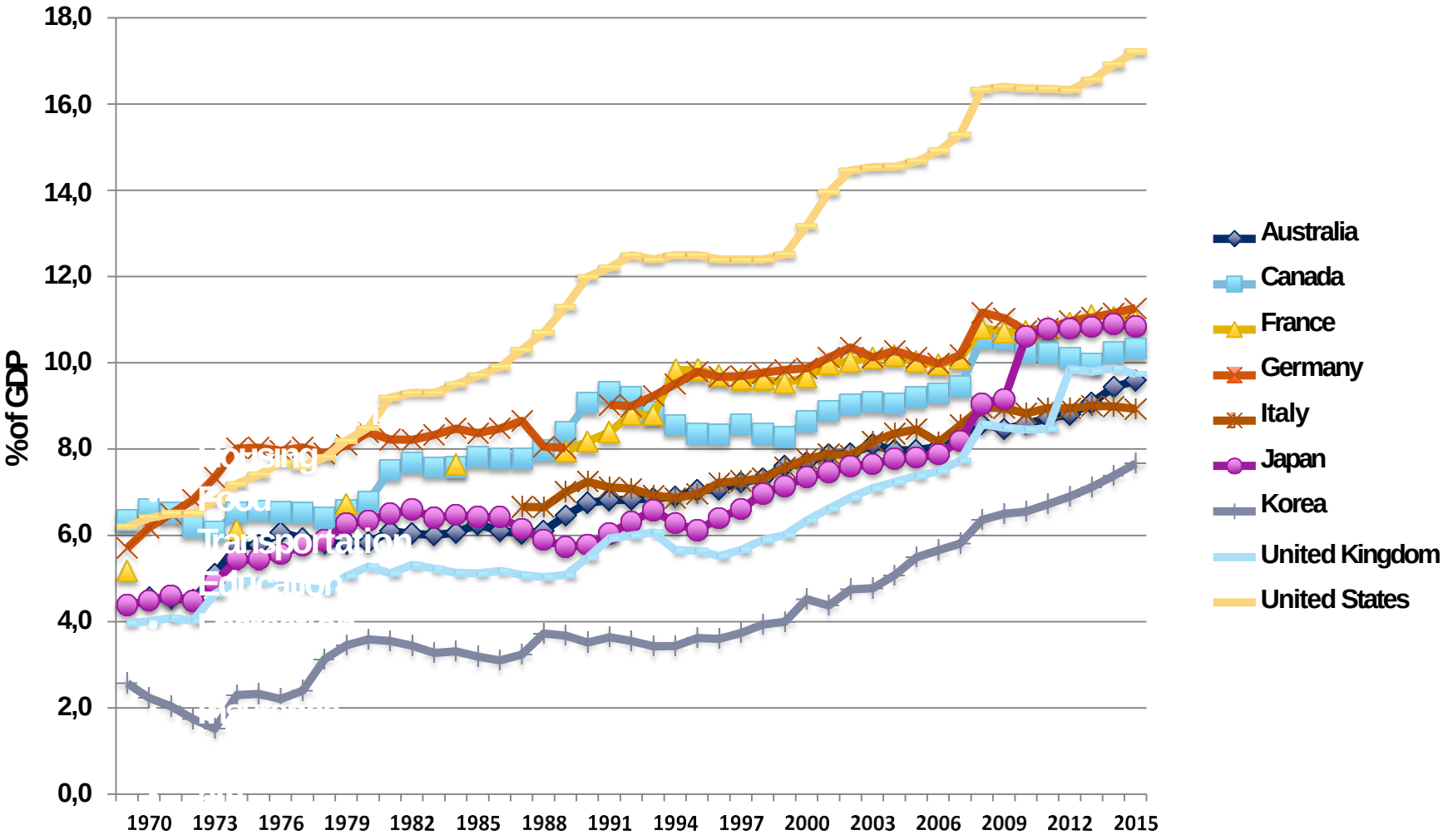
3rd HYRCANIA Medical Laboratory Congress

دانشگاه تربیت مدرس

The Global Health Care Crisis

Health Care Expenditures – All Providers
(selected countries)



OECD Health Data 2017

Competing with

- Housing
- Food
- Transportation
- Education
- Recreation
- Energy
- Insurance
- Social welfare
- etc.

Reproduced from World eXplorer
'http://ncva.itn.liu.se/explorer/world-explorer?l=en

Population, total

Population 60+ ↑
Longevity ↑
Health care volume ↑

Japan
1960-2013

Italy
Germany
U.S.
China
India

2013

Population ages 65 and above (% of total)

26 24 22 20 18 16 14 12 10 8 6 4 2

48 52 56 60 64 68 72 78 80

Life expectancy at birth, total years

The NEW ENGLAND JOURNAL of MEDICINE

EDITORIALS

A Glimpse of the Next 100 Years in Medicine

Isaac S. Kohane, M.D., Ph.D., Jeffrey M. Drazen, M.D., and Edward W. Campion, M.D.

- [T]he era of shifting more and more economic resources toward health care is going to end.
- The medicine of the future will focus on more efficient use of resources.

Kohane, I.S., J.M. Drazen, and E.W. Campion, A glimpse of the next 100 years in medicine. N Engl J Med, 2012. 367(26): p. 2538-9

what is going on and wrong in health care

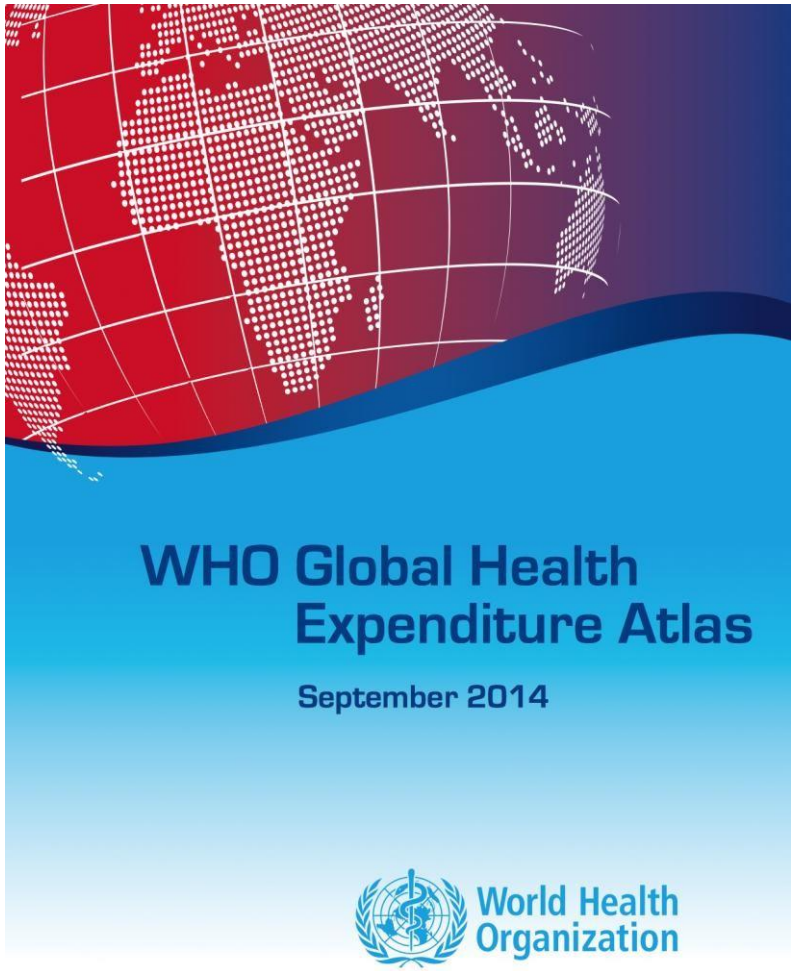
The financial dimension of what is going wrong

Health financing March 2014

Key facts[1]

- 100 million people are pushed into poverty every year because they have to pay directly for their health care.
- WHO recommends moving away from direct, out-of-pocket payments to using prepaid mechanisms to raise funds for health.
- In 2011, US$ 6.9 trillion was spent on health.
- Typically between 20–40% of health spending is wasted.

A minimum of US$ 44 is needed per person per year to provide basic, life-saving health services: 26 WHO Member States spend less than this in 2011[2]



The Cost of Health Care
How much is waste?

1 2 3 4 5

Click the diagram for more detail or here to CONTINUE

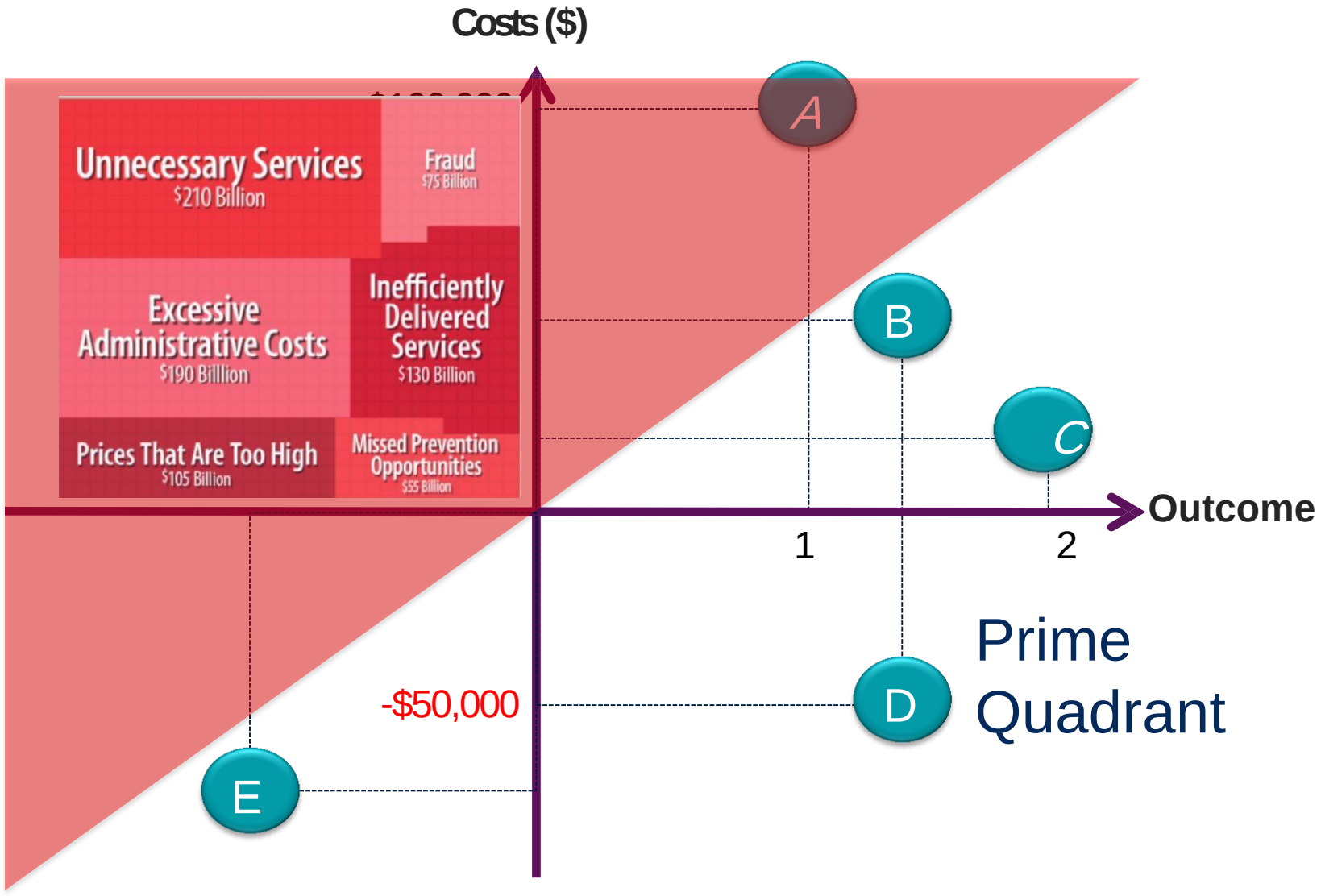
■ = $1 Billion

Source: Data from workshop presentations and discussions summarized in *The Healthcare Imperative*

THE HEALTHCARE IMPERATIVE Lowering Costs and Improving Outcomes

INSTITUTE OF MEDICINE

Cost-Effectiveness Plane



The triad of anaemia, bleeding & transfusion

Global, regional, and national incidence, prevalence, and years lived with disability for 310 diseases and injuries, 1990–2015: a systematic analysis for the Global Burden of Disease Study 2015

GBD 2015 Disease and Injury Incidence and Prevalence Collaborators*

www.thelancet.com Vol 388 October 8, 2016

- The impairment that affected the greatest number of people in 2015 was **anaemia, with 2.36 billion (2.35–2.37 billion) individuals affected**
- The prevalence of **iron-deficiency anaemia** alone was **1.46 billion** (1.45-1.46 billion).

Systematic review

Meta-analysis of the association between preoperative anaemia and mortality after surgery

- **949’449 patients of 24 studies analyzed**
- **39% of patients were anemic (WHO definition)**
- **Anemia was associated with**
  - ⇨ Perioperative mortality - OR 2.90 (2.30 – 3.68, p< 0.001)
  - ⇨ Acute kidney injury - OR 3.75 (2.95 – 4.76, p< 0.001)
  - ⇨ Infections - OR 1.93 (1.06 – 1.55, p< 0.01)
  - ⇨ Stroke in cardiac surgery - OR 1.28 (1.17 – 3.18, p< 0.01)
  - ⇨ RBC transfusion - OR 5.04 (4.12 – 6.17, p< 0.001)

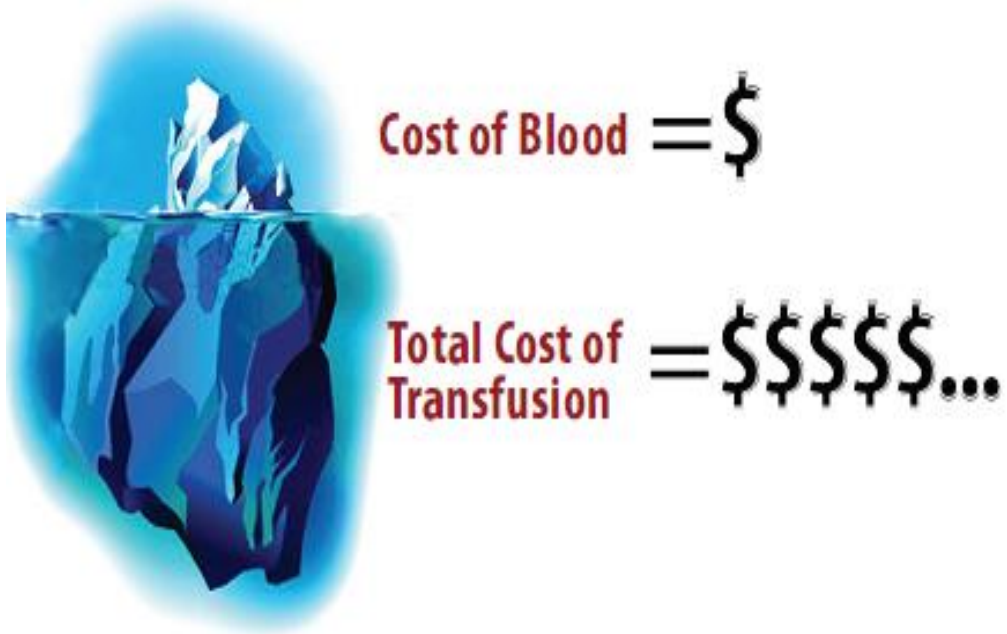
Fowler A.J. et al. Br J Surg (2015) 102:1314

Postpartum Hemorrhage and Predelivery Anemia are Risk Factors for Severe Postpartum Anemia after Cesarean Sections

- Cesarean sections are one of the most common surgical operations. Postpartum anemia is a prevalent side-effect, and has been linked to postpartum depression, fatigue and other impaired cognitive functions. In a recent study published by *Transfusion*, researchers analyzed data from over 70,000 women after cesarean sections performed between 2005 and 2013 to determine risk factors for postpartum anemia. Overall, 7.3% of women developed severe postpartum anemia (hemoglobin [Hb]<8.0 g/dl). Risk factors for postpartum anemia included postpartum hemorrhage (adjusted odds ratio [aOR]=8.45; [95% CI, 7.8-9.16]) and predelivery anemia (Hb= 10-10.9 g/dL, aOR=5.38; [95%CI, 4.89-5.91]; and Hb<10 g/dL, aOR=30.6; [95% CI, 27.1-34.6]). Since no guidelines currently exist for postpartum anemia, women who have a cesarean section with postpartum hemorrhage, predelivery anemia, or no predelivery hemoglobin level should be screened approximately one week after delivery

1. Butwick AJ, Walsh EM, Kuzniewicz M, Li SX, Escobar GJ. Patterns and predictors of severe postpartum anemia after Cesarean section. Transfusion 2017;57: 36-44.
2. Prabhu M, Bateman BT. Postpartum anemia: missed opportunities for prevention and recognition. Transfusion 2017;57: 3-5.

BLOOD COSTS ARE THE TIP OF THE ICEBERG

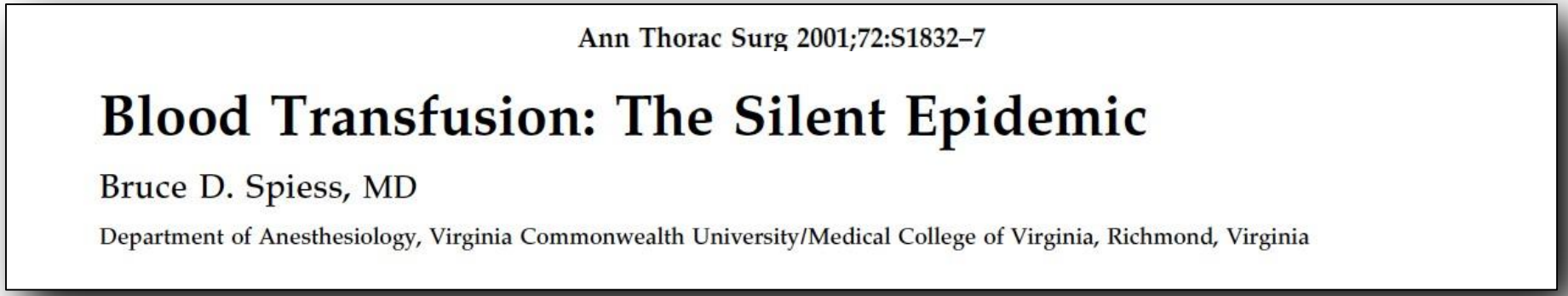


The total cost of transfusing patients exceeds blood acquisition costs by five times or greater when labor, supplies, blood administration and transfusion-related adverse events costs are considered. The cost to purchase blood products, while significant for many hospitals, is only the "tip of the iceberg" for total blood costs.

http://www.bloodmanagement.com/the-bloody-truth/the-bloody-truth

“[M]ore patients have died in any one year owing to transfusion immunomodulation’s side effects than died in the entire transfusion transmitted AIDS epidemic”

Blumberg, N. and J.M. Heal, Immunomodulation by blood transfusion: an evolving scientific and clinical challenge. Am J Med, 1996. 101(3): p. 299-308.



Ann Thorac Surg 2001;72:S1832–7

Blood Transfusion: The Silent Epidemic

Bruce D. Spiess, MD

Department of Anesthesiology, Virginia Commonwealth University/Medical College of Virginia, Richmond, Virginia

nature
International weekly journal of science
24 | NATURE | VOL 520 | 2 APRIL 2015

Marking the paradig m shift

SAVE BLOOD, SAVE LIVES

Transfusions are one of the most overused treatments in modern medicine, at a cost of billions of dollars. Researchers are working out how to cut back.

BY EMILY ANTHES

The Multi-Billion Dollar Question:

of ≈150 million allogeneic blood components per year

Does transfusion do what it is intended to do—improve outcome or prevent adverse outcomes?

- There are few if any articles that support transfusion actually improving patient outcomes.
- The majority of database papers show associations between transfusion utilization and with immunosuppression, increased infection, increased renal failure, multisystem organ failure, and death.

Spiess, B.D., Risks of transfusion: outcome focus. Transfusion, 2004. 44(12 Suppl): p. 4S-14S.

2007

- 8,500 pts
- Compared transfused vs non-transfused after multivariable logistic regression and propensity score analysis

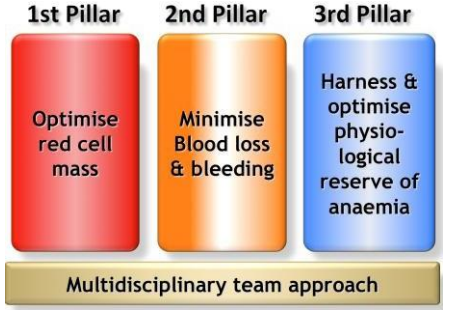
- 30-day mortality was over 6-times higher in the txd patients
- Increased ICU, high-dependency unit and hospital length of stay

"RBC transfusion appears to be harmful for almost all cardiac surgery patients"

Murphy, G.J., et al., Increased mortality, postoperative morbidity, and cost after red blood cell transfusion in patients having cardiac surgery. Circulation, 2007. 116(22): p. 2544-52.

Prime Quadrant

Patient Blood Management (PBM) is "the timely application of evidence-based medical and surgical concepts designed to maintain hemoglobin concentration, optimize hemostasis and minimize blood loss in an effort to improve patient outcome"[1]. The definition presented by the Society for the Advancement of Blood Management (SABM), as well as several other definitions of PBM, have moved away from placing the focus on reducing the use of blood components to the development of a multidisciplinary and multimodal strategy centred on patients' outcome. Reducing transfusions might be a means, but it is certainly not an end. Thus, PBM has moved from a product-centred approach to a patient-centred approach.



World Health Organization

Sixty-third World Health Assembly

Date: 17–21 May 2010
Location: Geneva, Switzerland

The Sixty-third session of the World Health Assembly took place in Geneva during 17–21 May 2010. At this session, the Health Assembly discussed a number of public health issues, including:

WHA63.12 adopted by resolution May 21, 2010:

„Bearing in mind that ***patient blood management means*** *that before surgery every reasonable measure should be taken to* ***optimize the patient's own blood volume, to minimize the patient's blood loss and to harness and optimize the patient-specific physiological tolerance of anaemia*** *following WHO's guide for optimal clinical use* ***(three pillars of patient blood management)***"

	1st Pillar Optimise red cell mass	2nd Pillar Minimise blood loss & bleeding	3rd Pillar Harness & optimise physiological reserve of anaemia
PREOP	• Detect anaemia • Identify underlying disorder(s) causing anaemia • Manage disorder(s) • Refer for further evaluation if necessary • Treat suboptimal iron stores/iron deficiency/anaemia of chronic disease/iron-restricted erythropoiesis • Treat other haematinic deficiencies • Note: Anaemia is a contraindication for elective surgery	• Identify and manage bleeding risk • Minimise iatrogenic blood loss • Procedure planning and rehearsal	• Assess/optimise patient's physiological reserve and risk factors • Compare estimated blood loss with patient-specific tolerable blood loss • Formulate patient-specific management plan using appropriate blood conservation modalities to minimise blood loss, optimise red cell mass and manage anaemia
INTRAOP	• Time surgery with haematological optimisation	• Meticulous haemostasis and surgical techniques • Blood-sparing surgical devices • Anaesthetic blood conserving strategies • Autologous blood options • Maintain normothermia • Pharmacological/haemostatic agents	• Optimise cardiac output • Optimise ventilation and oxygenation
POSTOP	• Optimise erythropoiesis • Be aware of drug interactions that can increase anaemia	• Vigilant monitoring and management of post-operative bleeding • Avoid secondary haemorrhage • Rapid warming / maintain normothermia (unless hypothermia specifically indicated) • Autologous blood salvage • Minimise iatrogenic blood loss • Haemostasis/anticoagulation management • Prophylaxis of upper GI haemorrhage • Avoid/treat infections promptly • Be aware of adverse effects of medication	• Optimise anaemia reserve • Maximise oxygen delivery • Minimise oxygen consumption • Avoid/treat infections promptly • Restrictive transfusion thresholds

Perioperative multidisciplinary multimodal patient-specific team approach

Hofmann et al. Current Opinions in Anaesthesiology 2012

WHY Patient Blood Management

https://www.nba.gov.au

"PBM aims to improve clinical outcomes by avoiding unnecessary exposure to blood and blood products. Decisions on whether to transfuse should be carefully considered, taking into account the full range of available therapies, and balancing the evidence for efficacy and improved clinical outcome against the potential risks."

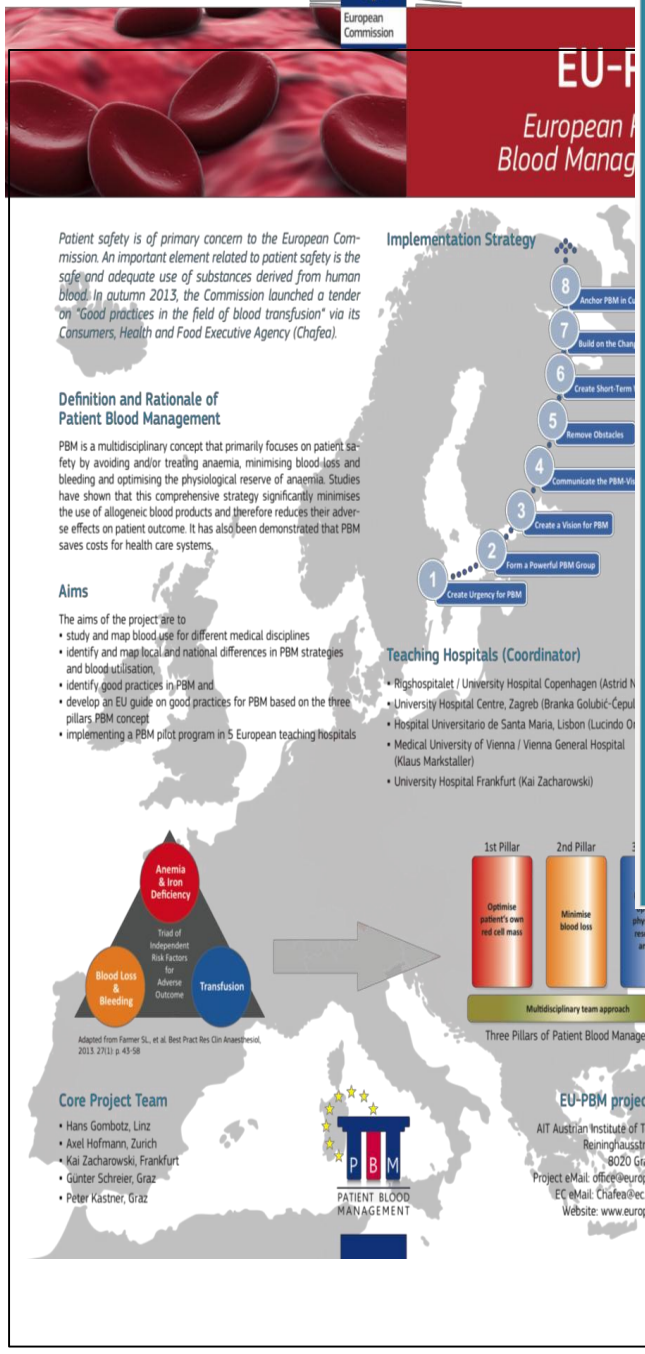
NATIONAL BLOOD AUTHORITY AUSTRALIA

"PBM improves patient outcomes by improving the patient's medical and surgical management in ways that boost and conserve the patient's own blood. As a consequence of better management, patients usually require fewer transfusions… thus avoiding transfusion-associated complications."

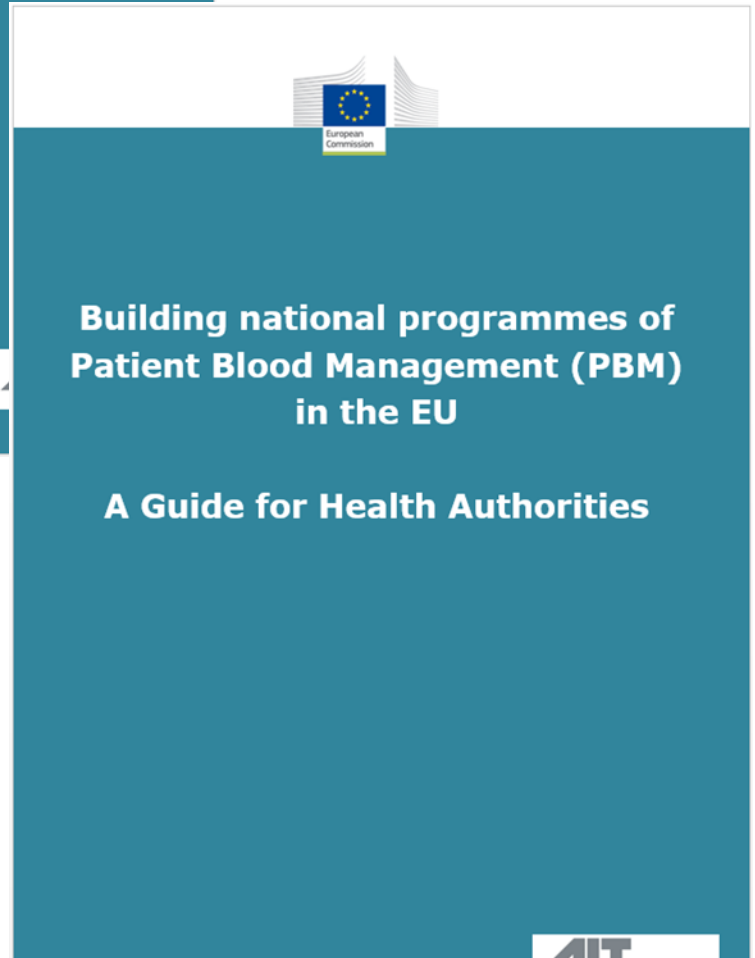
AUSTRALIAN COMMISSION ON SAFETY AND QUALITY IN HEALTH CARE

National Priorities

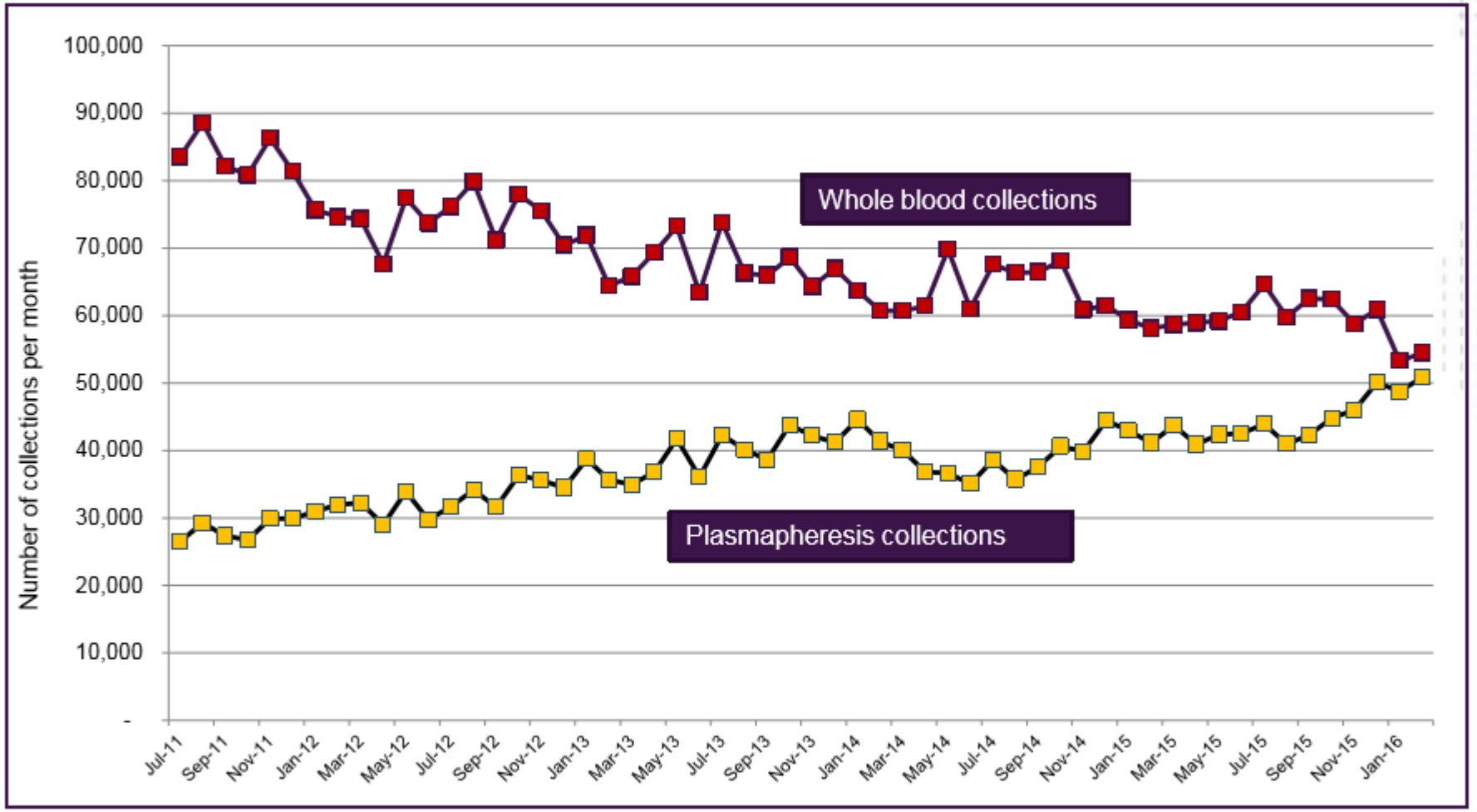
PBM is a multidisciplinary approach that promotes appropriate care for patients and reduces exposure to unnecessary blood transfusions.


European Commission
EU-P
European
Blood Manag
Patient safety is of primary concern to the European Commission. An important element related to patient safety is the safe and adequate use of substances derived from human blood. In autumn 2013, the Commission launched a tender on "Good practices in the field of blood transfusion" via its Consumers, Health and Food Executive Agency (Chafea).
Definition and Rationale of Patient Blood Management
PBM is a multidisciplinary concept that primarily focuses on patient safety by avoiding and/or treating anaemia, minimising blood-loss and bleeding and optimising the physiological reserve of anaemia. Studies have shown that this comprehensive strategy significantly minimises the use of allogeneic blood products and therefore reduces their adverse effects on patient outcome. It has also been demonstrated that PBM saves costs for health care systems.
Aims
The aims of the project are to
• study and map blood use for different medical disciplines
• identify and map local and national differences in PBM strategies and blood utilisation,
• identify good practices in PBM and
• develop an EU guide on good practices for PBM based on the three pillars PBM concept
• implementing a PBM pilot program in 5 European teaching hospitals
Implementation Strategy
8 Anchor PBM in
7 Build on the Chan
6 Create Short-Term
5 Remove Obstacles
4 Communicate the PBM-Vis
3 Create a Vision for PBM
2 Form a Powerful PBM Group
1 Create Urgency for PBM
Teaching Hospitals (Coordinator)
• Rigshospitalet / University Hospital Copenhagen (Astrid N
• University Hospital Centre, Zagreb (Branka Golubić-Čepul
• Hospital Universitario de Santa Maria, Lisbon (Lucindo O
• Medical University of Vienna / Vienna General Hospital (Klaus Markstaller)
• University Hospital Frankfurt (Kai Zacharowski)
Anemia & Iron Deficiency
Blood Loss & Bleeding
Transfusion
Triad of Independent Risk Factors for Adverse Outcome
Adapted from Farmer SL., et al. Best Pract Res Clin Anaesthesiol. 2013. 27(1): p.43-58
1st Pillar
2nd Pillar
Optimise patient's own red cell mass
Minimise blood loss
Multidisciplinary team approach
Three Pillars of Patient Blood Management
Core Project Team
• Hans Gombotz, Linz
• Axel Hofmann, Zurich
• Kai Zacharowski, Frankfurt
• Günter Schreier, Graz
• Peter Kastner, Graz
P B M
PATIENT BLOOD MANAGEMENT
EU-PBM project office
AIT Austrian Institute of Technology
Reininghausstrasse 13/1
8020 Graz, Austria
Project eMail: office@europe-pbm.eu
EC eMail: Chafea@ec.europa.eu
Website: www.europe-pbm.eu


European Commission
Supporting Patient Blood Management (PBM) in the EU
A Practical Implementation Guide for Hospitals
www.europe-pbm.eu
August 2016

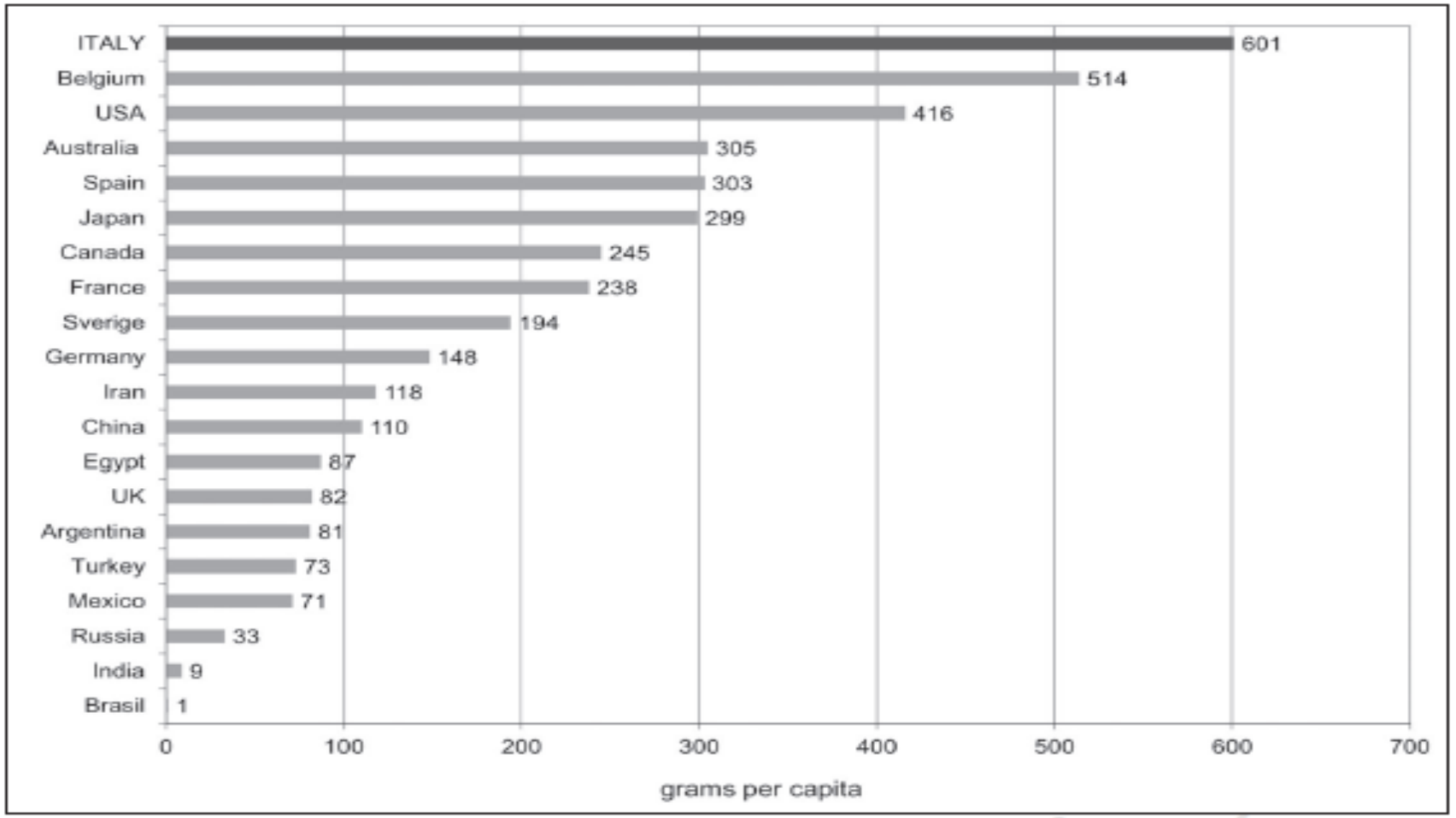

European Commission
Building national programmes of Patient Blood Management (PBM) in the EU
A Guide for Health Authorities

COLLECTION PERFORMANCE (Jul 2011 – Feb 2016)



Australian Red Cross
BLOOD SERVICE

Standardising albumin use: a good start for PBM applied to PDMP (Vaglio S et al 2013)



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]

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[b] School of Surgery, Faculty of Medicine Dentistry and Health Sciences, University of Western Australia, 35 Stirling Highway, Crawley, Perth, WA 6009, Australia
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[d] Western Australia Patient Blood Management Program Team, Office of the Chief Medical Officer, Western Australia, Department of Health, Perth, WA, Australia
[e] Department of Anaesthesiology, Critical Care Medicine, Pain Management and Hyperbaric Medicine, Englewood Hospital and Medical Center, 350 Engle Street, Englewood, NJ, USA
[f] Department of Anesthesiology, Mount Sinai School of Medicine, New York, NY 10029, USA
[g] Department of Medicine, Mount Sinai School of Medicine, New York, NY 10029, USA
[h] Department of Surgery, Mount Sinai School of Medicine, New York, NY 10029, USA
[i] Australian National University College of Medicine, Biology and Environment, Canberra ACT, Australia

The transfusion rates differ across the world countries with Denmark to be 60 units per 1000 population, Germany 57.3, UK 36.1, and France 35.4. All these countries with an almost similar economic status and health system.

Iran 27 Units per 1000 population

- **First year of Implementation of Patient blood Management expenses for blood products decreased $510,000 in the first year.**
  25% reduction in hospital stay for non-transfused vs. transfused patients. *Sarode R, et al. Transfusion2010;50-487-92.*
- **Implementation of an Anemia Management program resulted in a reduction of RBC transfusion by 62%.Transfusion,Vol 81,2011**
- **A program of engagement and interdiction using evidence-based guidelines can successfully decrease the use of FFP without any observable increase in unexpected bleeding 80% reduction in FFP transfusion**
- We also have a low rate of transfusion for heart surgery," said Bruce Spiess, M.D., professor in the VCU Department of Anesthesiology and part of the PET staff. "From our PET program, the Virginia Cardiovascular Surgery Quality Initiative, VCSQI, has instituted a blood management **program that over a two-year period saved more than $44 million in the state**."
- Changes in medicine have eliminated the need for millions of blood transfusions, which is good news for patients getting procedures like coronary bypasses and other procedures that once required a lot of blood.
  Transfusions are down almost one-third over the last five years, **to about 11 million units last year from about 15 million units, according to the American Red Cross, which has about 40 percent of the market.**
  One reason for declining demand is that recent studies have found many transfusions unnecessary, so patients are no longer getting expensive services that did them no good.

Minimizing Iatrogenic Blood Loss

A patient can lose up to 50 ml or 1% of their blood volume per day through phlebotomy (negate the effects of physiological erythropoesis

Only order essential tests

Use of microtainer tubes

NHS
Blood and Transplant

SINGLE Unit Blood Transfusions reduce the risk of an adverse reaction

Don't give unit two without review

Before you transfuse your patient:

- What is your patient's current haemoglobin level?
- What is your patient's target haemoglobin level and would this be achieved by transfusing one unit?

Each unit transfused is an independent clinical decision

Clinically re-assess your patient after each unit is transfused.

- ✓ Is your patient still symptomatic?
- ✓ Is further transfusion appropriate?


Two-by-two was good for Noah, but not for blood transfusions.
Don't flood your patient!
Get on board with single unit transfusions!
B+
www.BloodManagement.com
STRATEGIC BLOOD MANAGEMENT™