

Patient Blood Management

November 22, 2016

Outline and Objectives

1. Recognize liberal transfusion contributes to increased morbidity
2. Recognize that anemia is an independent risk factor for poor patient outcomes
3. Recognize that anemia is an epidemic
4. Implement transfusion reduction strategies
5. Outline and develop a strategy to treat and prevent anemia without transfusion

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Transfusion Medicine

Ten Things Physicians and Patients Should Question

Released October 29, 2014 (1-5) and June 2, 2015 (6-10)



- 1 Don't transfuse blood if other non-transfusion therapies or observation would be just as effective.**
Blood transfusion should not be given if other safer non-transfusion alternatives are available. For example, patients with iron deficiency without hemodynamic instability should be given iron therapy.
- 2 Don't transfuse more than one Red cell unit at a time when transfusion is required in stable, non-bleeding patients.**

<u>Year</u>	<u>Recommendation</u>	<u>Society</u>
1988	<7g/dl	NIH
1996	<6g/dl	American Society of Anesthesiologists
1998	<6g/dl	College of American Pathologists
2001	7g/dl	Australasian Society of Blood Transfusion
2007	7g/dl	Society of Thoracic Surgeons
2009	7g/dl	American College of Critical Care Medicine
2011	8g/dl	Society for Cardiovascular Anesthesiologists
2012	7g/dl (non CV)	American Association of Blood Banks
2012	8g/dl (CV)	American Association of Blood Banks
2012	7g/dl	Br. Com for Standards in Hematology
2016	7g/dl	AABB/AMA

RBC transfusions result in

- ◆ **Mortality ↑**
- ◆ **Length of hospital stay ↑**
- ◆ **Organ dysfunction ↑**
 - Lung injury (TRALI, TACO)
 - Renal impairment
 - Stroke
 - Myocardial infarction
- ◆ **Infection ↑**
- ◆ **Transfusion reactions**
- ◆ **Tumor growth promotion ↑**
- ◆ **Costs ↑**
- ◆ **Non-Hodgkin lymphoma ↑**

Spahn D. R. et al. Lancet (2013) 381: 1855

Allogenic Blood Transfusion Following Total Hip Arthroplasty: Results from the Nationwide Inpatient Sample, 2000 to 2009

Anas Saleh, MD, Travis Small, DO, Aiswarya Lekshmi Pillai Chandran Pillai, MBBS, MS, Nicholas K. Schiltz, BS, Alison K. Klika, MS, and Wael K. Barsoum, MD

Investigation performed at the Department of Orthopaedic Surgery, Cleveland Clinic, Cleveland, Ohio

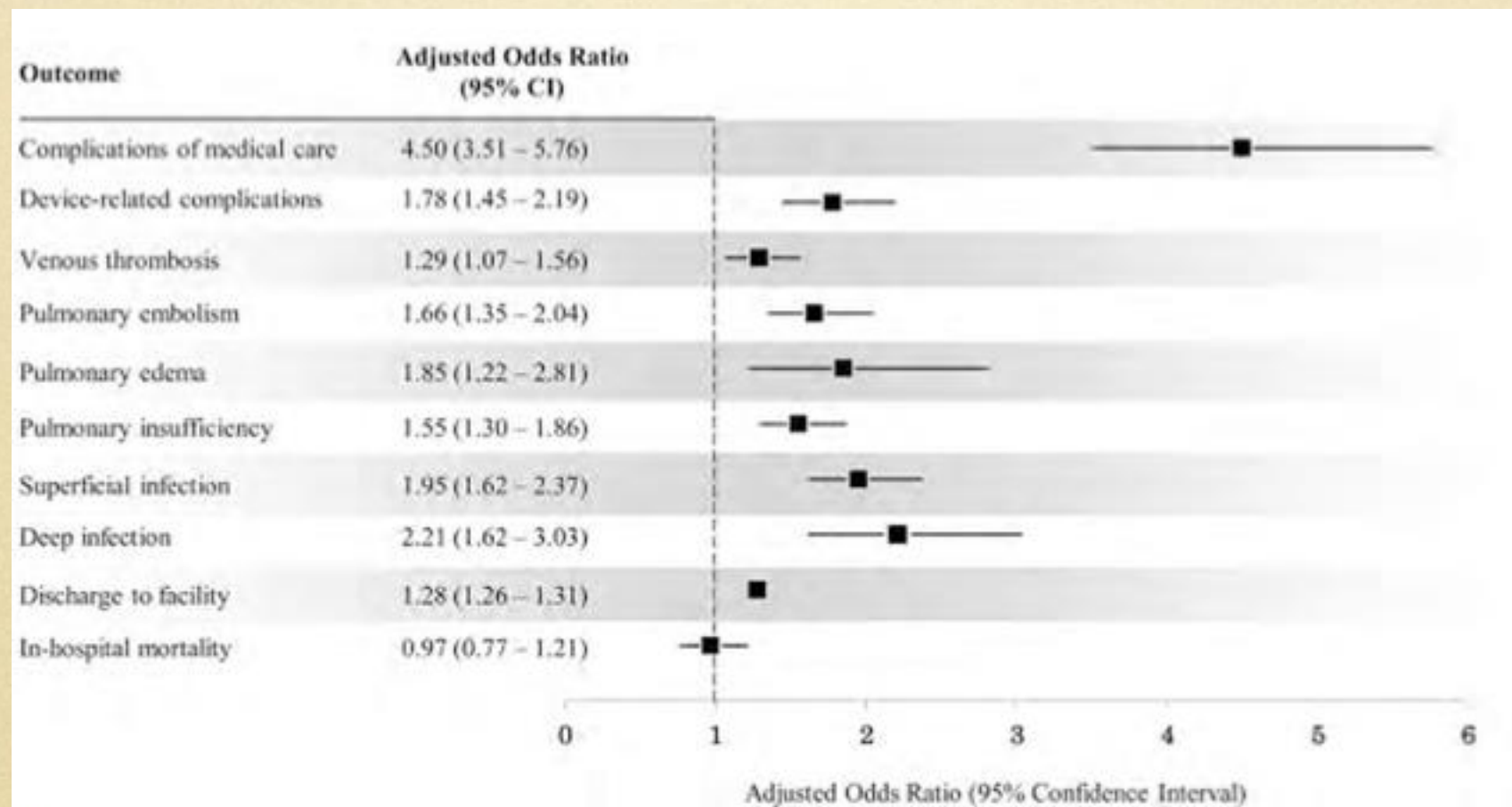


Fig. 4

Graph showing the adjusted effect of allogenic blood transfusion on the outcomes after total hip arthroplasty.

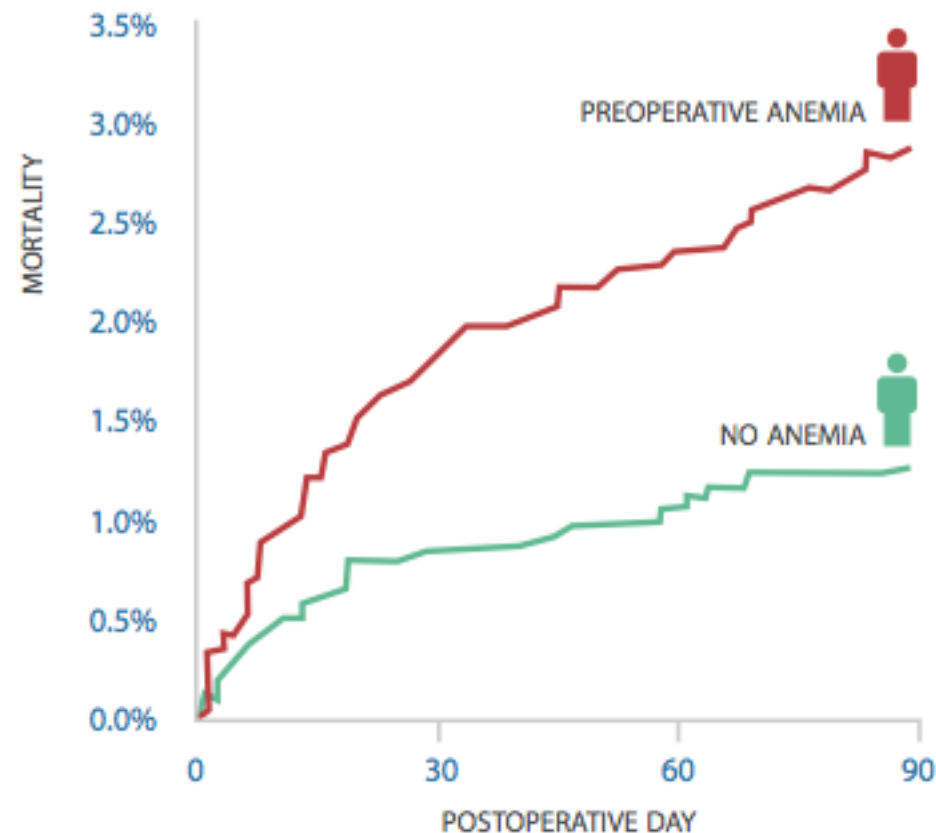
Meta-analysis of the association between preoperative anaemia and mortality after surgery

A. J. Fowler¹, T. Ahmad¹, M. K. Phull², S. Allard³, M. A. Gillies⁴ and R. M. Pearse¹



Preoperative Anemia Is Associated With Postoperative Mortality

N = 7759 2003 – 2006
HB < 12 G/DL FOR WOMEN AND < 13 G/DL FOR MEN



24 studies, 949,445 patients, 39.1% anemic

Odds ratio calculated:

30 day mortality: 2.9

Acute kidney injury: 3.75

Infection: 1.93

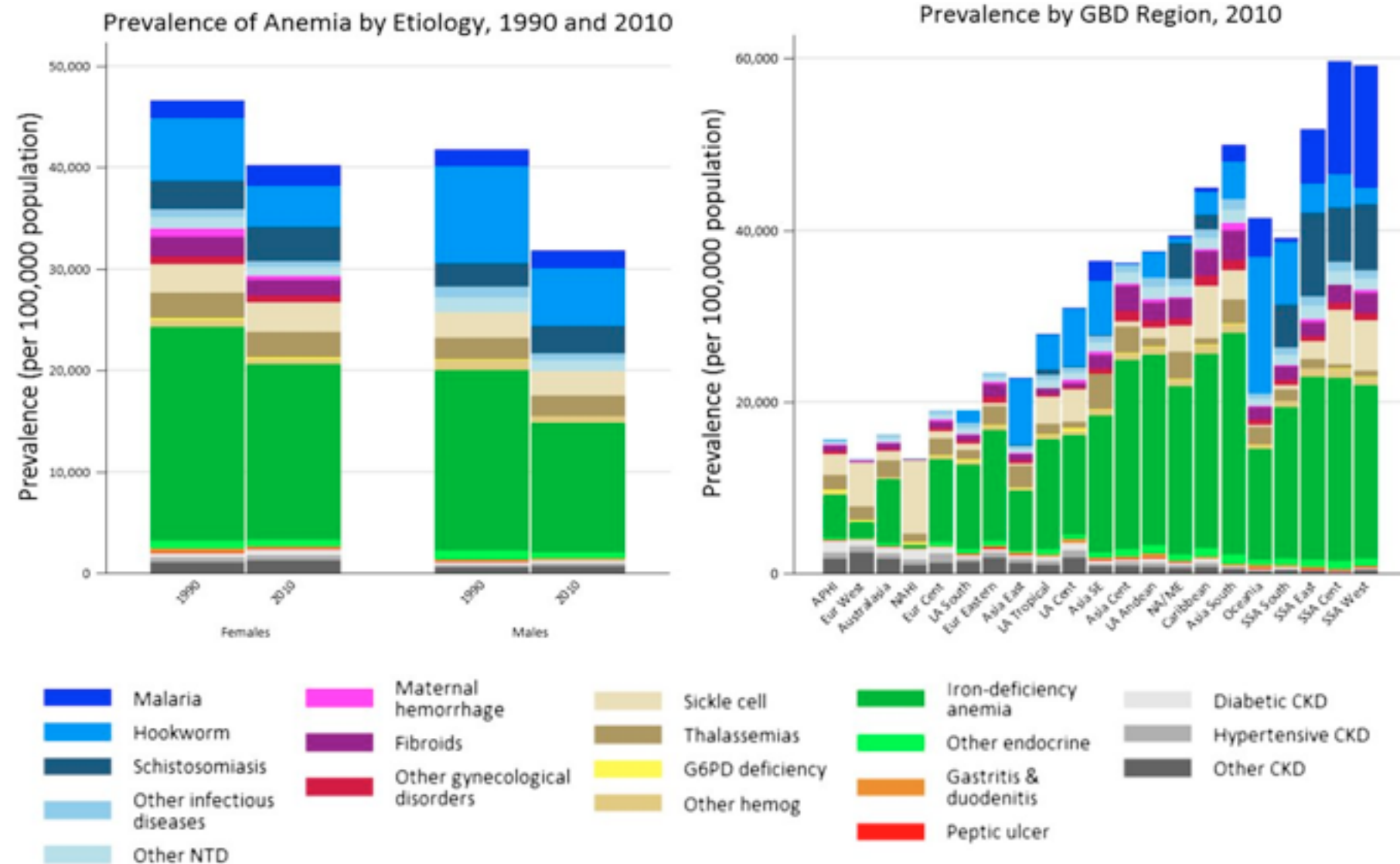
Transfusion: 5.04

Stroke (in CV sx): 1.28

MI (in CV sx): 1.11

Anemia according to WHO < 130g/L

Global and regional cause-specific anemia prevalence for 1990 and 2010.



Nicholas J. Kassebaum et al. *Blood* 2014;123:615-624

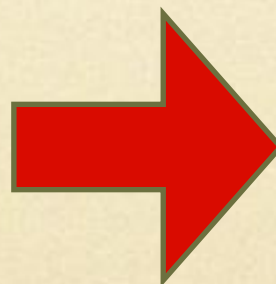
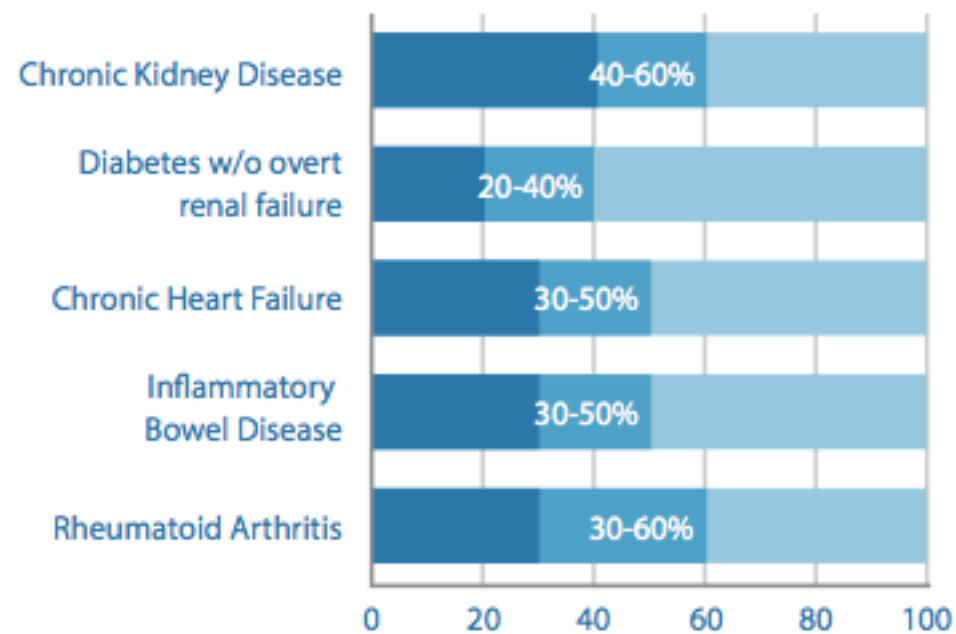




F1

Prevalence of Iron Deficiency Anemia

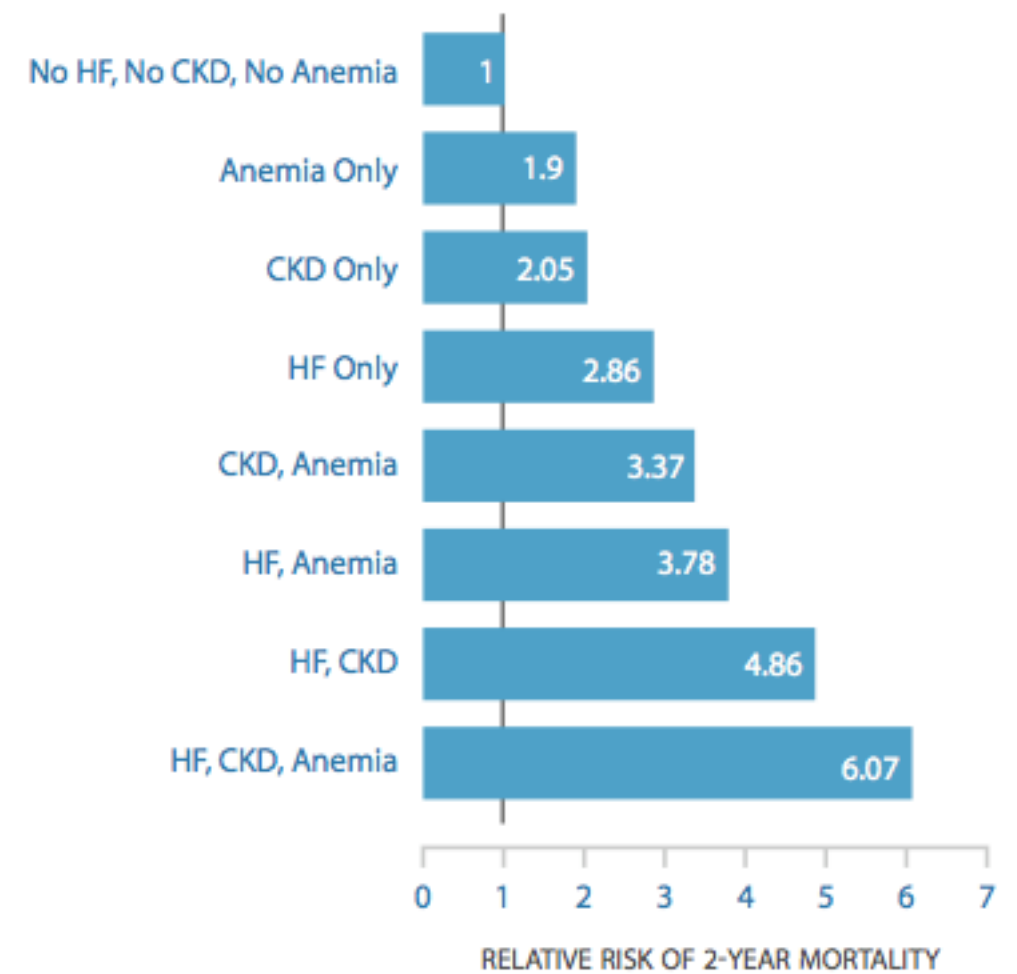
■ MINIMUM ■ MAXIMUM ■ TOTAL



F3

Anemia: A Potent Multiplier of Mortality

N = 1.1 MILLION (5% MEDICARE SAMPLE, 1996-1997)





F5

Does Preoperative Anemia Adversely Affect Colorectal Surgery Outcomes?

2005-2008 - NSQIP (251 HOSPITALS)

CO - MI, CVA, AKI, MORTALITY AND HLOS

N - 23,348 - 47.4 % ANEMIC

UNI, MULTI, LOGISTIC REGRESSION AND PROPENSITY SCORING

ANEMIA	HCT	N	CO-OR	HLOS
None	(>38%)	12,281	1.0	-
Mild	(30-37%)	9037	1.47	-
Moderate	(26-29%)	1726	1.87	1.2
Severe	(21-25%)	304	2.1	1.6



F2

Hospital Acquired Anemia

10 hospitals, from 1/2009 - 08/2011

188,447 Hospitalizations

Endpoints: Mortality, Charges and LOS

	MILD	MODERATE	SEVERE
Definition	>11-12F > 11-13M	9.1 ≤ 11	≤ 9.0
HAA (74%)	29%	41%	30%
Mort RR	1.0	1.51	3.28
LOS	1.08	1.28	1.88
Charges	1.06	1.18	1.80

Patient Blood Management Systems

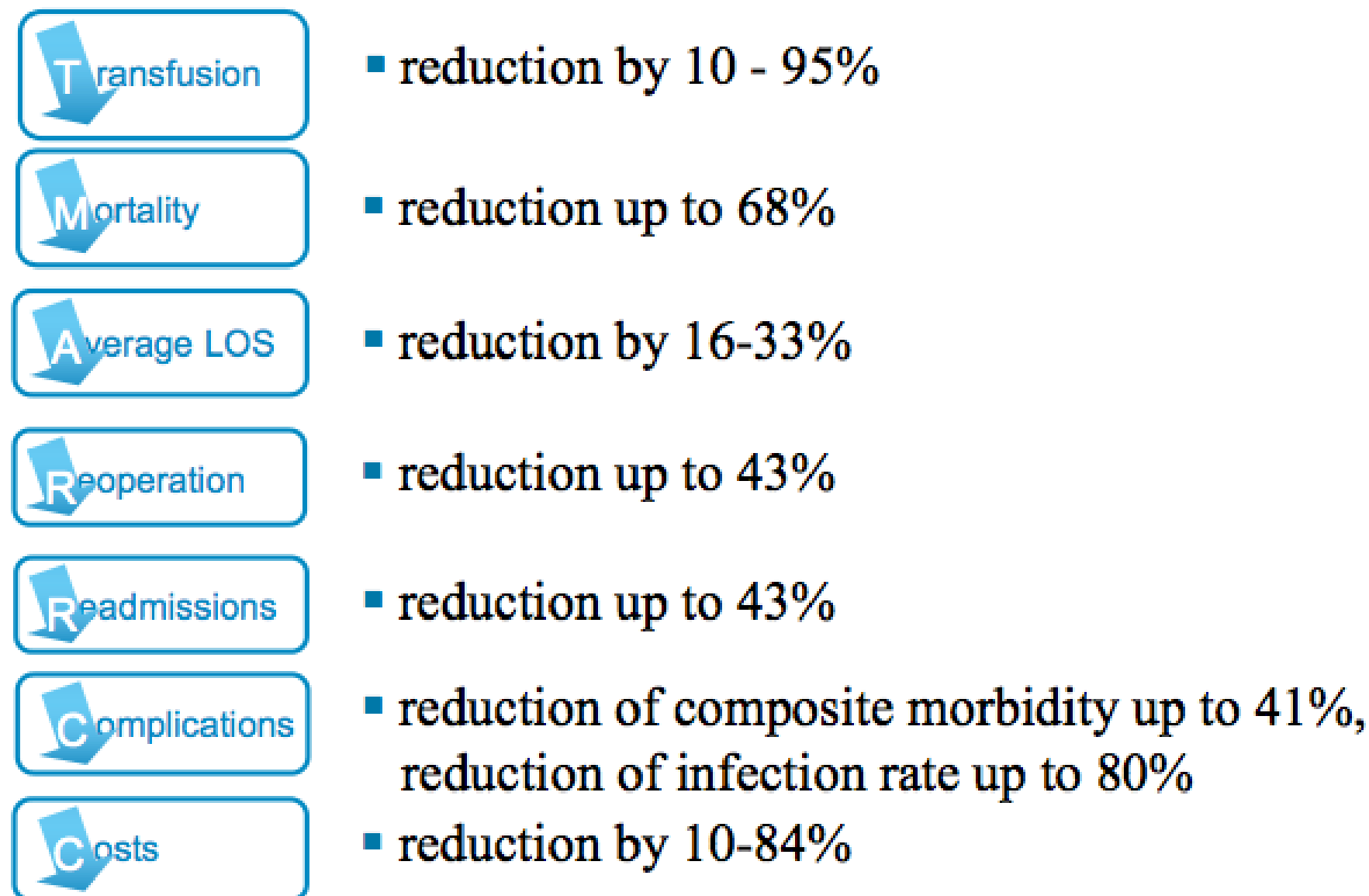


Fig. (1). Outcomes reported with comprehensive Blood Conservation/Patient Blood Management Programs. Reductions vary according to baseline utilization/practice, measure used and level of program implementation. Data compiled from: Frank 2014; Pattakos 2012; Lapar 2013; Kotze 2012; Moskowitz 2010; Reddy 2009; Brevig 2009; Ferraris 2007; Wong 2007; Ghiglione 2007; Freedman 2007; Martinez 2007; DeAnda 2006; Freedman 2005; Pierson 2004; Green 2004; Kourtzis 2004; Morgan 2004; Slappendel 2003; Van der Linden 2001; Helm 1998.

Tranexamic acid use and postoperative outcomes in patients undergoing total hip or knee arthroplasty in the United States: retrospective analysis of effectiveness and safety

 OPEN ACCESS

Jashvant Poeran *assistant professor*¹, Rehana Rasul *biostatistician*¹, Suzuko Suzuki *fellow anesthesiology*², Thomas Danninger *research fellow anesthesiology*², Madhu Mazumdar *professor*¹, Mathias Opperer *research fellow anesthesiology*², Friedrich Boettner *attending orthopedic surgeon*³, Stavros G Memtsoudis *attending anesthesiologist and senior scientist*² *clinical professor of anesthesiology and public health*⁴

BMJ 2014;349:g4829 doi: 10.1136/bmj.g4829

Table 3| Outcome variables by tranexamic acid use. Values are numbers (percentages) unless stated otherwise

Variables	Tranexamic acid (n=20 051)	No tranexamic acid (n=852 365)	P value*
Primary outcome variables			
Allogeneic or autologous transfusion	1549 (7.7)	171 423 (20.1)	<0.001
Allogeneic transfusion only	1202 (6.0)	123 764 (14.5)	<0.001
Thromboembolic complications:			
Deep venous thrombosis	85 (0.4)	3993 (0.5)	0.3607
Pulmonary embolism	49 (0.2)	3169 (0.4)	0.0033
Other:			
Acute renal failure	250 (1.2)	13 383 (1.6)	0.0003
In-hospital mortality	7 (0.04)	672 (0.1)	0.0275
Cerebrovascular events	13 (0.1)	853 (0.1)	0.1173
Acute myocardial infarction	20 (0.1)	1945 (0.2)	0.0002
Combined complications†	382 (1.9)	22 041 (2.6)	<0.001
Secondary outcome variables			
Mechanical ventilation	11 (0.1)	1344 (0.2)	0.0003
Admission to intensive care unit	628 (3.1)	63 828 (7.5)	<0.001
Median(interquartile range) length of hospital stay (days)‡	3 (2-4)	3 (3-4)	<0.001
Median (interquartile range) cost of hospital stay (\$)‡	14 890 (12 508-17 483)	15 110 (12 409-18 740)	<0.001

Stanford Experience

s (DOES NOT ORDER TRANSFUSION)

ulin (RhoGam)

ucts

s Not Order Product)

e, LAB ONE TIME First occur

LAB ONE TIME

Starting: 12/7/2010

First Occurrence: To

Scheduled Times:

12/07/10 1300

Routine

Prompt

1. Transfuse U
2. Over Hour(s)
3. Autologous/Directed Donor
4. Nursing Instructions

s Not Order Product)

e, LAB ONE TIME

Not Order Product)

e, LAB ONE TIME

s Not Order Product)

e, LAB ONE TIME

inous, PRN for 1 dose, For blood and blood component transfusion

BestPractice Alert - Weaver,Elizabeth

Strong evidence suggests that in hemodynamically stable, non-bleeding patients a hemoglobin threshold of 7 gm/dl (or 8 gm/dl in acute coronary syndromes/post cardiac surgery) can decrease transfusion requirements and avoid adverse outcomes.

Single unit transfusions are usually preferable.

Last HGB=7.4 on 12/7/2010

Prev HGB=8.6 on 12/7/2010

Prev HGB=10.0 on 12/6/2010

Acknowledge Reason:

[Jump to Clinical Practice Guidelines](#)

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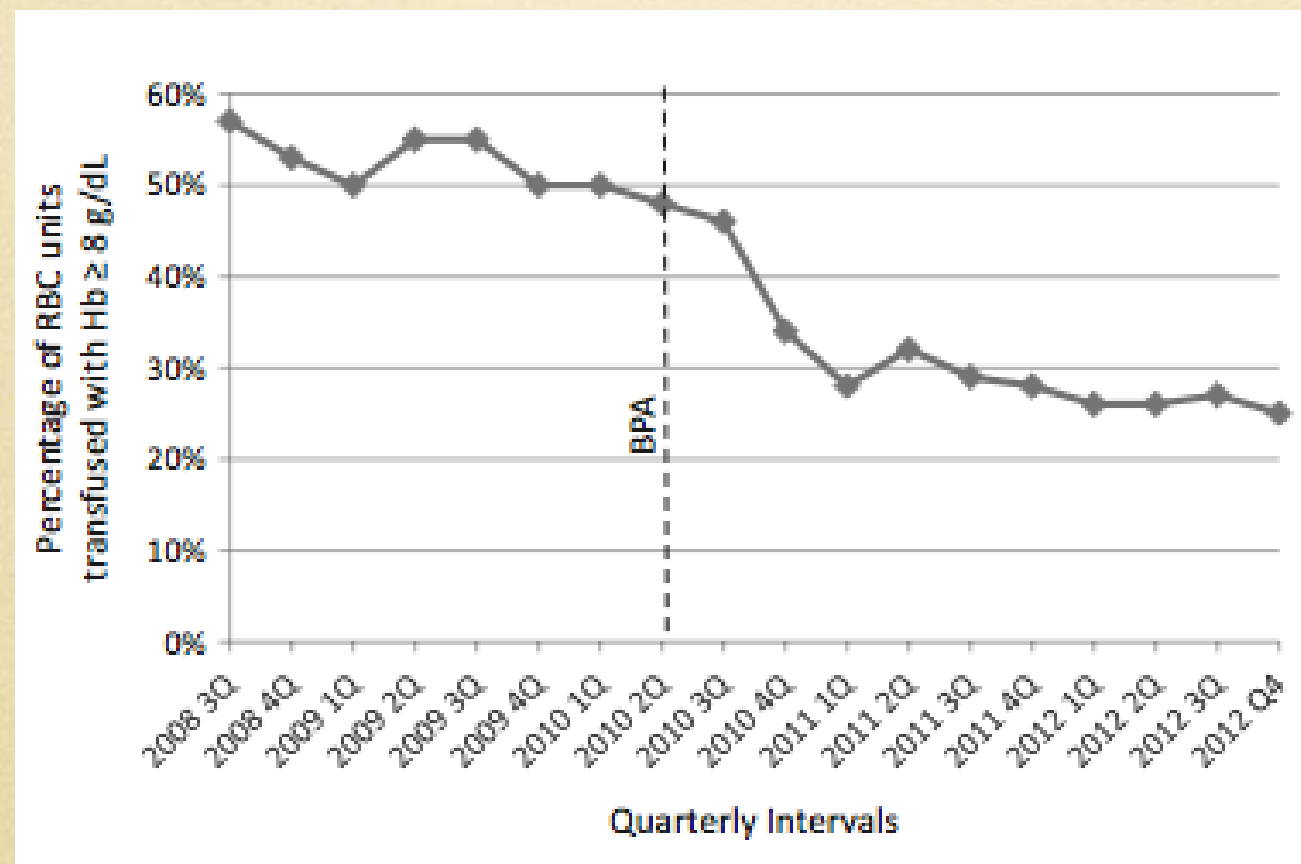
Acute Bleeding

Hgb less than or equal to 8 and acute coronary syndrome

Hgb less than or equal to 8 and postoperative cardiothoracic patient

Other (Click Note icon to enter comment)

Stanford Experience



Stanford Experience



24%

Reducing the blood used for transfusions by nearly one-quarter saved the hospital US \$1.6 million per year.



The average length of stay for patients who received transfusions went from 10.1 days to 6.2.

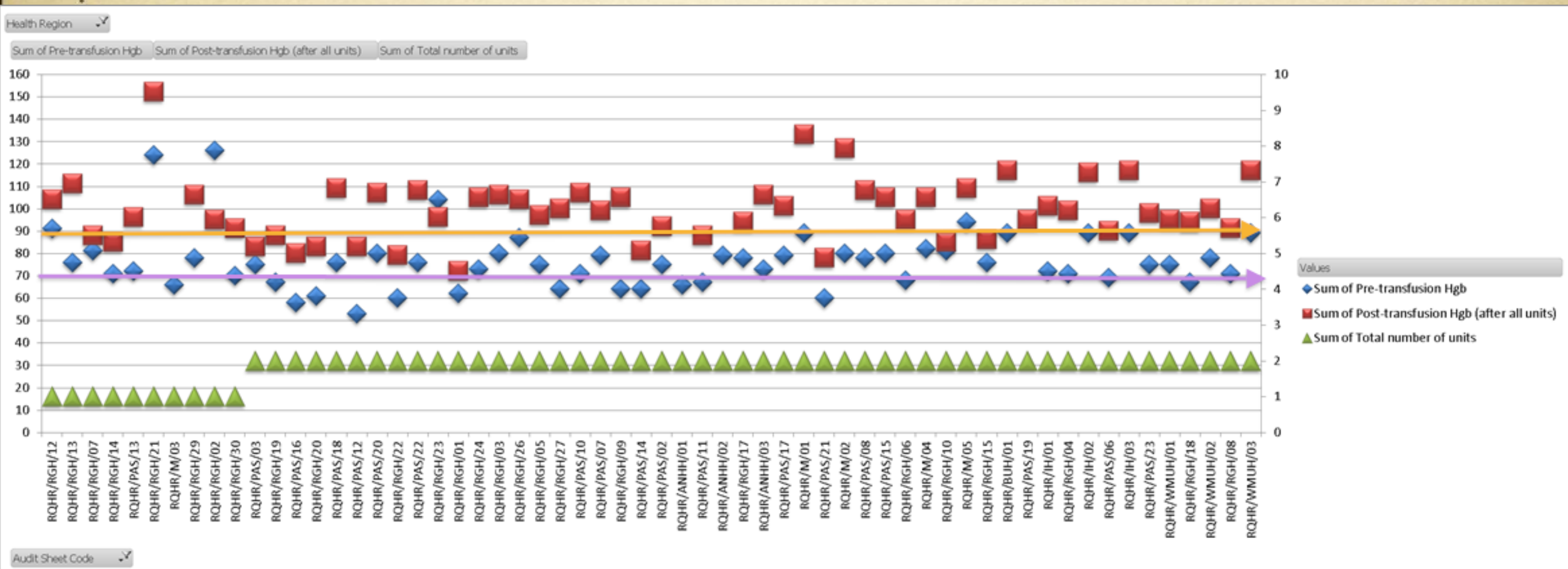
5.5%



3.3%

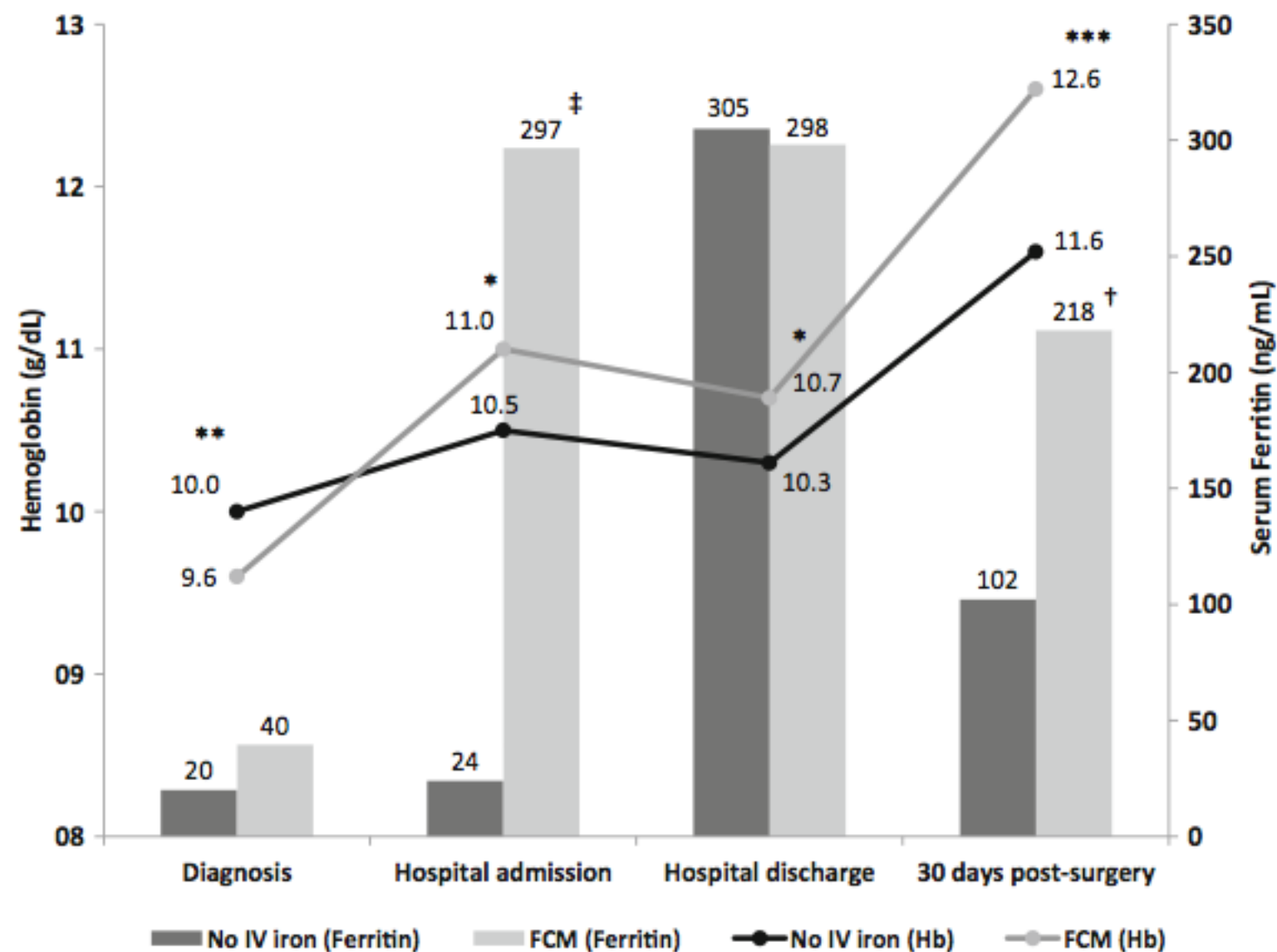
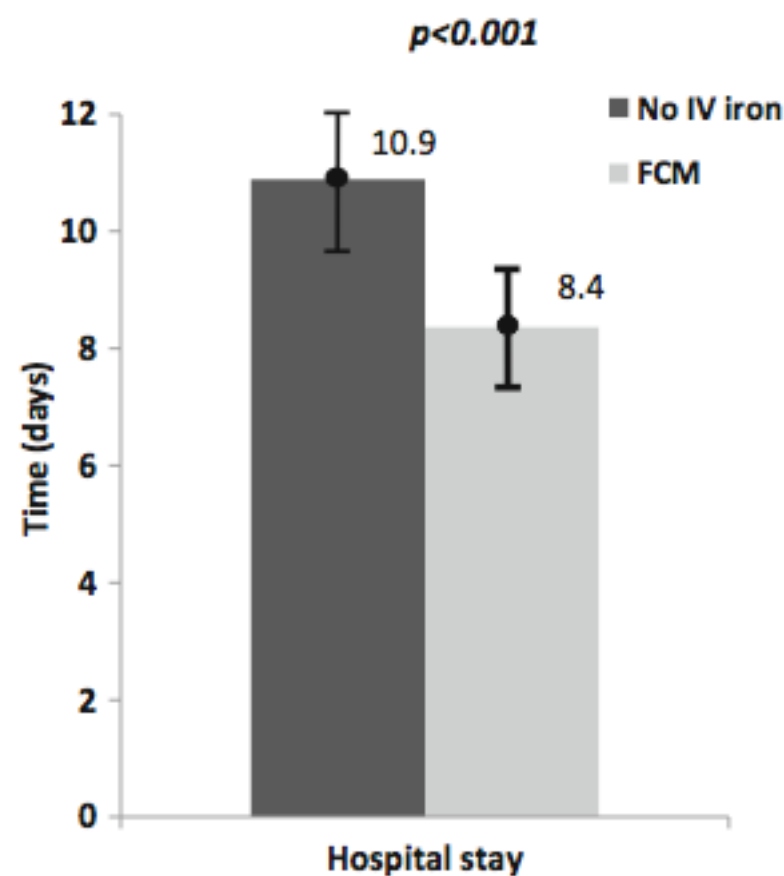
Mortality among people who had transfusions fell from 5.5% to 3.3%.

RQHR Experience



Ferric carboxymaltose reduces transfusions and hospital stay in patients with colon cancer and anemia

José Luis Calleja¹ • Salvadora Delgado² • Adolfo del Val³ • Antonio Hervás⁴ •
José Luis Larraona⁵ • Álvaro Terán⁶ • Mercedes Cucala⁷ • Fermín Mearin⁸ •
on behalf of the Colon Cancer Study Group



OPEN

The Important Role for Intravenous Iron in Perioperative Patient Blood Management in Major Abdominal Surgery

A Randomized Controlled Trial

Bernd Froessler, MD, MClinSc,† Peter Palm, MD,* Ingo Weber, MD,* Nicolette A. Hodyl, PhD,‡
Rajvinder Singh, MBBS, MPhil,§¶ and Elizabeth M. Murphy, PhD||*

Intervention group 5 transfusions (12.5%) and 5 patients, Usual care had 17 transfusions (53%) $p < 0.001$ in 10 patients; Relative Risk Reduction of 60%

No intraop or preoperative transfusions in intervention group compared to 6% preop and 16% intraop in usual care group

Similar Hb at randomization, higher Hb at admission and 4 wk followup

Length of stay shortened by 3 days (average) in intervention group

Proposal:

1. Standardize and track tranexamic acid use
2. Streamline and track red blood cell ordering
3. Continue to work with pharmacy for broader use of intravenous iron in appropriate patient groups