



Göğüs Kalp Damar Anestezi ve Yoğun Bakım Derneği

Ulusal
20. KONGRESİ

17-20 Nisan 2014

Grand Yazıcı Turban Otel - Marmaris

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PERİOPERATİF ANEMİ



Dr. Hüseyin İlksen TOPRAK
İnönü Ün. Tıp Fakültesi
Anesteziyoloji ve Rean AD



SORU ?

Anemi Neden Önemli?

SORU ?

British Journal of Anaesthesia **107** (S1): i41–i59 (2011)
doi:10.1093/bja/aer350

BJA

What is really dangerous: anaemia or transfusion?

A. Shander^{1,2,3,4*}, M. Javidroozi¹, S. Ozawa⁵ and G. M. T. Hare^{6,7}

İnsidans

Önemi



Tanı

Tedavi

Anemi Nedir?

WHO

Hb < 13 g/dL ♂

Hb < 12 g/dL ♀

Dünya nüfusunun

1/4'ü anemik

Research Paper

**Worldwide prevalence of anaemia, WHO V
Information System, 1993–2005**

Erin McLean^{a1}, Mary Cogswell^{a2}, Ines Egli^{a3}, Da
Benoist^{a1 c1}

^{a1} Department of Nutrition for Health and Development, World
Geneva 27, Switzerland

^{a2} Division of Nutrition and Physical Activity, Centers for Disease

^{a3} Institute of Food Science and Nutrition, Swiss Federal Institute

^{a4} Escuela de Estadística, Universidad Nacional de Rosario,

Abstract

– McLean, 2008

Anemi Neden Önemli?

- **Yaygın** bir sağlık sorunu
- Mortalite ve morbidite ile ilişkili

İnsidans ?

- Non-kardiyak cerrahide
 - %20-30
- Kardiyak cerrahide
 - %50

Postoperatif dönemde %90

- Hare, 2013
- Hare, 2011
- Hajjar 2010

Can J Anesth/J Can Anesth (2013) 60:168–175
DOI 10.1007/s12630-012-9861-y

REVIEW ARTICLE/BRIEF REVIEW

Review article: Risks of anesthetic strategies: can perioperative safety?

Article de synthèse: Risques de anesthésie en charge : la gestion périopératoire et la sécurité du patient?

Gregory M. T. Hare, MD, PhD · John Freedman, MD
C. David Mazer, MD

Received: 21 June 2012 / Accepted: 27 November 2012 /
© Canadian Anesthesiologists' Society 2013

Role of preoperative anemia for risk of transfusion and postoperative morbidity in fast-track hip and knee arthroplasty

*Øivind Jans, Christoffer Jørgensen, Henrik Kehlet, and Pär I. Johansson on behalf of the Lundbeck Foundation Centre for Fast-track Hip and Knee Replacement Collaborative Group**

Prospektif, gözlemsel kohort

6 Merkez, Toplam 5165 hasta

Anemik hasta oranı %13

	<u>Anemik</u>	<u>Non-anemik</u>	
LOS >5 days	90 (13.6)	199 (4.4)	<0.001
RBC transfusion during primary admission	209 (31.6)	363 (8.1)	<0.001
RBC transfusion <30 days	222 (33.7)	437 (9.7)	<0.001
Readmission (all cause) <90 days	85 (12.9)	351 (7.8)	<0.001
Mortality <90 days	7 (1.1)	15 (0.3)	<0.01



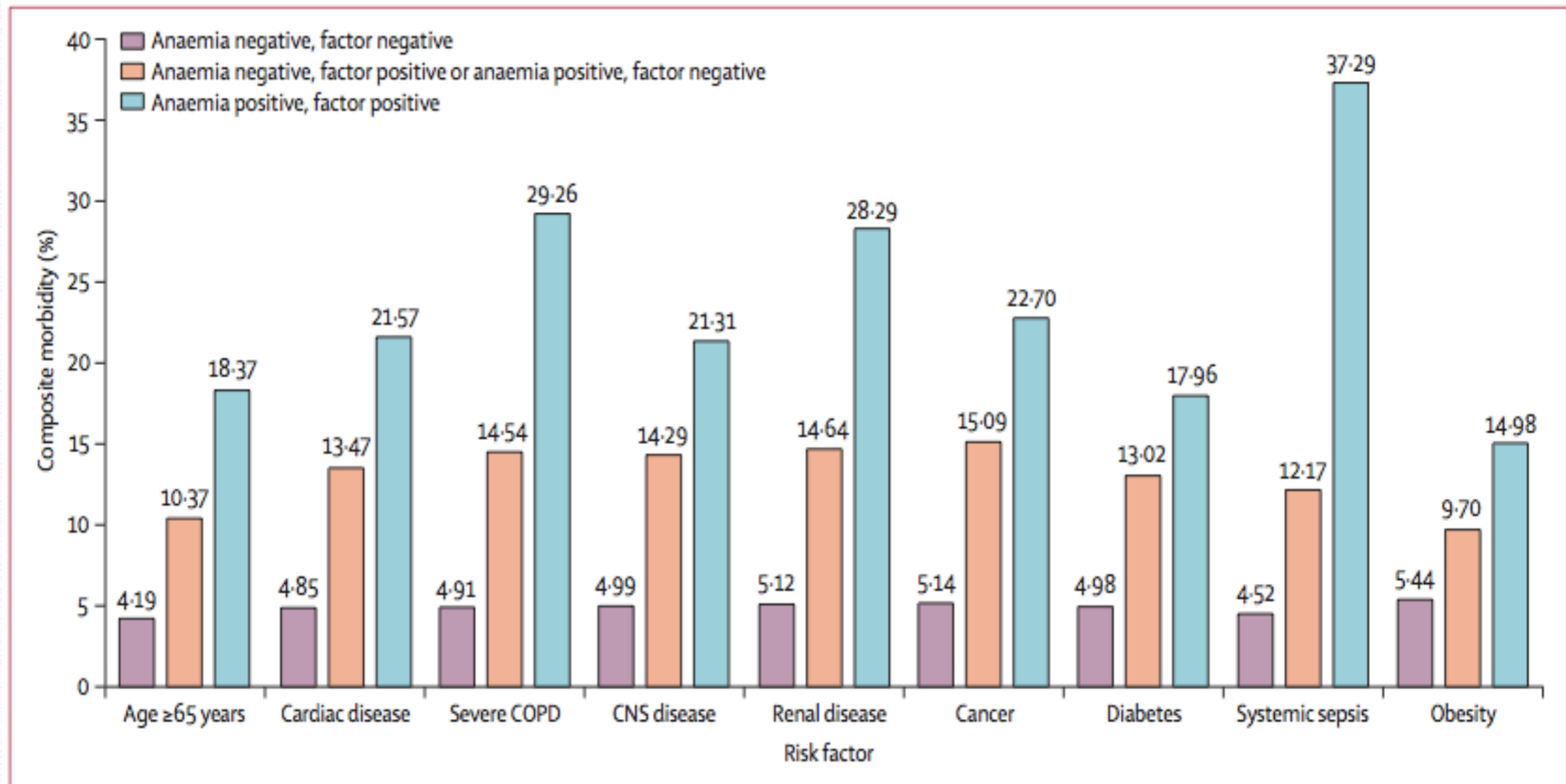
Articles

Preoperative anaemia and postoperative outcomes in non-cardiac surgery: a retrospective cohort study

Khaled M Musallam, MD^{a, c}, Hani M Tamim, PhD^{a, d}, Toby Richards, MD^e, Prof Donat R Spahn, MD^f, Prof Frits R Rosendaal, MD^g, Aida Habbal, BSN^b, Mohammad Khreiss, MD^b, Fadi S Dahdaleh, MD^b, Kaivan

Majör Nonkardiyak Cerrahi Geçiren Toplam 227425 hasta

Anemi oranı %30



THE LANCET

Volume 378, Issue 9800, 15–21 October 2011, Pages 1396–1407



Articles

Preoperative anaemia and postoperative outcomes in non-cardiac surgery: a retrospective cohort study

Khaled M Musallam, MD^{a, c}, Hani M Tamim, PhD^{a, d}, Toby Richards, MD^e, Prof Donat R Spahn, MD^f, Prof Frits R Rosendaal, MD^g, Aida Habbal, BSN^b, Mohammad Khreiss, MD^b, Fadi S Dahdaleh, MD^b, Kaivan

**Majör non-kardiyak cerrahi hastalarında,
anemi, ılımlı bile olsa,
hem morbidite hem de mortalitede
artış ile ilişkilidir**

Impact of Preoperative Anemia on Outcome in Patients Undergoing Coronary Artery Bypass Graft Surgery

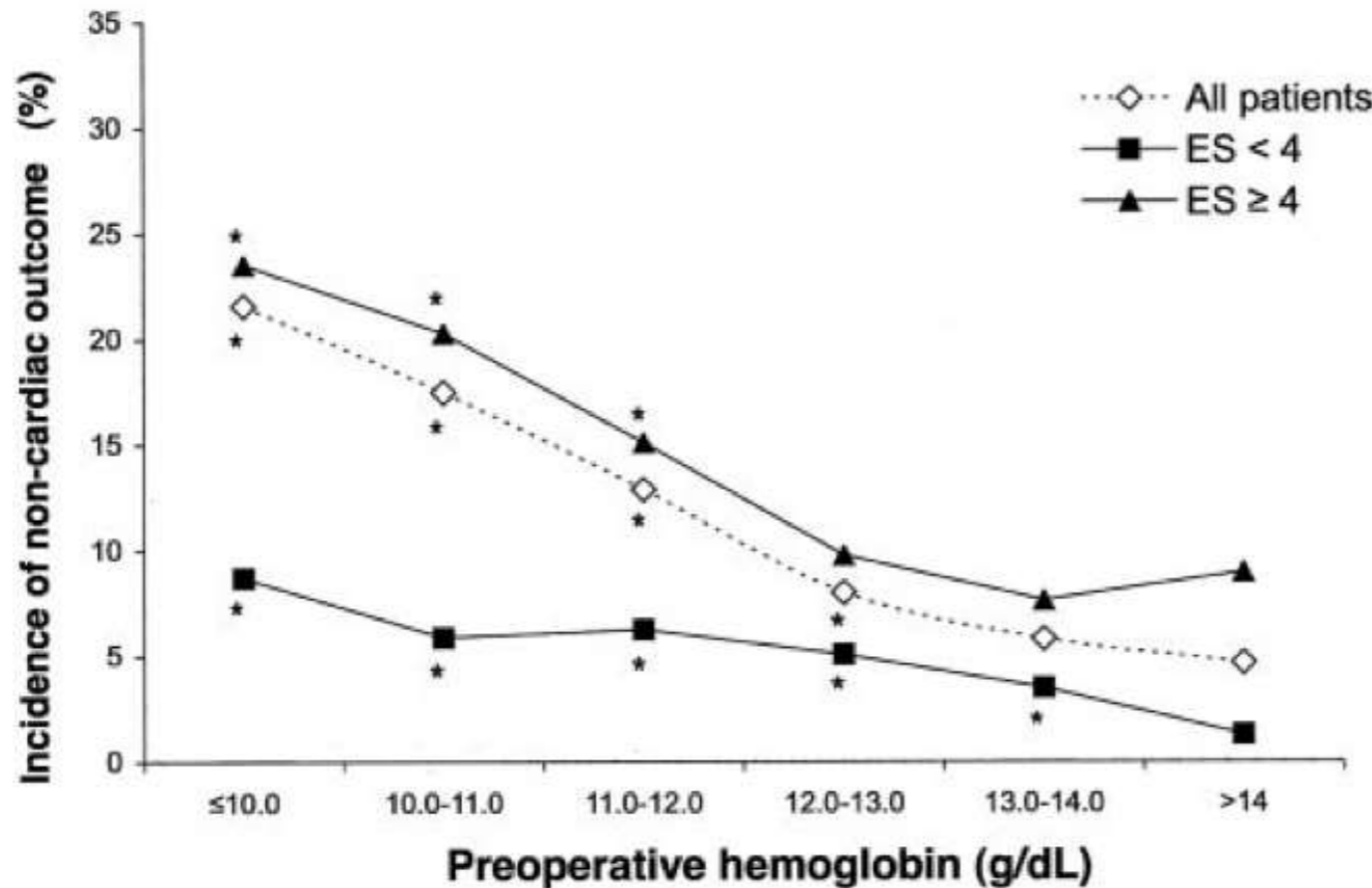
Alexander Kulier, Jack Levin, Rita Moser, Gudrun Rumpold-Seitlinger, Iulia Cristina Tudor, Stephanie A. Snyder-Ramos, Patrick Moehnle and Dennis T. Mangano

Circulation. 2007;116:471-479; originally published online July 9, 2007;

Çok Merkezli,
Toplam 4804 hasta

Anemik Hasta

♂ : %28 ve ♀ : %36



Postoperatif
morbidite riski
artmıştır

Eşlik eden yandaş
hastalık da varsa
risk daha da artar

Yüksek Preoperatif Hb Düzeyi

Hastane kalış süresini ve Enfeksiyon oranını azaltır

Table 1 Impact of transfusion on LOS and infection rate

Clinical Outcome		Transfused	Not transfused
LOS in days; mean (SD)	Knee	7.9 (13.3)	6.1 (16.2)
	Hip	7.6 (9.3)	5.8 (13.9)
	CABG	11.8 (21.6)	7.2 (11.4)
Postoperative infections	Knee	1.7%	1.1%
	Hip	5.4%	1.9%
	CABG	10.5%	3.4%

– Hare, 2013

Yüksek Preoperatif Hb Düzeyi

Transfüzyon gereksinimini azaltır

Table 2 Effect of preoperative Hb on transfusion rates after total knee or hip arthroplasty or CABG

Preoperative Hb	Percent transfused		
	Knee	Hip	CABG
Hb < 130 g·L ⁻¹	26.0%	31.5%	56.3%
Hb > 130 g·L ⁻¹	6.1%	7.3%	16.5%
Hb > 140 g·L ⁻¹	3.7%	3.7%	10.2%
<i>P</i> (ANOVA)	< 0.0001	< 0.0001	< 0.0001

Hb = hemoglobin concentration; CABG = coronary artery bypass grafting; ANOVA = analysis of variance

– Hare, 2013



Anemi Neden Önemli?

Cerrahi hastalarında yüksek anemi insidansı

Çoğu anemi tedavi edilebilir

Başarılı perioperatif anemi idaresi birçok transfüzyonu engeller

Nedenleri

– Demir Eksikliği

– Vitamin (B12, Folat) Eksikliği

– Kr. Böbrek Yetmezliği

– Kr. Hastalık Anemisi

En sık Anemi Nedeni

- Demir Eksikliği

- Vitamin (B12, Folat) Eksikliği

- Kr. Böbrek Yetmezliği

- Kr. Hastalık Anemisi

- Liu, 2012

- Hare, 2013

Demir Eksikliđi Tedavisi

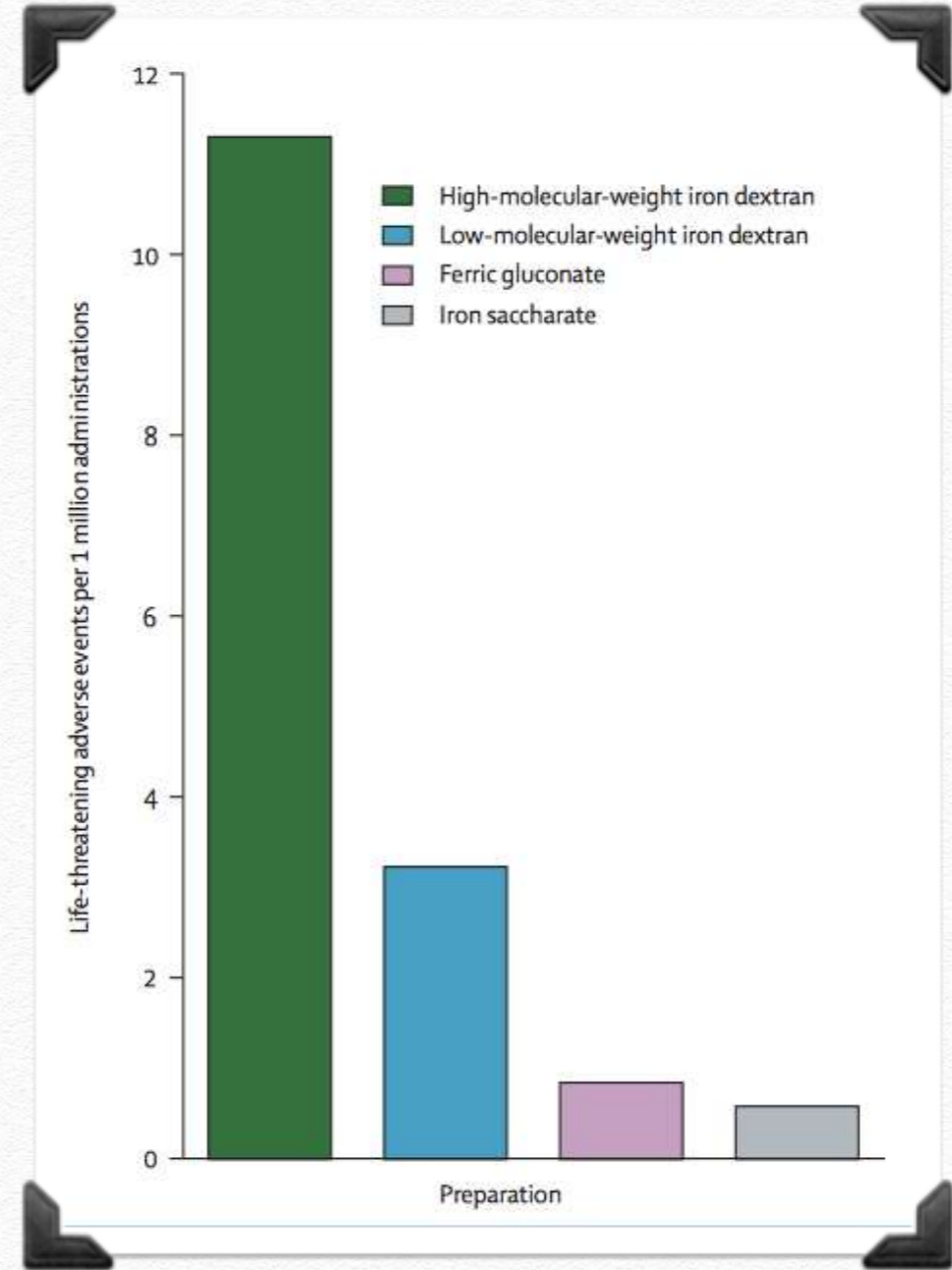
**Çođu hastada
ilk tercih oral demir tedavisidir.**

IV Demir Tedavisi

- Aşırı demir gereksinimi
 - Kronik kanama veya hemodializ
- Demir malabsorpsiyonu
 - çölyak, atrofik gastrit, gastrik bypass
- Zayıf emilim ve tolerans bozukluğu
- **Derin anemi**
- Oral tedaviye intolerans ya da uyum bozukluğu
- **Hızlı replasman gereksinimi**
 - operasyon öncesi

IV Demir Yan Etkileri

- Hipotansiyon
- Bulantı
- Artrit, myalji
- Cilt döküntüsü
- **Anaflaksi**



– Tahtacı , 2013

– Pinsk , 2008

– Auerbach, 2007

Eritropoez Stimulan Ajanlar

– Kr. Hastalık Anemisi

– KBY Anemisi

– Kemoterapiye Sekonder Anemi

ESA

Tromboz Riski

Kanser Yayılım Riski

FDA Karakutu listesinde

Efficacy and Safety of Erythropoietin and Intravenous Iron in Perioperative Blood Management: A Systematic Review

David M. Lin ^{a,*}, Estelle S. Lin ^b, Minh-Ha Tran ^{c,d}

Oral Demir tedavisine göre
IV Fe tedavisi daha hızlı ve
etkindir

mayan çalışma

Tek doz EPO + IV Demir,
transfüzyon gereksinimini

anemia may have an
ery with preoperative
mentation.

belirgin

IV Demir, en az oral Demir
kadar iyi tolere edilir ve

EPO plus
od, may
complete-
oral iron;

şiddet

Tromboembolizm riskinden
kaçınmak için EPO düşük doz ve
tromboemboli profilaksisi ile
önerilmektedir

significantly
ly avoid RBC
• Intravenous
however, the
attributable t
because of it
• Erythropoiet
spinal surgery patients
prophylaxis in the pe
thromboprophylaxis is

riski ç

Anemi Tedavisi

Elektif cerrahi
öncesi

En az 4 hf önce
(İdeal)

Özellikle kanama riski
yüksek olan hastalarda

Preoperatif Anemi Tedavisi

Ne kadar erken, o kadar etkin

Table 3 Effect of having a long lead time to optimize preoperative treatment of anemia

Lead time	Percent Transfused	
	Knee	CABG
< 7 days	10.4%	41.3%
7-14 days	9.8%	31.4%
15-21 days	8.6%	25.0%
> 21 days	7.3%	22.8%
<i>P</i> (ANOVA)	< 0.0001	< 0.0001

CABG = coronary artery bypass grafting; ANOVA = analysis of variance

– Hare, 2013



Anemi Neden Önemli?

Anemi

- **Transfüzyon**'a neden olur
- **Transfüzyon** mortalite ve morbidite ile ilişkili

“Kanama”

“Kan oksijen içeriğinde azalma”

“Doku oksijen sunumunda azalma”

Doku hipoksisi

Organ Yetmezliđi

ÖLÜM

“Kanama”

Tedavi

“Kan oksijen içeriğini artırma”
tedavileri sağkalım oranında
artışa neden olur

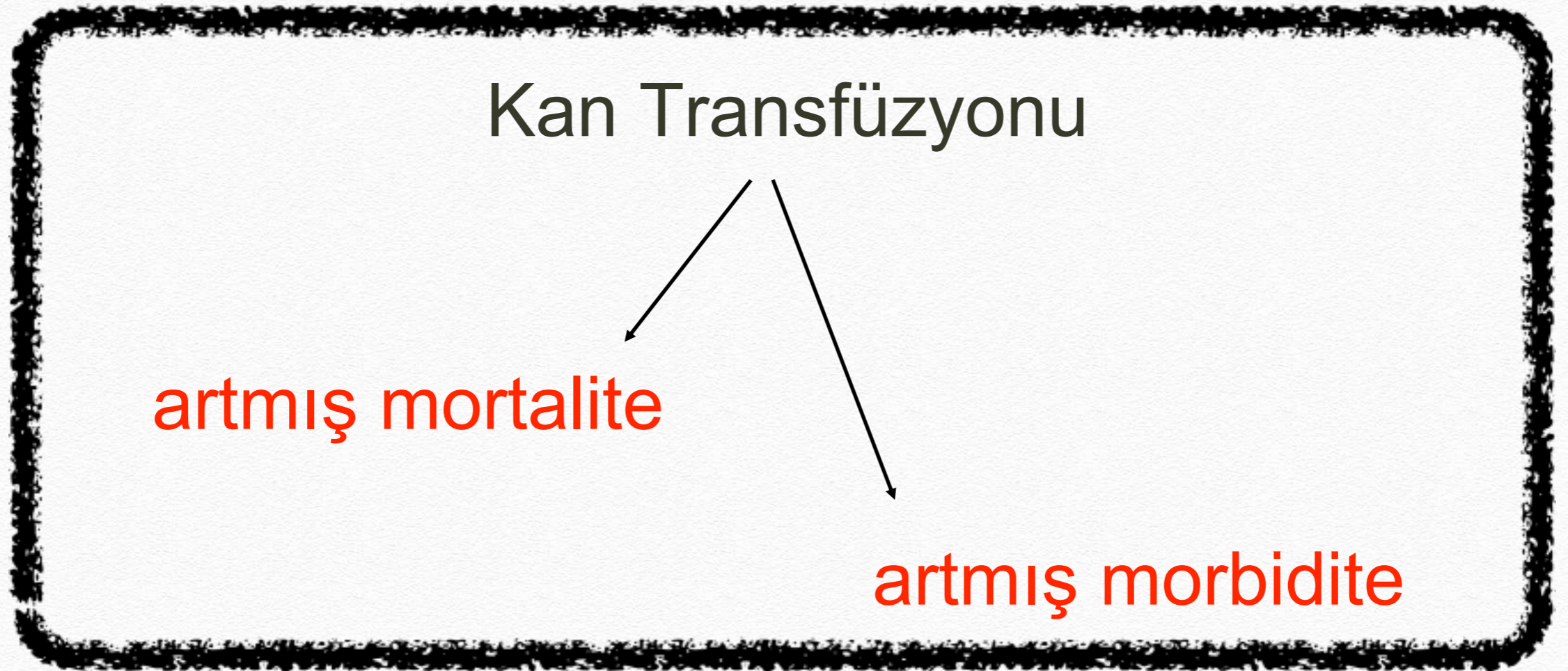
“Anemi Tedavisi”

Tedavi

“Kan oksijen içeriğini artırma”
için **transfüzyon**
tedavileri sağkalım oranında
artışa neden olur **mu?**

"Ancak kan transfüzyonu ile
bu **gösterilememiş**"

AKSİNE



Blood Transfusion 1

Concepts of blood transfusion in adults

Lawrence T Goodnough, Jerrold H Levy, Michael F Murphy

Lancet 2013; 381: 1845-54

a procedure.¹ Of the 39 million hospital discharges in the USA, 5.8% (2.3 million) are associated with blood transfusion.² Although blood transfusions are believed to be lifesaving, this hypothesis has never been proven in a prospective controlled clinical trial. Thus, the relative benefit-risk ratio of a blood transfusion is an important bedside discussion for patients' informed consent.³

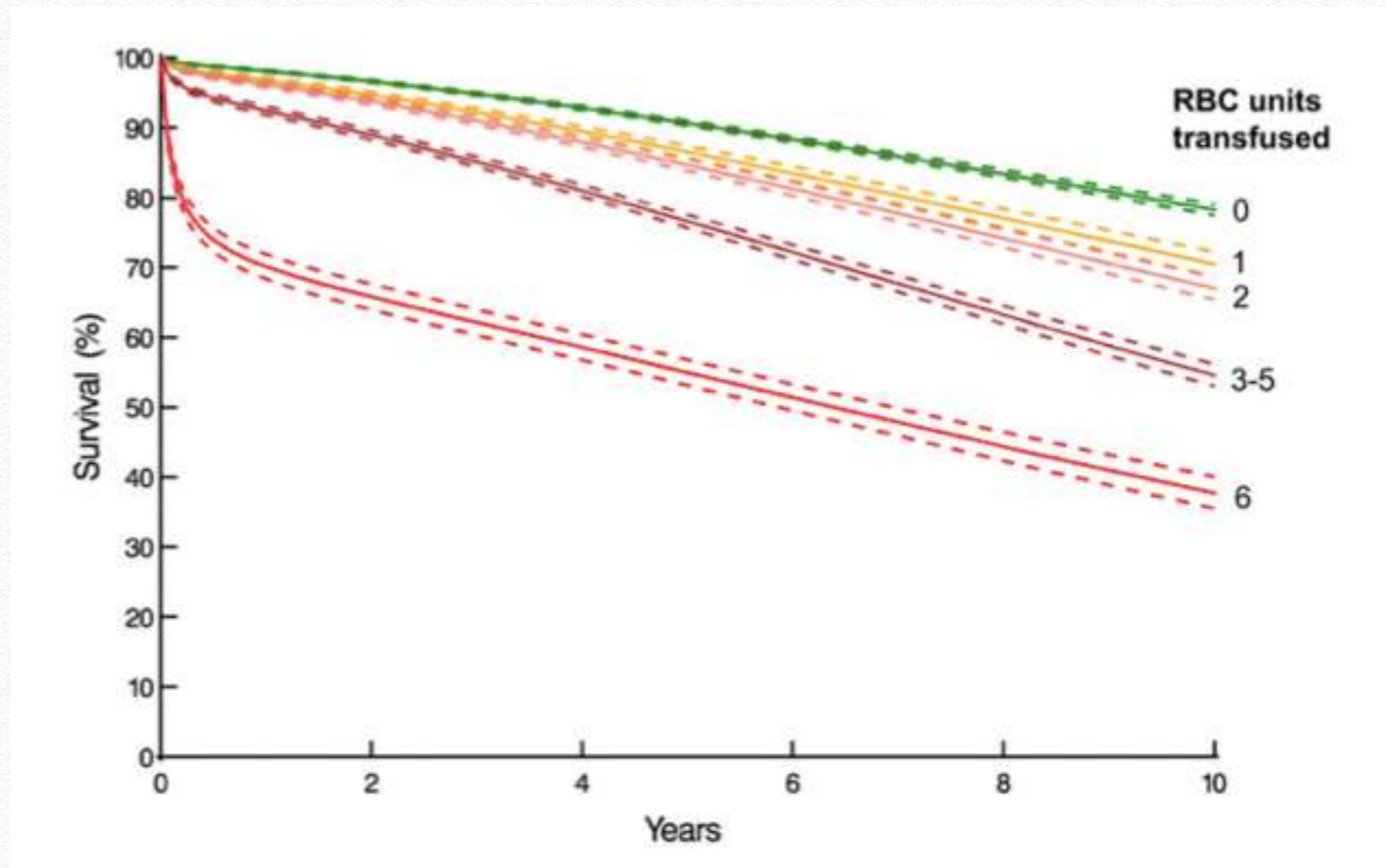
“Kan transfüzyonunun sağkalım üzerine olumlu etkisini gösteren bir RCT yoktur”

– Salpeter, 2014

– Goodnough, 2013

Implications and management of anemia in cardiac surgery: Current state of knowledge

Gabriel Loor, MD,^a Colleen G. Koch, MD, MS, MBA,^b Joseph F. Sabik III, MD,^a Liang Li, PhD,^c and Eugene H. Blackstone, MD^{a,c}



The least of 3 evils: Exposure to red blood cell transfusion, anemia, or both?

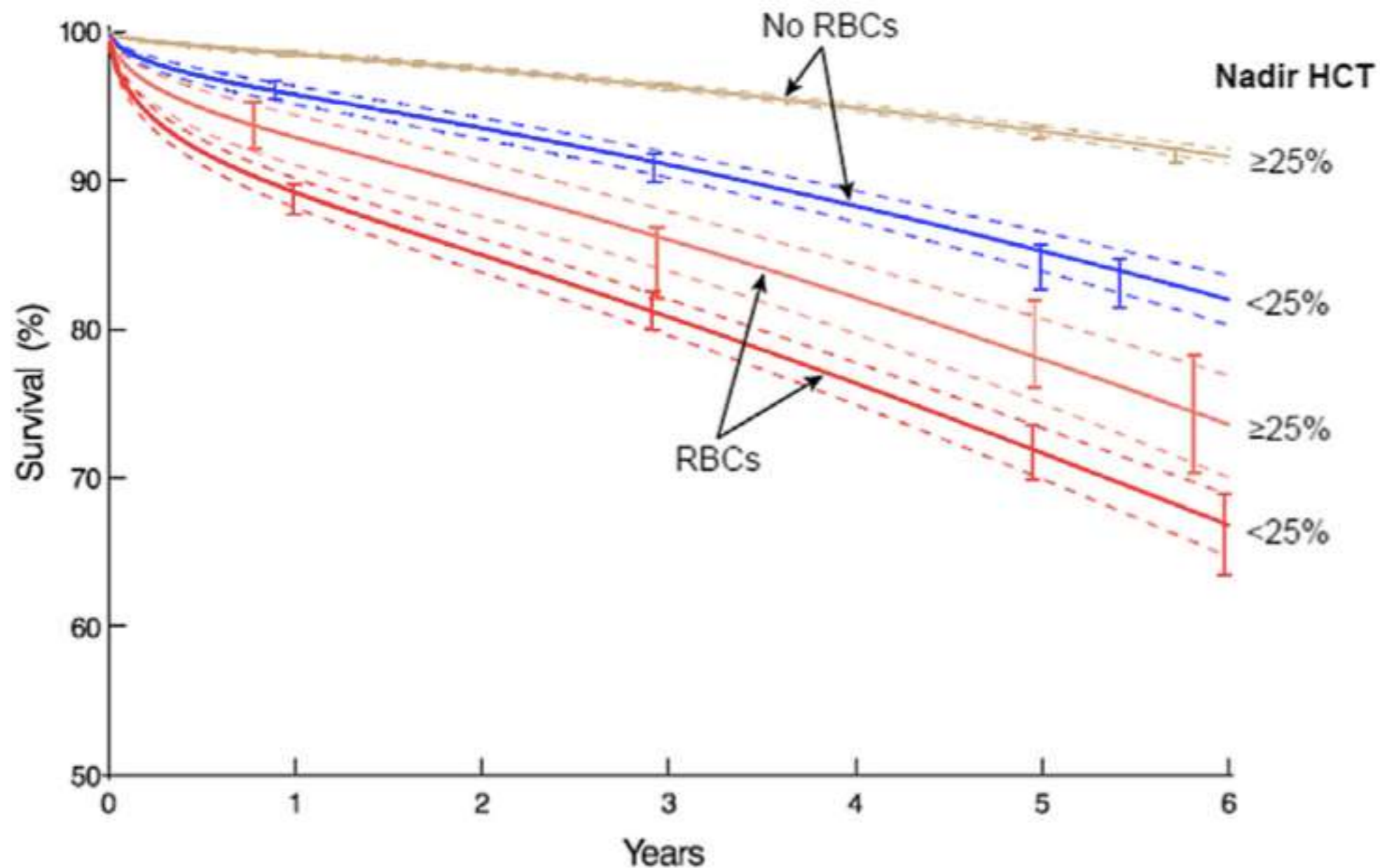
Gabriel Loor, MD,^a Jeevanantham Rajeswaran, PhD,^b Liang Li, PhD,^b Joseph F. Sabik III, MD,^a Eugene H. Blackstone, MD,^{a,b} Keith R. McCrae, MD,^c and Colleen G. Koch, MD, MS, MBA^{d,e}

2004-2009 yılları arasında 9144 hasta
- 7942 transfüzyon yapılmayan
- 1202 yalnızca intraop transfüzyon

1. No negative exposures: nadir HCT $\geq 25\%$ without RBC transfusion (n = 6937; 76%).
2. Single negative exposure: nadir HCT $\geq 25\%$ with RBC transfusion (n = 246; 2.7%).
3. Single negative exposure: nadir HCT $< 25\%$ without RBC transfusion (n = 1005; 11%).
4. Double negative exposure: nadir HCT $< 25\%$ with RBC transfusion (n = 956; 10%).

The least of 3 evils: Exposure to red blood cell transfusion, anemia, or both?

Gabriel Loor, MD,^a Jeevanantham Rajeswaran, PhD,^b Liang Li, PhD,^b Joseph F. Sabik III, MD,^a Eugene H. Blackstone, MD,^{a,b} Keith R. McCrae, MD,^c and Colleen G. Koch, MD, MS, MBA^{d,e}



The least of 3 evils: Exposure to red blood cell transfusion, anemia, or both?

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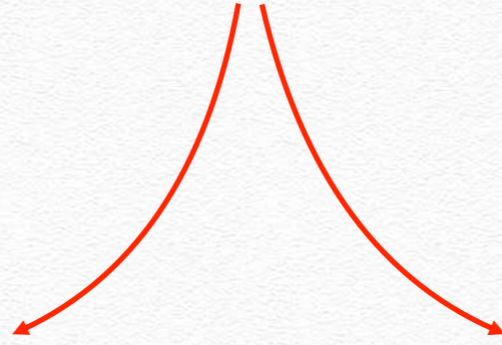
Preoperatif anemi tedavisi

operatif anemi gelişimini önleyerek hasta sonuçlarını düzeltebilir

CONCLUSIONS

Ideally, all cardiac surgical patients would have preoperative HCT optimized before surgical intervention; however, the reality is that patients are prone to being exposed to both anemia and RBC transfusion perioperatively. Our findings have practical implications for clinical practice. Clearly, a double negative exposure to RBCs and anemia (HCT <25%) carries the highest morbidity risk; however, single exposures carry increased morbidity risk as well. Managing preoperative anemia more aggressively and implementing measures to avoid development of operative anemia may circumvent negative exposures and improve patient outcomes.

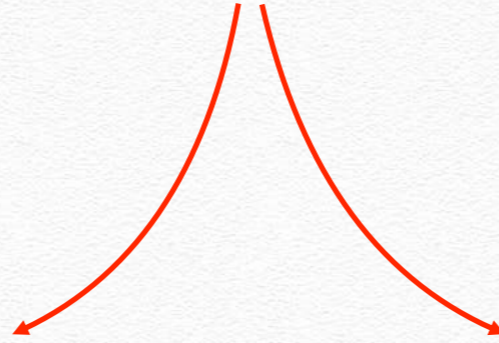
NE YAPILABİLİR?



Anemi
Tedavisi

Transfüzyon

NE YAPILABİLİR?



Anemi
Tedavisi

Transfüzyon

NEDEN TRANSFÜZYON

Eđitim
Eksikliđi

En kolayı

Bilgi Eksikliđi

Monitörizasyon
Eksikliđi

Noninvaziv Hb Monitörizasyonu



Noninvaziv Hb Monitörizasyonu

Devamlı
Hemen
Noninvaziv

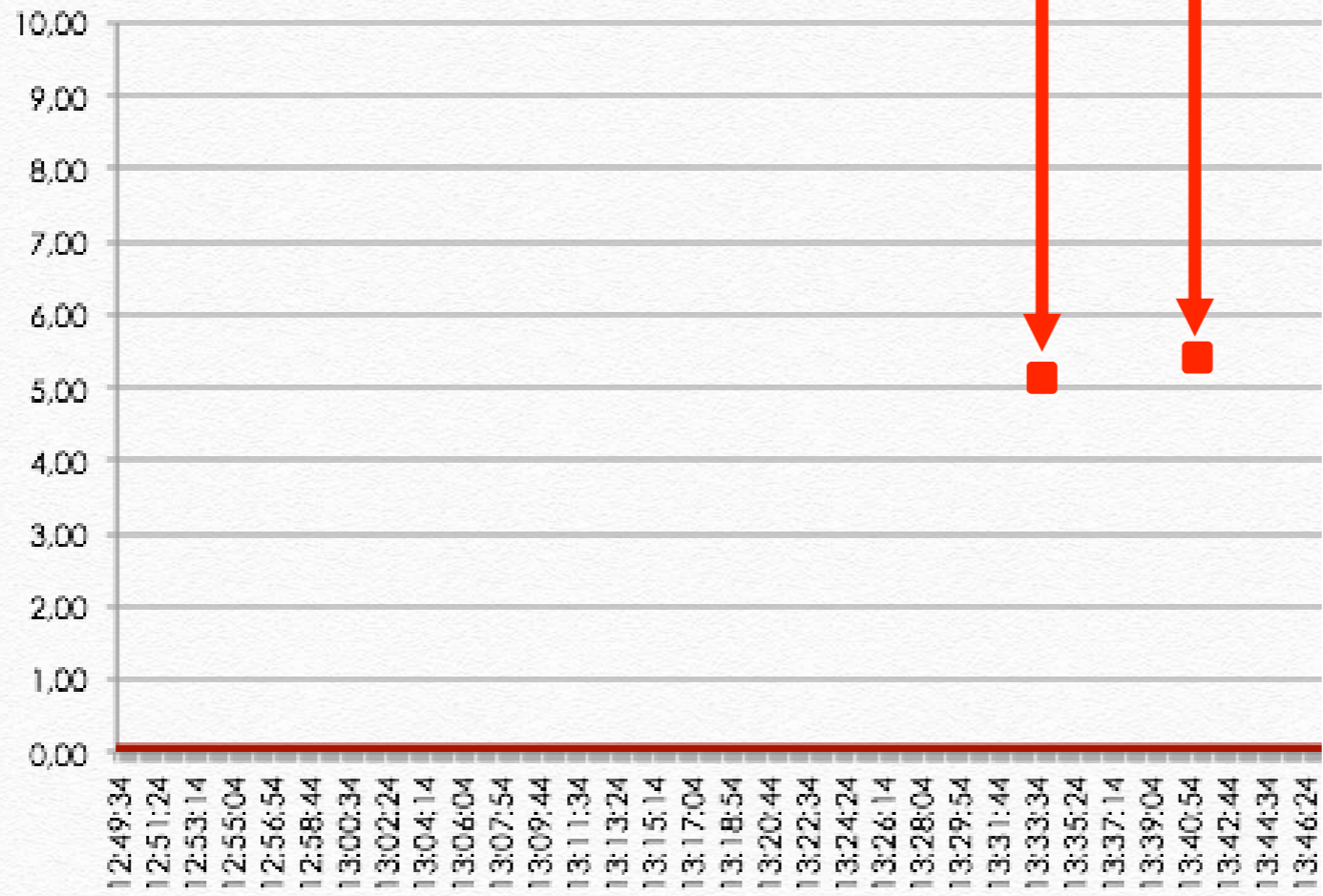
Düşük Hb düzeyinin farkına varılmasını
Farkedilmeyen kanamaların farkedilmesine
yardımcı olur

3 y., 13 kg, PBS
KC Nakli operasyonu
Önceki gün Hb= 9,1 g/dL
Tahmini operasyon süresi 6 sa



Hemogram: Hb=5,3

AKG: Hb=5,1

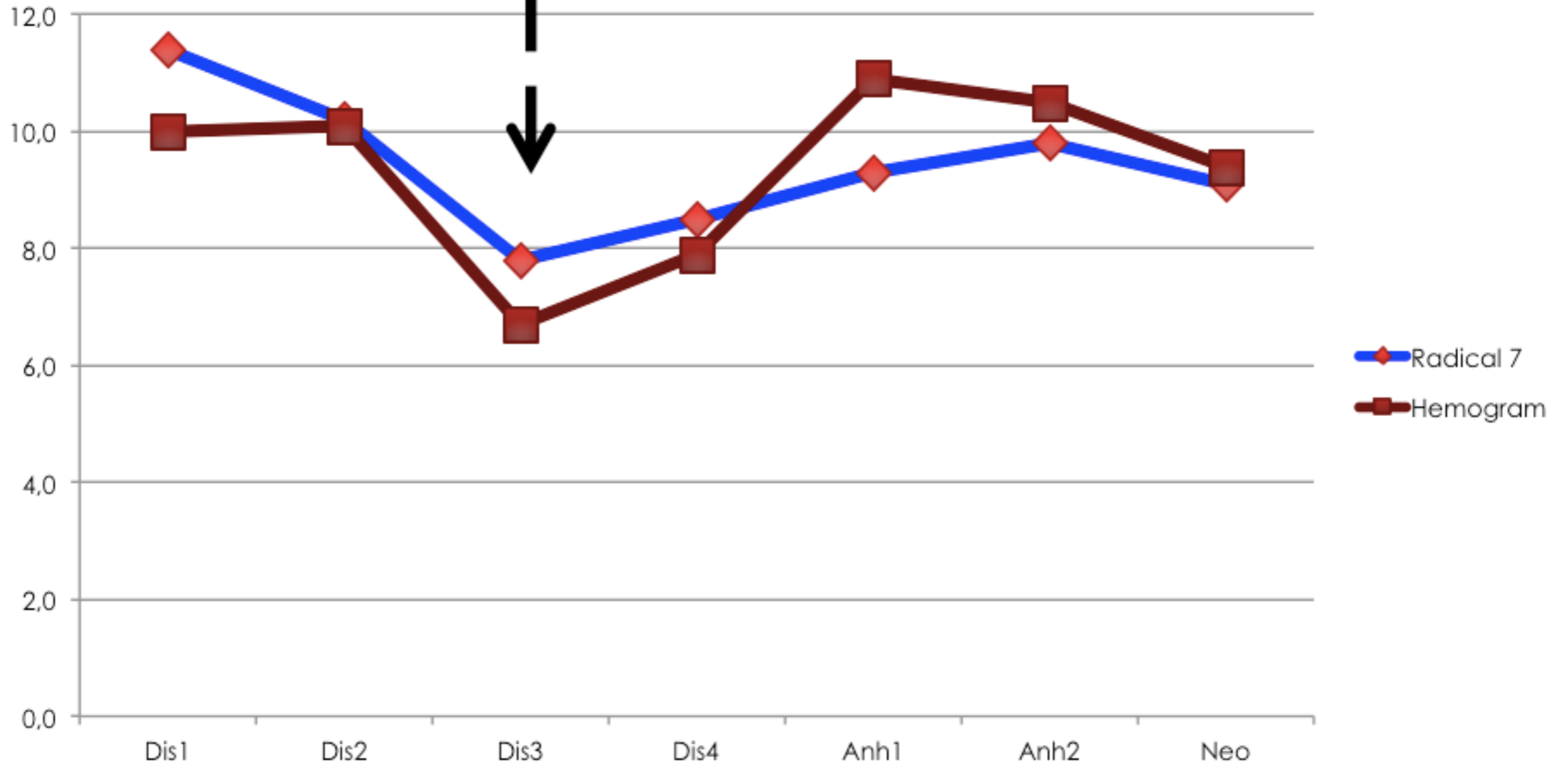




*Radical 7
3/1/10*



Transfüzyon



Karaciğer nakli operasyonu

42 y. ♂, 72 kg

Hb: 6,7 g/dL (Root, Masimo®)

SORU ?

Transfüzyon ??

NE YAPILABİLİR?

Anemi
Tedavisi

Transfüzyon

Transfüzyon
eşiği

Impact of More Restrictive Blood Transfusion Strategies on Clinical Outcomes: A Meta-analysis and Systematic Review

Shelley R. Salpeter, MD,^a Jacob S. Buckley,^b Saurav Chatterjee, MD^c

^aStanford University School of Medicine, Stanford, Calif; ^bBrown University, Providence, RI; ^cSt Luke's — Roosevelt Hospital Center, New York, NY.

< 7 g/dL vs liberal

- MORTALİTE daha düşük
- MORBİDİTE daha düşük
 - * Akut Koroner Send
 - * Pulmoner ödem
 - * Kanama
 - * Enfeksiyon

- Transfüzyon daha az
 - * %55 vs %95
 - * 2 Ü/hasta daha az

Impact of More Restrictive Blood Transfusion Strategies on Clinical Outcomes: A Meta-analysis and Systematic Review

Shelley R. Salpeter, MD,^a Jacob S. Buckley,^b Saurav Chatterjee, MD^c

^aStanford University School of Medicine, Stanford, Calif; ^bBrown University, Providence, RI; ^cSt Luke's — Roosevelt Hospital Center, New

7,5 - 10 g/dL vs liberal

- Transfüzyon daha az
- 0,8 Ü/hasta daha az

MORTALİTE ve MORBİDİTE
açısından liberal grupla bir fark yok

<7 grup vs 7,5 - 10 g/dL grup

- Daha az Transfüzyon
- Daha az Akut Koroner Sendrom
- Daha az Pulmoner Ödem

Impact of More Restrictive Blood Transfusion Strategies on Clinical Outcomes: A Meta-analysis and Systematic Review

Shelley R. Salpeter, MD,^a Jacob S. Buckley,^b Saurav Chatterjee, MD^c

^aStanford University School of Medicine, Stanford, Calif; ^bBrown University, Providence, RI; ^cSt Luke's — Roosevelt Hospital Center, New York, NY.

CONCLUSIONS: In patients with critical illness or bleed, restricting blood transfusions by using a hemoglobin trigger of <7 g/dL significantly reduces cardiac events, rebleeding, bacterial infections, and total mortality. A less restrictive transfusion strategy was not effective.

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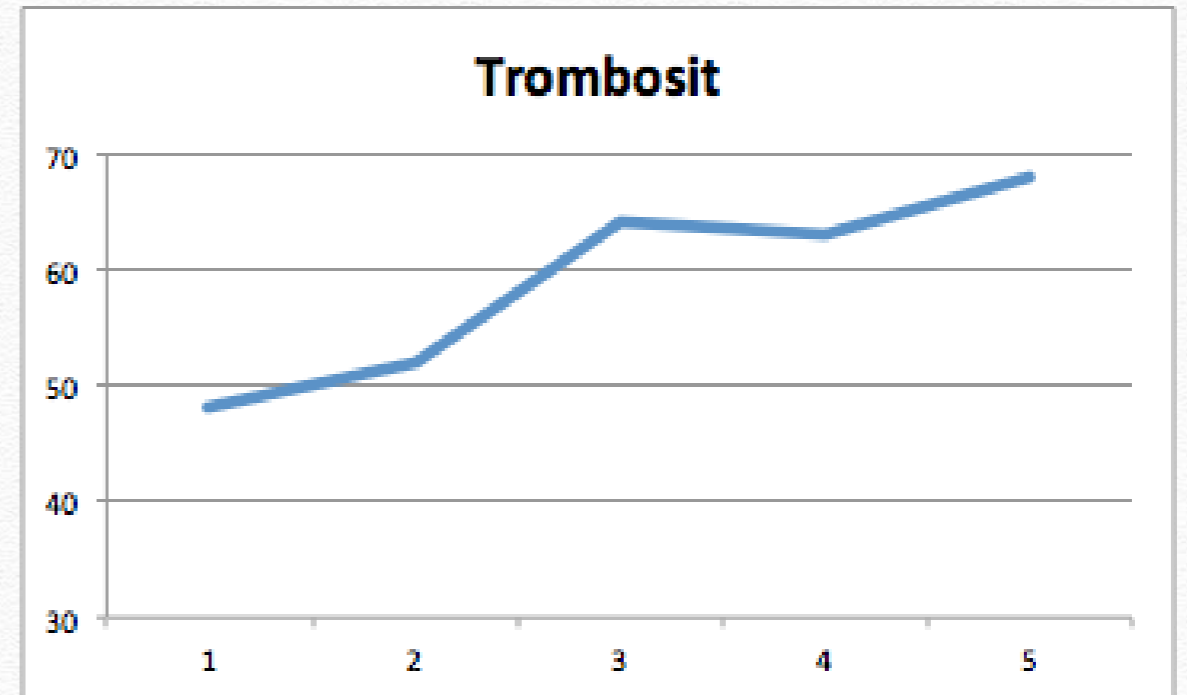
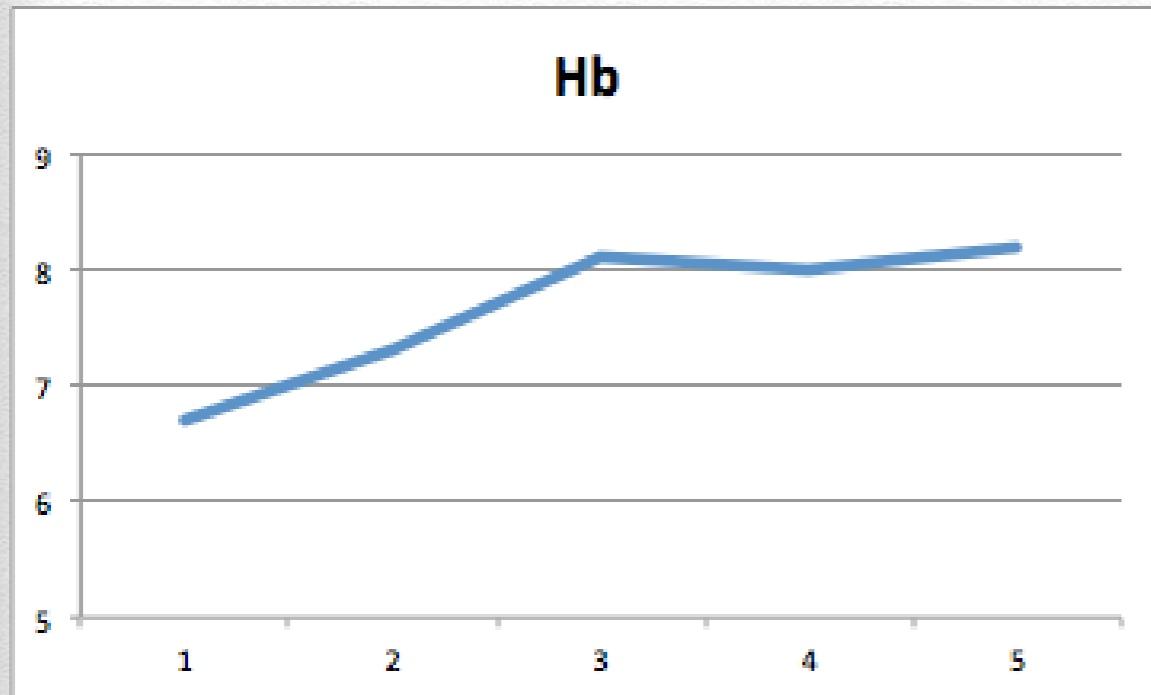
Karaciğer nakli operasyonu

42 y. ♂, 72 kg

Hb: 6,7 g/dL (Root, Masimo®)

Hemodinami	:	Stabil
PVI	:	5
SVV	:	8
PPV	:	7
İdrar	:	100 mL/sa
pH	:	7,46

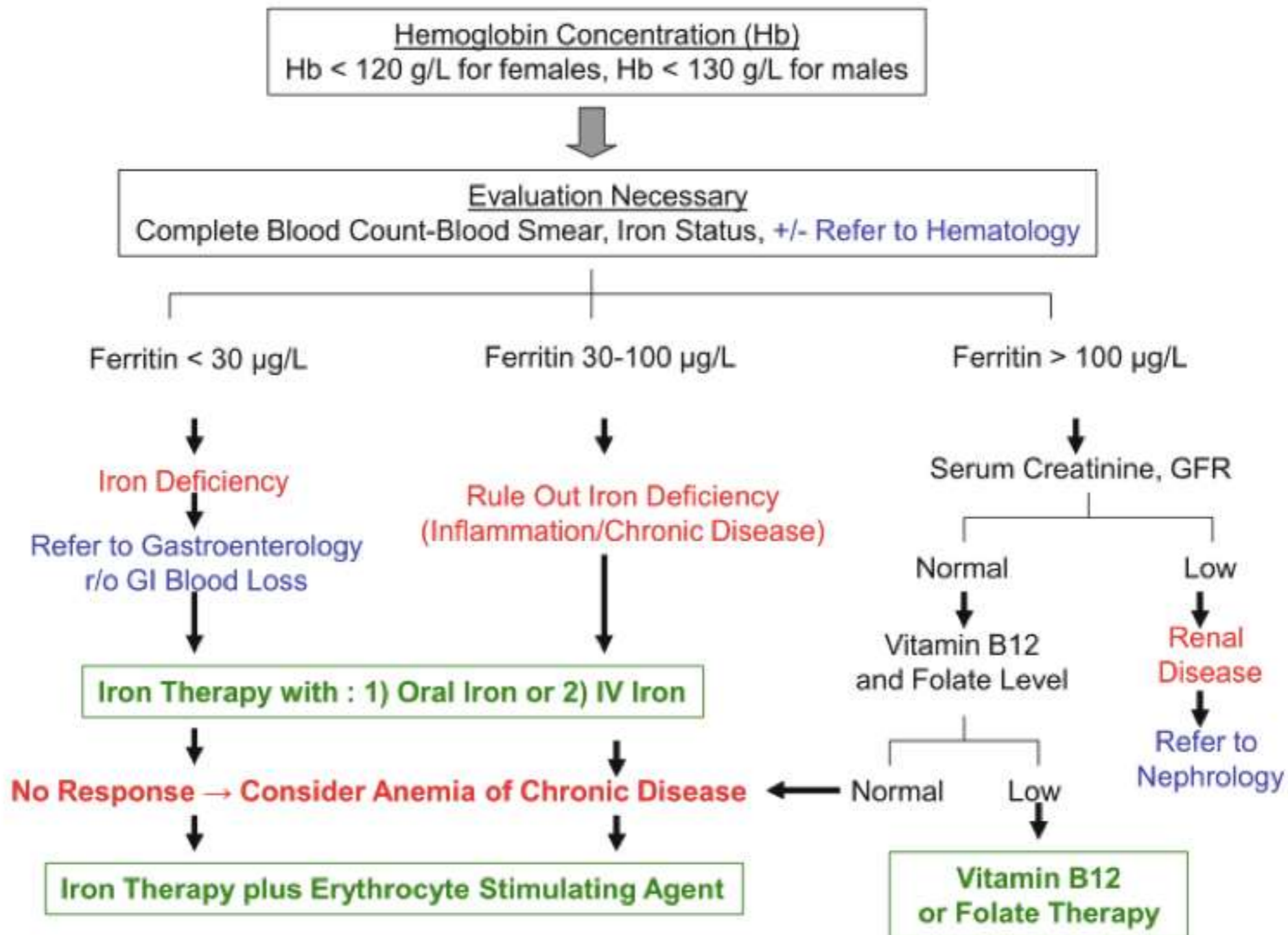
700 mL İdrar sonrası
Hb: 8,2 g/dL (Root, Masimo®)





Son olarak ...

Detection, Evaluation & Management of Preoperative Anemia in Elective Orthopaedic Patients: NATA Guidelines 2010 (Network for Advancement of Transfusion Alternatives)



Serum
Serum
(see B

MCV
coexist

- Consi
- Inac
 - Inac
 - foot
 - inge
 - Cov
 - Rap
 - form
 - Coe
 - Para
 - GI b

Trea

- Oral iron required for at least 2-3 months after normalisation of Hb
- Optimise dietary iron content

- normalisation of Hb
- IV iron for selected patients (see Box 6)
- Optimise dietary iron (secondary prevention) and address underlying cause

A unlikely
of anaemia
CD or CKD if
important for
n and ESAs

IDA
naemia

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il women

neoplasm)

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xt

Clinical Study

The Impact of an Algorithm-Guided Management of Preoperative Anemia in Perioperative Hemoglobin Level and Transfusion of Major Orthopedic Surgery Patients

Dietmar Enko,¹ Franz Wallner,¹ Achim von-Goedecke,² Christa Hirschmugl,² Vinzenz Auersperg,³ and Gabriele Halwachs-Baumann¹

Hb \geq 13 g/dL \longrightarrow No diagnostic and therapeutic consequence

➤ Hb < 13 g/dL (men and women)

Thomas plot:
indicating ACD
(without functional ID)

200 mg iron i.v.
40000 I.U. ESA s.c. or i.v.

Thomas plot:
indicating ID or combined
functional ID and ACD

1000 mg iron i.v.
10000 I.U. ESA s.c. or i.v.

Clinical Study

The Impact of an Algorithm-Guided Management of Preoperative Anemia in Perioperative Hemoglobin Level and Transfusion of Major Orthopedic Surgery Patients

Dietmar Enko,¹ Franz Wallner,¹ Achim von-Goedecke,² Christa Hirschmugl,² Vinzenz Auersperg,³ and Gabriele Halwachs-Baumann¹

335 patients were included

Group I (n = 101): before algorithm implementation	
Men	36
Women	65
Hip arthroplasty	41
Knee arthroplasty	60
Anemic	24
Preoperative procedure	No iron-/ESA substitution

Group II (n = 234): after algorithm implementation	
Men	93
Women	141
Hip arthroplasty	104
Knee arthroplasty	130
Anemic	32
Preoperative procedure	Diagnostic algorithm with iron-/ESA substitution

Clinical Study

The Impact of an Algorithm-Guided Management of Preoperative Anemia in Perioperative Hemoglobin Level and Transfusion of Major Orthopedic Surgery Patients

Dietmar Enko,¹ Franz Wallner,¹ Achim von-Goedecke,² Christa Hirschmugl,²
Vinzenz

Çünkü preoperatif Hb düzeyleri tedavi alan grupta daha iyi.

Group I: all patients (n = 101)			Group II: all patients (n = 234)		
Men (n = 36)	8 hasta (%8)	6 RBC units	Men (n = 93)	15 hasta (%6)	5 RBC units
Women (n = 65)		21 RBC units	Women (n = 141)		30 RBC units
Total		27 RBC units	Total		35 RBC units
Group I: anemic patients (n = 24)			Group II: anemic patients (n = 32)		
Men (n = 1)		6 RBC units	Men (n = 5)		1 RBC unit
Women with Hb ≥ 12 g/dL (n = 6)	7 hasta (%29)	3 RBC units	Women with Hb ≥ 12 g/dL (n = 5)	6 hasta (%19)	3 RBC units
Women with Hb < 12 g/dL (n = 6)		13 RBC units	Women with Hb < 12 g/dL (n = 5)		4 RBC units
Total		22 RBC units	Total		12 RBC units

Group I: 8% (8/101) of all patients received 27 RBC units, respectively 8% (8/101) of all patients received 22 RBC units. Group II: 6% (15/234) of all patients received 35 RBC units, respectively, 19% (6/32) of anemic patients received 12 RBC units. Group II: 6% (15/234) of all patients received 12 RBC units, respectively, 19% (6/32) of anemic patients received 12 RBC units.

%44 azalma

Clinical Study

The Impact of an Algorithm-Guided Management of Preoperative Anemia in Perioperative Hemoglobin Level and Transfusion of Major Orthopedic Surgery Patients

Dietmar Enko,¹ Franz Wallner,¹ Achim von-Goedecke,² Christa Hirschmugl,²
Vinzenz Auersperg,³ and Gabriele Halwachs-Baumann¹

“Komplikasyon masrafları hariç !!”

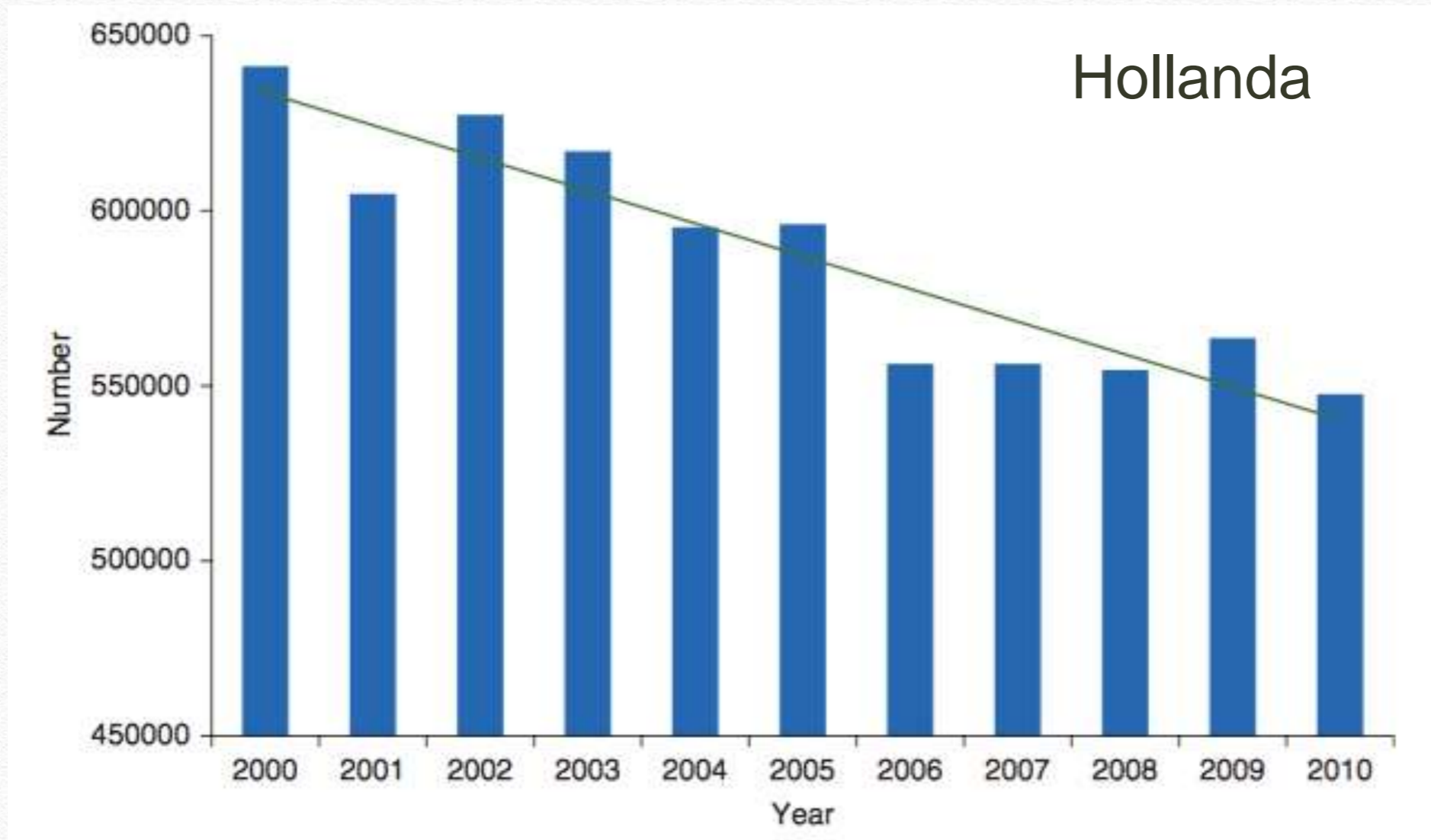
Product	Group I (n = 101) Quantity	€/unit	Product	Group II (n = 234) Quantity	€/unit
			<i>i.v. iron</i>		
			200 mg	24	27.32€ per 100 mg
			1000 mg	8	
			ESA		
			40000 I.E.	24	Free of charge
			10000 I.E.	8	0.69€ per 1000 I.E.
<i>RBC units</i>	27	135€	<i>RBC units</i>	35	135€
	Total costs: 3645€			Total costs: 8277.16€	
	Costs per patient: 36.08€			Costs per patient: 35.37€	

**Algoritmik preoperatif anemi tedavisi
preoperatif Hb düzeyini YÜKSELTİR,
kan kullanımını AZALTIR**

Anestezist,
preoperatif dönemde **ANEMİ**yi
belirlemeli,
tedavi et(tir)meli,
perioperatif dönemde
yakın takibe almalıdır

Üstelik perioperatif aneminin
tanı, tedavi ve takibi,
kişisel tercihlere bırakılmamalı,
kurumsal ve hatta ulusal bir politika
olarak geliştirilmelidir

Ulusal Politika Yarar Sağlar mı?



~%15'lik azalma
~100 milyon Euro

– Shander, 2012

Ulusal Preoperatif Anemi Tanı,
Değerlendirme ve Tedavi Etme
Kılavuzuna öncelik verilmelidir

SORU ?

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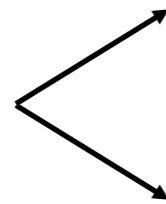
BJA

What is really dangerous: anaemia or transfusion?

A. Shander^{1,2,3,4*}, M. Javidroozi¹, S. Ozawa⁵ and G. M. T. Hare^{6,7}

CEVAP :

ANEMİ



KENDİSİNDEN DOLAYI

TRANSFÜZYONA NEDEN OLMASI



Teşekkür ederim