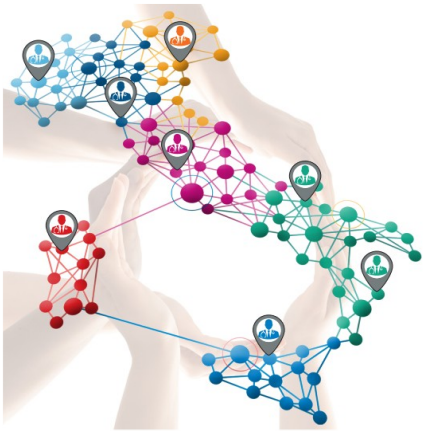
4° CONGRESSO NAZIONALE
FRAGILITY FRACTURE NETWORK - ITALIA

Appropriatezza, Qualità e Sostenibilità delle Cure nel Percorso Ortogeriatrico



Terapia marziale: esiti clinico funzionali

Dott.ssa Monica Pizzonia
IRCCS Ospedale Policlinico San Martino, S.S.
Ortogeriatria - Genova

Perugia 19-20 gennaio 2024

Anemia in the elderly: clinical implications and new therapeutic concepts

Reinhard Stauder,[1] and Swee Lay Thein[2,3]

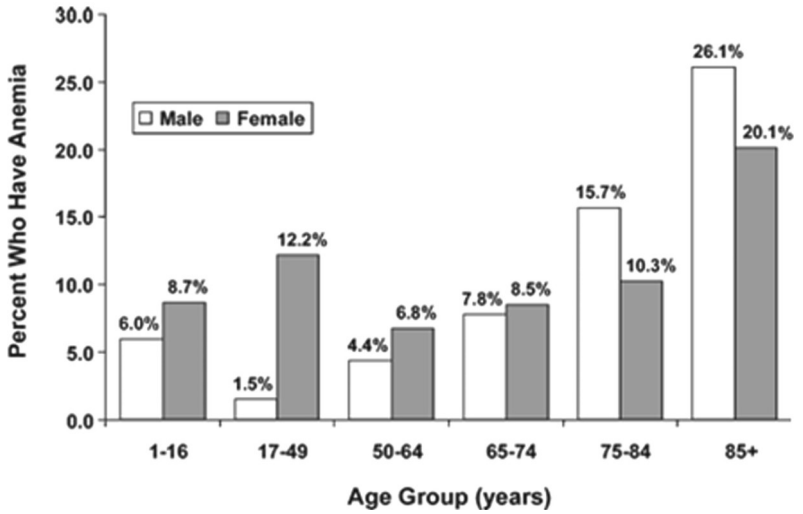
The overall prevalence of anemia is 17% in older adults

- 7% to 11% of community-dwelling older adults,
- 47% of those in nursing homes,
- 40% in hospitalized patients

Anemia has been associated with

- a higher incidence of cardiovascular disease, Culleton BF, Impact of anemia on hospitalization and mortality in older adults. *Blood*. 2006;
- cognitive impairment,Denny SD, . Impact of anemia on mortality, cognition, and function in community-dwelling elderly. *Am J Med*. 2006
- decreased physical performance and quality of life
- increased risk of falls and fractures.Beghe C, Prevalence and outcomes of anemia in geriatrics: a systematic review of the literature. *Am J Med*. 2004;S

Prevalence of anemia for men and women across the full age spectrum (From reference 1 with permission)



JB&JS
OPEN ACCESS

Anemia at Presentation Predicts Acute Mortality and Need for Readmission Following Geriatric Hip Fracture

Gareth Ryan, BSc(Hons), Lauren Nowak, PhD, Luana Melo, PhD, Sarah Ward, MD, MSc, FRCSC, Amit Atrey, MD, MSc, FRCSC, Emil H. Schemitsch, MD, FRCSC, Aaron Nauth, MD, MSc, FRCSC, and Amir Khoshbin, MD, MSc, FRCSC

Investigation performed at St. Michael's Hospital, University of Toronto, Toronto, Ontario, Canada

TABLE III Unadjusted Rates of 30-Day Postoperative Complications: Comparison of Non-Anemic and Anemic Groups*

Complication	No. (%) of Total Cohort (N = 34,805)	No. (%) with Normal HCT (N = 12,336)	No. (%) with Low HCT (N = 22,469)	P Value†
Death	1,432 (4.1)	313 (2.5)	1,119 (5.0)	**<0.001**
Readmission	2,989 (8.6)	829 (6.7)	2,160 (9.6)	**<0.001**
MI	570 (1.6)	139 (1.1)	431 (1.9)	**<0.001**
CVA	246 (0.7)	83 (0.7)	163 (0.7)	0.6

*HCT = hematocrit, MI = myocardial infarction, and CVA = cerebrovascular accident. The values are given as the number, with the percentage in parentheses. The percentages in the Complication column are of the total cohort (n = 34,805). †Bold indicates a significant difference between the Normal HCT and Low HCT groups.

Anemia in Old Age Is Associated With Increased Mortality and Hospitalization

Brenda W. J. H. Penninx,[1] Marco Pahor,[2] Richard C. Woodman,[3] and Jack M. Guralnik[4]

Table 2. Subsequent Hospitalization and Mortality Information According to Anemia Status

Hospitalization/ Mortality Variable	No Anemia ($N = 3156$)	Anemia ($N = 451$)	p*
Mean years of follow-up (*SD*)	4.1 (1.0)	3.6 (1.3)	<.001
Died during follow-up, %	22.1%	37.0%	<.001
Hospitalized during follow-up, %	54.6%	65.9%	<.001
No. of hospitalizations during follow-up (*SD*)	1.4 (2.0)	2.0 (2.5)	<.001
No. of hospital days during follow-up (*SD*)	13.7 (28.1)	25.0 (47.3)	<.001
No. of hospital days per hospitalization (*SD*)	9.2 (9.6)	10.9 (10.4)	.01

Notes: *p value based on chi-square tests (categorical variables) and t test analyses of (continuous variables).
SD = standard deviation.

B.W. Penninx, J.M. Guralnik, G. Onder, L. Ferrucci, R.B. Wallace, M. Pahor

Anemia and decline in physical performance among older persons

Am J Med, 115 (2003), pp. 104-110

Uno studio di coorte prospettico :
durata 4 anni

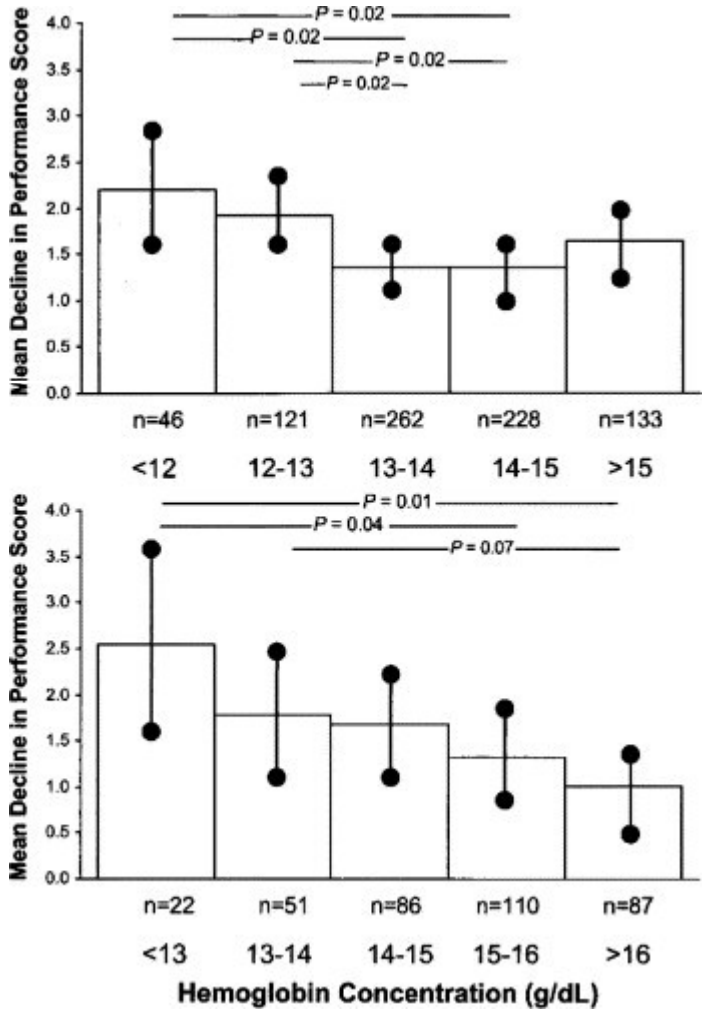
- 1146 individui di età ⩾ 71 anni

- Test per prestazioni fisiche funzionalità degli arti inferiori - test di equilibrio in posizione eretta, velocità di camminata e capacità di alzarsi da una sedia.

Conclusioni:, l'anemia è stata associata a un maggiore declino medio delle prestazioni fisiche nell'arco di 4 anni;
2,3 (intervallo di confidenza al 95% [CI]: da 1,7 a 2,8) nei soggetti con anemia

- 1,4 (IC al 95%: da 1,2 a 1,5) in quelli senza anemia (P = 0,003).

- anemia borderline, ovvero una concentrazione di emoglobina entro 1 g/dl superiore ai criteri dell'OMS, hanno mostrato anche un declino fisico medio maggiore (1,8; IC 95%: da 1,5 a 2,2) rispetto a quelli con concentrazioni di emoglobina più elevate (P = 0,02).



Blood management in hip fractures; are we leaving it too late? A retrospective observational study BMC Geriatr. 2019;

L'obiettivo dello studio:

→ misurare la prevalenza

→l'anemia e

IDENTIFICARE I PAZIENTI A RISCHIO
predittori per la trasfusione postoperatoria:

- livelli di emoglobina preoperatoria
- l'età
- comorbilità
- fratture intracapsulari

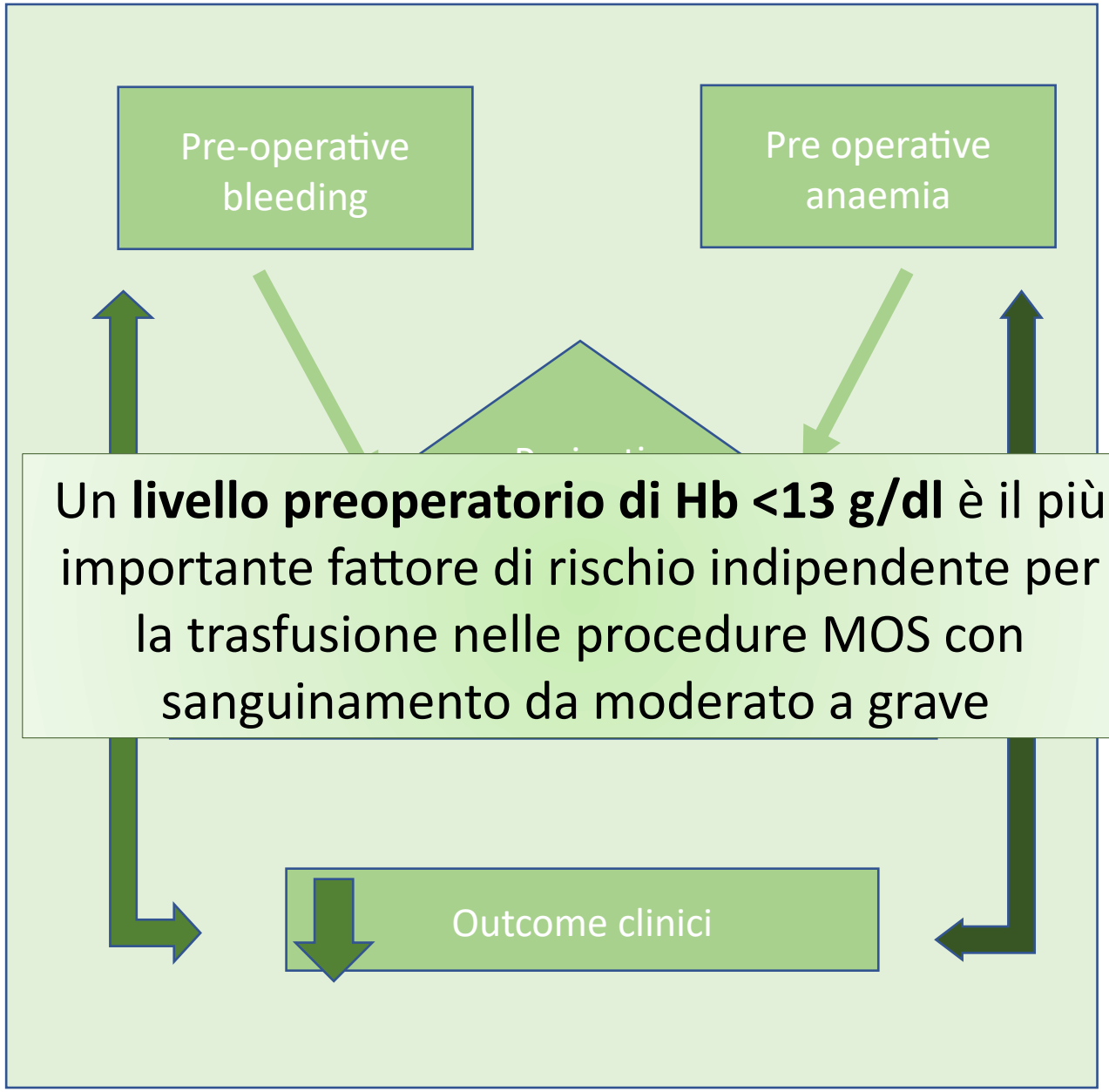
Effect of blood transfusion on survival after hip fracture surgery. *Eur J Orthop Surg Traumatol* 2018
Allogeneic blood transfusion and prognosis following total hip replacement: a population-based follow up study. *BMC Musculoskelet Disord* 2009;

Mean (SD) of Hb levels and percentages of patients by subgroup who had anaemia, percentage reduction in Hb and significance or reduction over time and postoperative blood transfusion percentage

Groups	Patients n (%)	Hb g/dL mean ± SD			Anaemia by subgroup n(%)			Reduction in Hb by subgroup (n)%		Postoperative transfusion of PRBC n (% sample)
					D0	D1	D2	D0-D1	D1-D2	
					116 (44.8)	88 (50.9)	33 (69.4)	143 (82.3)	34 (71.4)	75 (28.7)
					39 (52.0)	33 (69.3)	12 (75.0)	(36) 73.5	12 (78.6)	18 (6.9)
					77 (41.9)	85 (68.3)	21 (66.7)	107 (85.7)	(21) 67.9	58 (22.2)
					41 (34.7)	41 (49.4)	12 (48.0)	63 (75.3)	(20) 80.0	15 (5.7)
					74 (53.2)	77 (85.6)	21 (92.0)	80 (88.9)	14 (63.6)	61 (23.4)
					25 (32.9)	26 (52.9)	5 (45.5)	41 (80.4)	7 (66.7)	17 (6.5)
					90 (49.7)	91 (74.2)	28 (76.3)	102 (83.1)	26 (72.7)	59 (22.6)

Legend: *Hb* haemoglobin; anaemia = Hb < 13 g/dL in males and 12 g/dL in females, *PRBC* packed red blood cells, *D0* day of admission, *D1* day after admission (pre-operative), *D2* second day after admission (pre-operative); D0 – D1 [a] = $p < 0.05$; D1 – D2 [b] $p < 0.05$

la progressione dell'anemia è stata significativa in tutti i gruppi($p<0.05$) nelle prime 24 -48 ore


Pre-operative bleeding
Pre operative anaemia
Un **livello preoperatorio di Hb <13 g/dl** è il più importante fattore di rischio indipendente per la trasfusione nelle procedure MOS con sanguinamento da moderato a grave
Outcome clinici

Patient blood management (PBM)

- maintaining Hb concentrations,
- optimizing hemostasis,
- minimizing blood loss to improve patient outcomes

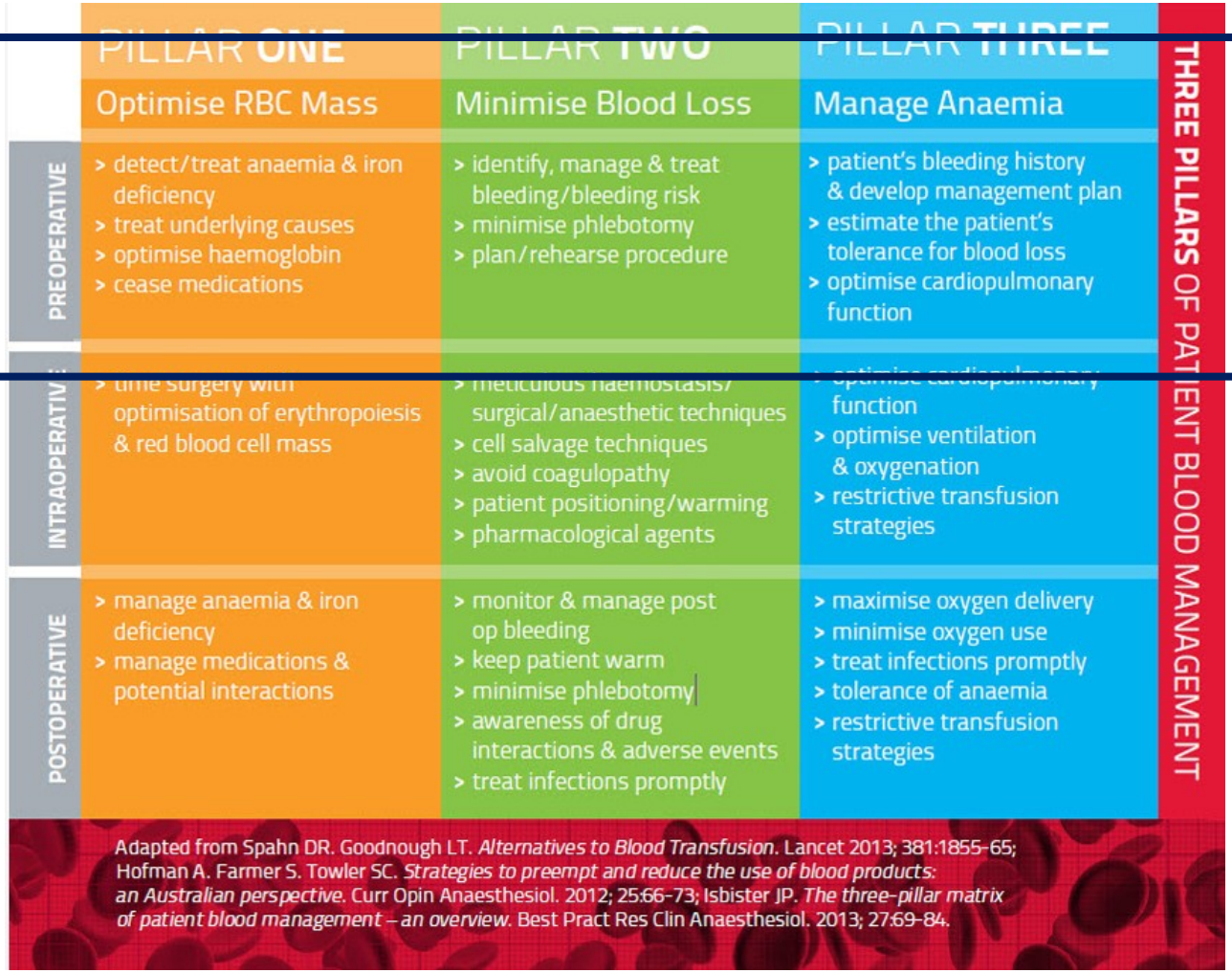
Indicazioni per ricevere una trasfusione di globuli rossi :

1) Hb postoperatoria <8 g/dl o <9 g/dl con comorbilità cardiorespiratorie,

2) Anemia grave con Sanguinamento attivo

3) Hb postoperatoria <9 g/dl con instabilità emodinamica (cardiaca -neurologica - renale)

4) Hb postoperatoria <7 g/dl indipendentemente dai sintomi



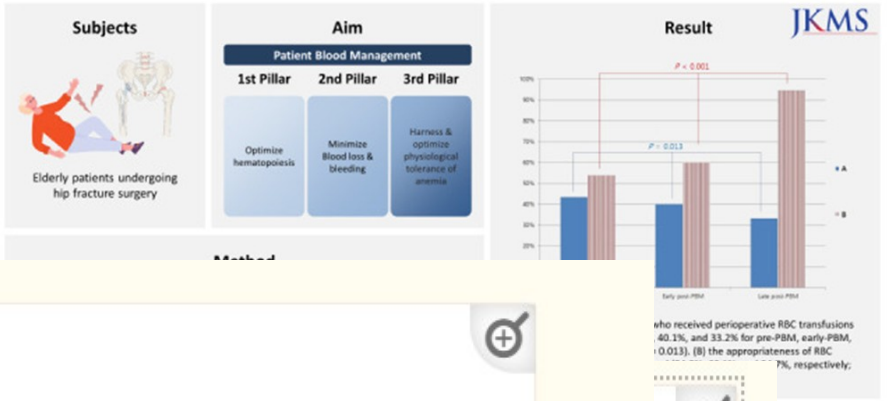
NICE guideline [NG24]. Blood transfu-sion.

Epoetin alfa reduces blood transfusion requirements in patients with intertrochanteric fracture. J Crit Care 2010;

Ferric carboxymaltose with or without erythropoietin in anemic patients with hip fracture: a randomized clinical trial. Transfusion 2016;

Effect of a Patient Blood Management Program on the Appropriateness of Red Blood Cell Transfusion and Clinical Outcomes in Elderly Patients Undergoing Hip Fracture Surgery

J Korean Med Sci. 2023 Feb 27;38(8):e64
https://doi.org/10.3346/jkms.2023.38.e64
eISSN 1598-6357·pISSN 1011-8934



hip fracture surgery from 2017 to 2020

884 pazienti: comprendeva 625
età media di 80 anni (intervallo i

I pazienti sono stati classificati
timing of PBM implementation

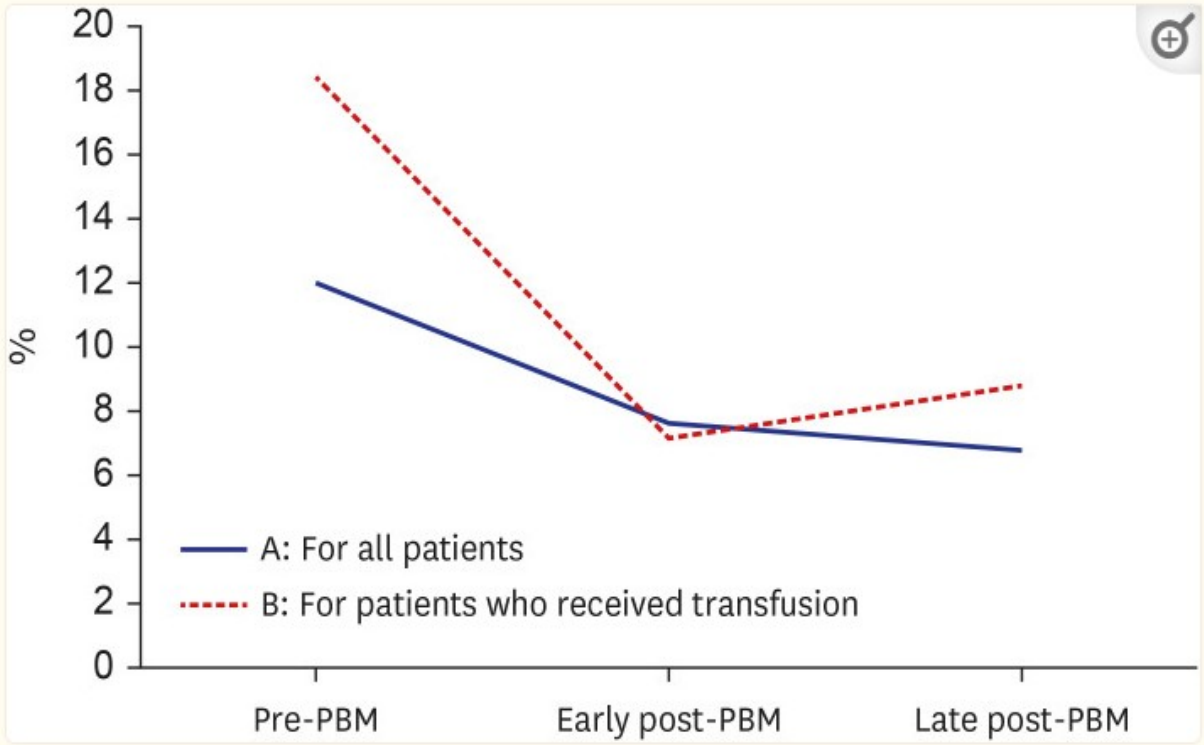


Fig. 3

The rate of 30-day readmission in the pre-PBM, early post-PBM, and late post-PBM periods.

PBM = patient blood management.

patients.

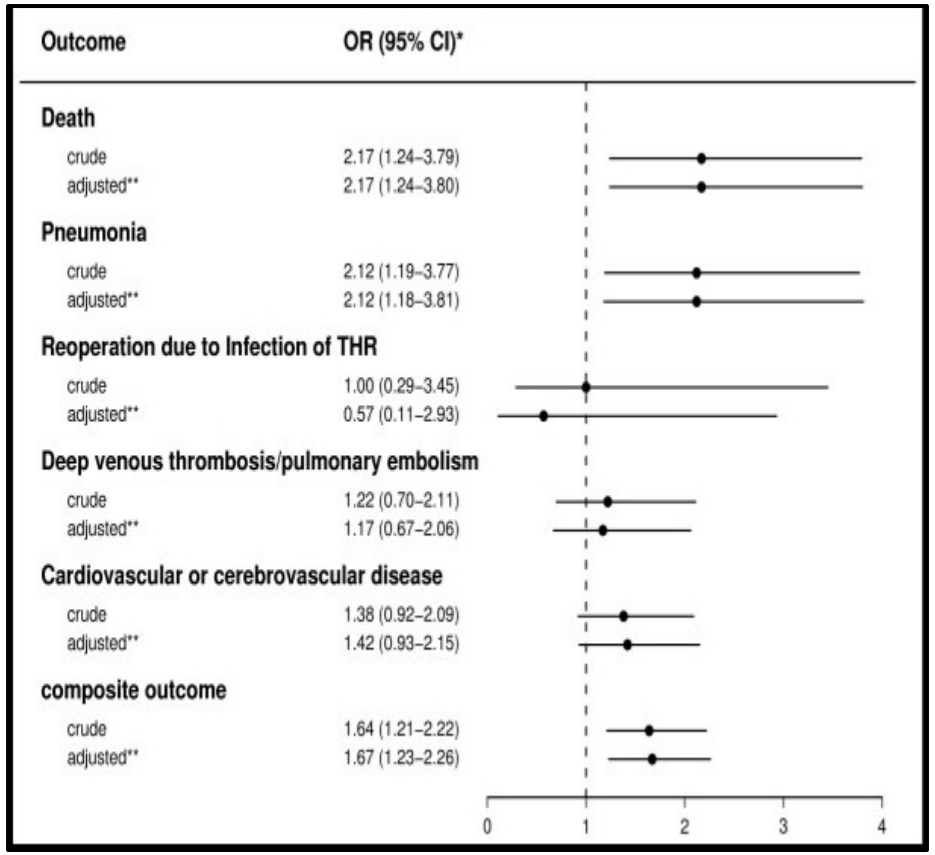
A. 43,5%, 40,1% e 33,2%;

B. 54,0%, 60,1% e 94,7%;

ent data sources.

Spahn DR. Anemia and patient blood management in hip and knee surgery: a systematic review of the literature. Anesthesiology 2010;

Allogeneic blood transfusion and prognosis following total hip replacement: a population-based follow up study.2009



2.254 pazienti trasfusi e 2.254 pazienti non trasfusi

Table 3: Number of adverse events within 90 days after primary total hip replacement (THR) among propensity score matched patients who were eligible for red blood cell transfusion.

	Propensity score matching model	
Outcome	**Transfusion n = 2,254**	**Non-transfusion n = 2,254**
Death	39 (1.7%)	18 (0.8%)
Cardiovascular or cerebrovascular disease	54 (2.4%)	39 (1.7%)
Deep venous thrombosis and/or pulmonary embolism	28 (1.2%)	23 (1.0%)
Pneumonia	36 (1.6%)	17 (0.8%)
Reoperation due to Infection of THR	5 (0.2%)	5 (0.2%)

l'aumento delle probabilità non era limitato ai pazienti che ricevevano molte trasfusioni,poiché i pazienti che ricevevano solo 1 trasfusione avevano una maggiore probabilità di un esito avverso (OR aggiustato 2,7, IC 95%: 1,2-5,7).

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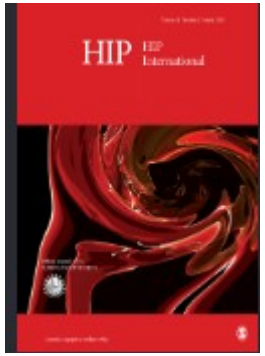
Koval KJ, . Does blood transfusion increase the risk of infection after hip fracture? J Orthop Trauma 1997;
Shin HJ, Allogeneic red blood cell transfusion is an independent risk factor for 1-year mortality in elderly patients undergoing femoral neck surgery: retrospective study. Medicine (Baltimore) 2020
Guo Y, Prevalence and risk factors of postoperative delirium in elderly hip fracture patients. J Int Med Res 2016



Original Research Article - Trauma

Blood transfusion rates and predictors following geriatric hip fracture surgery 2022

Armin Arshi, Wilson C Lai, Brenda C Iglesias, Edward J McPherson, Erik N Zeegen, Alexandra I Stavrakis, and Adam A Sassoon

Table 2. Assessment of risk factors for postoperative blood transfusion using multivariate logistic regression.

Covariate	Odds ratio (OR) (95% CI)	*p*-value
Age	1.03 (1.02–1.04)	<0.001
Sex (female)	1.61 (1.39–1.87)	<0.001
Race (non-white)	1.08 (0.87–1.35)	0.496
Body mass index (BMI)	0.97 (0.96–0.98)	<0.001
Functional health status		
Partially dependent	1.11 (0.94–1.31)	0.234
Totally dependent	1.44 (0.98–2.13)	0.064
ASA classification	1.14 (1.01–1.27)	0.031
Dementia	0.92 (0.79–1.09)	0.331
Preoperative delirium	0.87 (0.71–1.08)	0.201
Diabetes	0.79 (0.66–0.94)	0.009
Smoking	0.65 (0.50–0.85)	0.001
COPD	1.30 (1.06–1.59)	0.011
Ascites	1.97 (0.54–7.22)	0.304
CHF	1.09 (0.80–1.49)	0.569
Hypertension	1.17 (1.01–1.35)	0.038
Dialysis	1.19 (0.77–1.84)	0.441
Preoperative anaemia	4.69 (3.99–5.52)	<0.001
Operative time	1.02 (1.01–1.03)	<0.001
Hip fracture pattern		

Table 3. Perioperative complications and sequelae associated with blood transfusion in geriatric hip fracture patients.

Complications (within 30 days)	Postoperative transfusion ($n = 2384$)	No postoperative transfusion ($n = 6032$)	Adjusted OR (for patients with postoperative transfusion)¥	*p*-value
Death	8.4%	6.4%	1.29 (1.02–1.64)	0.035
Deep vein thrombosis (DVT)	1.8%	1.0%	1.31 (0.80–2.13)	0.280
Pulmonary embolism	0.5%	0.9%	0.66 (0.30–1.45)	0.306
Pneumonia	5.2%	3.9%	1.18 (0.87–1.62)	0.287
Acute renal failure	0.5%	0.2%	1.24 (0.46–3.33)	0.674
Urinary tract infection	5.4%	4.7%	1.50 (1.10–2.03)	0.009
Cerebrovascular accident	1.3%	0.9%	1.62 (0.92–2.85)	0.092
Cardiac arrest	1.1%	0.6%	1.60 (0.86–2.95)	0.135
Myocardial infarction	4.4%	2.4%	2.35 (1.62–3.43)	<0.001
Postoperative sepsis	0.9%	0.5%	1.90 (0.96–3.76)	0.065
Wound complications	0.9%	0.6%	1.26 (0.49–3.25)	0.627
Reoperation	2.3%	2.2%	1.11 (0.74–1.67)	0.612

Note: ¥Adjusted odds ratio (OR) computed using multivariate logistic regression with age, gender, body mass index (BMI), comorbidities, and ASA classification as covariates.

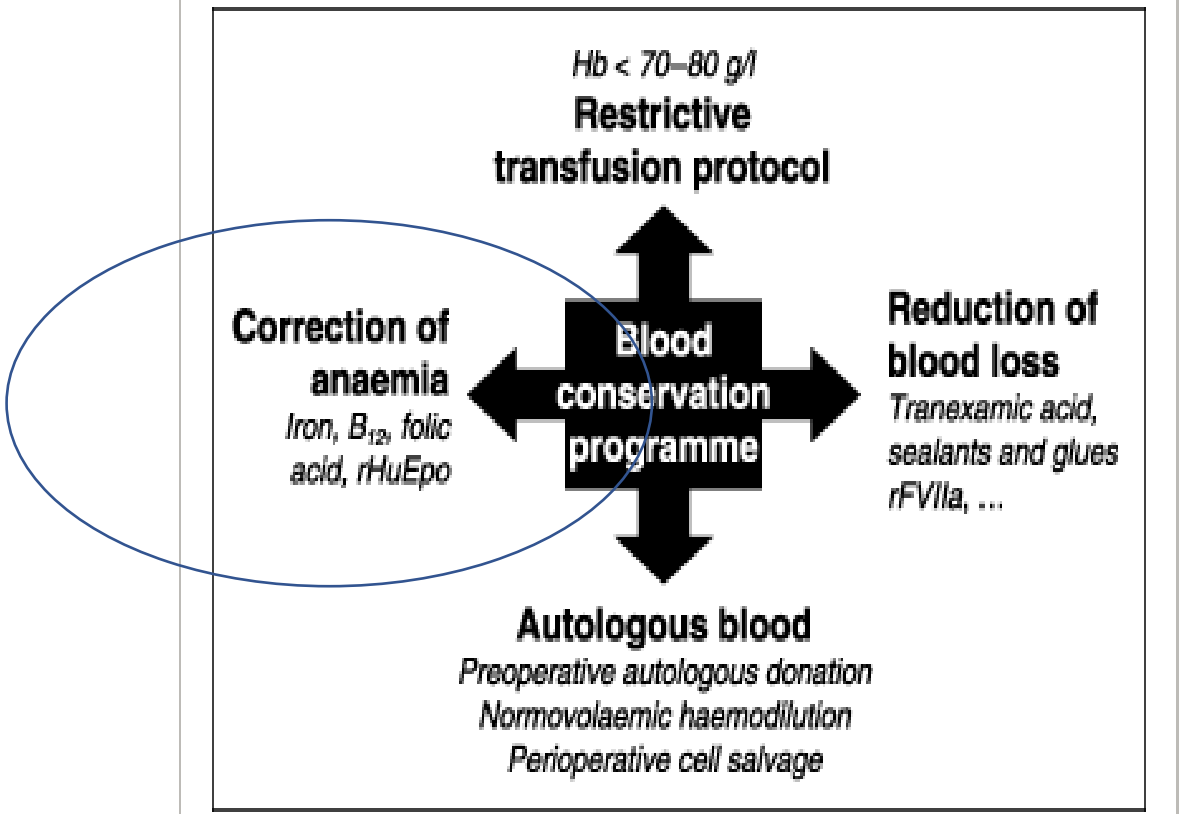
Table 4. Hip fracture outcome measures in patients with blood transfusion following geriatric hip fracture.

Outcome measure¥	Postoperative transfusion ($n = 2384$)	No postoperative transfusion ($n = 6032$)	Adjusted OR (for patients with postoperative transfusion)¥	*p*-value
Discharge to inpatient facility	84.6%	81.0%	1.11 (0.91–1.35)	0.287
Inpatient facility at 30 days	49.6%	42.9%	1.11 (0.96–1.28)	0.169
Hospital readmission	9.4%	7.7%	1.27 (1.04–1.55)	0.018
WBAT on POD1	65.5%	76.5%	0.64 (0.55–0.74)	<0.001
Outcome measure*	Postoperative transfusion ($n = 2,384$)	No postoperative transfusion ($n = 6,032$)	Coefficient (B) (for patients with postoperative transfusion)¥	*p*-value
Total hospital LOS (days)	7.3 ± 4.7	6.3 ± 4.3	1.06 (0.88–1.24)	<0.001

WBAT, weight-bearing as tolerated; POD, postoperative day; LOS, length of stay.
Note: ¥Adjusted odds ratio (OR) computed using multivariate logistic regression with age, gender, body mass index (BMI), comorbidities, and American Society of Anesthesiologists (ASA) classification as covariates.
* Adjusted OR computed using multivariate linear regression with age, gender, BMI, comorbidities, and ASA classification as covariates.

E’ necessaria un’attenta pianificazione preoperatoria e gestione multidisciplinare
per ridurre il ricorso alle trasfusioni postoperatorie.

Pre-operative iron therapy :where are we?



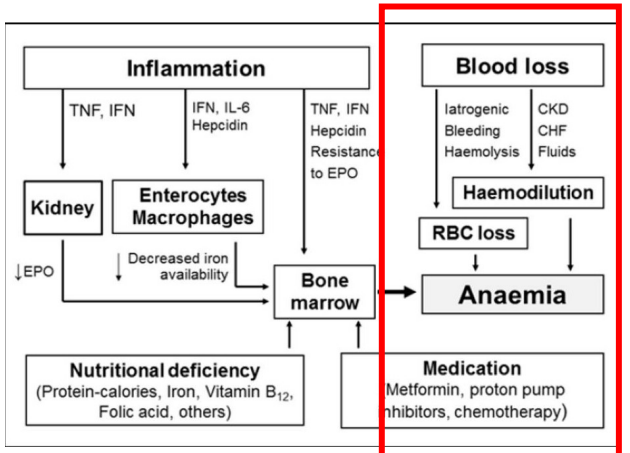


Table 2. Distribution of types of anemia in persons 65 years and older, United States: NHANES III, phase 2, 1991 to 1994

Anemia	No. in the United States	Type, %	All anemia, %
With nutrient deficiency			
Iron only	467 000	48.3	16.6
Folate only	181 000	18.8	6.4
B_{12} only	166 000	17.2	5.9
Folate and B_{12}	56 000	5.8	2.0
Iron with folate or B_{12} or both	95 000	9.9	3.4
Total	965 000	100.0	34.3
Without nutrient deficiencies			
Renal insufficiency only	230 000	12.4	8.2
ACI, no renal insufficiency	554 000	30.0	19.7
Renal insufficiency and ACI	120 000	6.5	4.3
UA	945 000	51.1	33.6
Total	1 849 000	100.0	65.7
Total, all anemia	2 814 000	NA	100.0

NA indicates not applicable.

Anaesthesia
Peri-operative medicine, critical care and pain
Association of Anaesthetists

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Review Article

Pre-operative anaemia

B. Clevenger, T. Richards

Trade name	Generic name	Dose	Monitoring for hypersensitivity	Maximum dose	Infusion time
Cosmofer® (Pharmacosmos, Holbaek, Denmark)	Low molecular weight iron Dextran	Ganzoni formula [a]	Slow injection of first 25 mg observing for adverse reaction	20 mg.kg^{-1}	4–6 h
Monofer® (Pharmacosomos)	Iron isosorbide	Ganzoni formula [a]	Yes – during and for 30 min post-dose	1000 mg per infusion	15–60 min
Venofer® (Vifor Pharma, Glattbrugg, Switzerland)	Iron Sucrose	200 mg	Yes – during and for 30 min post-dose	1000 mg per fortnight	2–5 min
Ferinject® (Vifor Pharma)	Iron carboxymaltose	Hb/weight [e]	Yes – during and for 30 min post-dose	1000 mg per week	15 min

[a] Total iron deficit [mg], and consequently the dose of intravenous iron required, is given by: body weight [kg] [b] × (150 − actual Hb) [g.l^{-1}] × 0.24 [c] + 500 [mg] [d].

[b] In patients with a body mass index (BMI) > 25 kg.m^{-2}, a normalised weight is used to calculate the iron deficit. Normalised weight [kg] = 25 × height [m] × height [m].

[c] Factor 0.24 = 0.0034 (iron content Hb = 0.34%) × 0.07 (blood volume = 7% of body weight) × 1000 (conversion g to mg).

[d] Depot iron.

Estimated total iron deficit (mg elemental iron) based on hemoglobina and body weight.[13]

Degree of iron deficiency	Haemoglobin level (g/dL)	Iron deficit (mg)	
		Body weight <70 kg	Body weight ≥70 kg
Moderate	10–12 (women) 10–13 (men)	1000	1500
Severe	7–10	1500	2000
Critical	<7	2000	2500

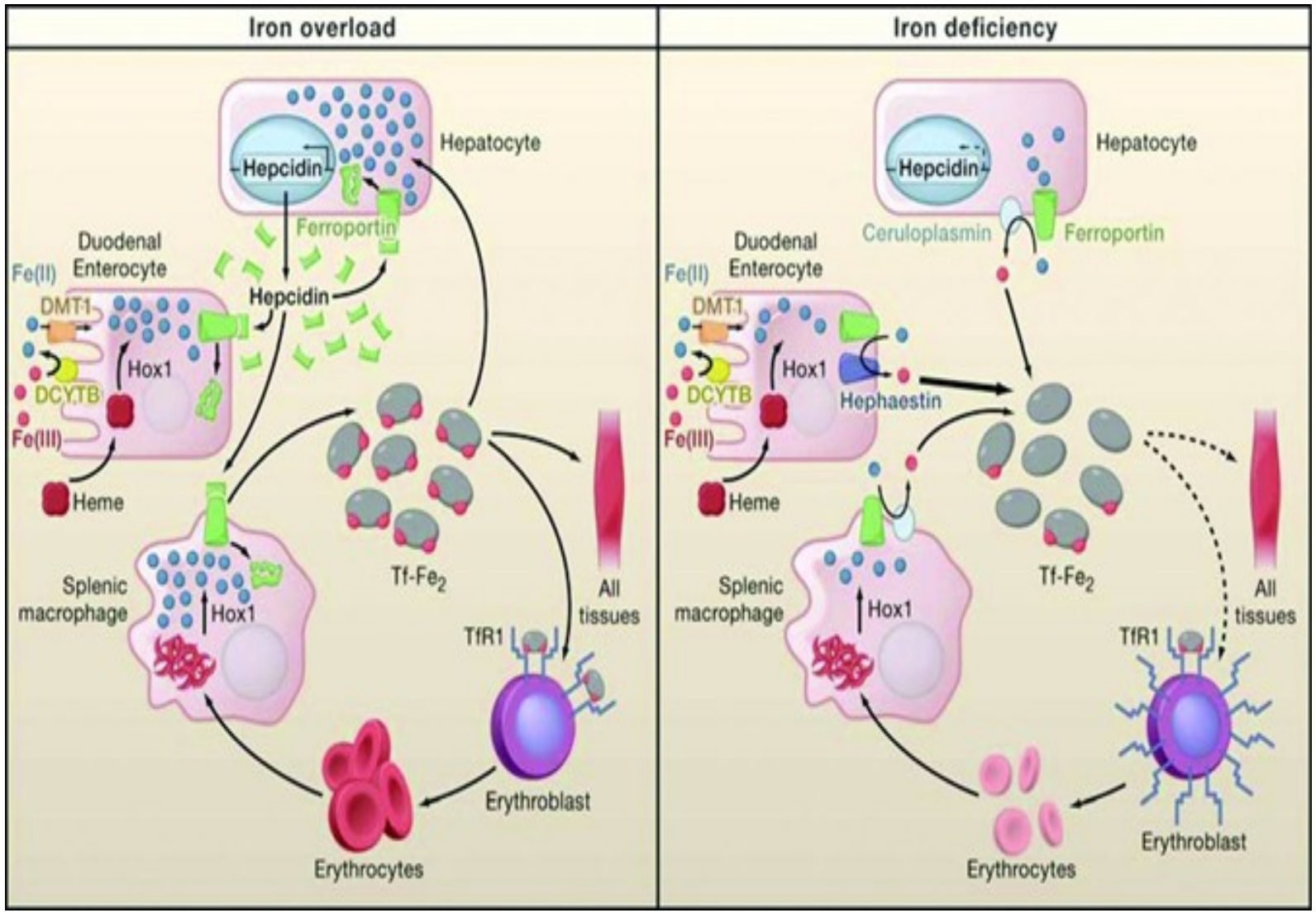
Simplified scheme for estimation of total iron requirements.[13]

The maximum recommended cumulative dose of Ferinject is 1000 mg of iron (20 mL Ferinject) per week.

Iron and hepcidin: a story of recycling and balance

Clara Camaschella[1]

[1]*Vita-Salute University and San Raffaele Scientific Institute, Milan, Italy*



VoxSanguinis
The International Journal of Transfusion Medicine
ISBT International Society of Blood Transfusion
Vox Sanguinis (2019) **114**, 3–16

DOI: 10.1111/vox.12718

REVIEW ARTICLE

Short-term perioperative iron in major orthopedic surgery: state of the art

Susana Gómez-Ramírez,[1] María Ángeles Maldonado-Ruiz,[2] Arturo Campos-Garrigues,[3] Antonio Herrera[4] & Manuel Muñoz[2]

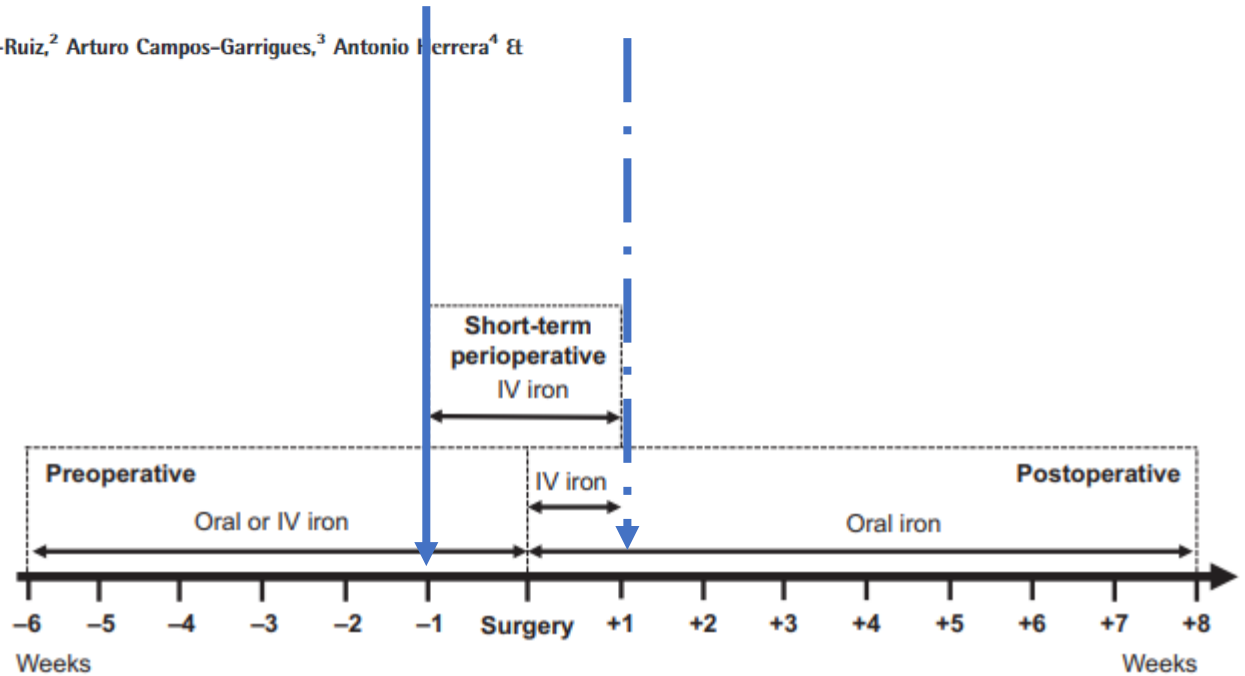


Fig. 1 Iron supplementation modalities according to the time of initiation. In major orthopaedic surgery, preoperative iron administration (4–6 weeks prior to surgery) is the standard approach for treating iron-deficient patient iron recommended by most guidelines[2, 5, 6, 36–38]. Short-term perioperative intravenous iron administration (up to 1 week before and/or after surgery) has been also suggested by some guidelines[2, 37]. Postoperative intravenous iron administration is usually restricted to hospital stay (approximately 1 week), whereas postoperative oral iron supplementation is usually prescribed for 4–8 weeks [5, 8].

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Ferro per via endovenosa perioperatoria in MOS non elettivo

VoxSanguinis
The International Journal of Transfusion Medicine
ISBT International Society of Blood Transfusion
Vox Sanguinis (2019) **114**, 3–16
REVIEW ARTICLE
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DOI: 10.1111/vox.12718

Short-term perioperative iron in major orthopedic surgery: state of the art

Susana Gómez-Ramírez,[1] María Ángeles Maldonado-Ruiz,[2] Arturo Campos-Garriguez,[3] Antonio Herrera[4] Et Manuel Muñoz[2]

Table 2 Studies evaluating perioperative intravenous iron administration in hip fracture repair surgery (five studies, 2063 patients)

Study [Ref.] Surgery	Patients	Baseline Hb (g/dl)	PostOP Hb (g/dl) [weeks]	Type of iron Dose (mg elemental iron) Administration schedule	Transfusion N (%) (U/pt)	30-day mortality (%)	Infection rate (%)	Length of stay (days)	Adverse events[a] (%)
Randomized controlled trials									
Serrano Trenas *et al.* (2010) [18] Hip fracture repair TTS: 4 days	IS: 100	12·1	10·6 [1]	IS (200 mg/48 h, max. 600 mg)	33 (33)[b] 0·8 ± 1·2	11	13	13·5	3
	SC: 100	11·9	10·3 [1]	No iron	41 (41) 0·9 ± 1·2	10	16	13·1	0
Kateros *et al.* [19] Hip fracture repair TTS:3 days	IS+EPO: 38	10·1	10·1 [1]	IS (100 mg/day, 10 days) +EPO (20 000 IU/day, 10 days)	? 1·5 ± 1·2*	?	?	6·7	8
	IS: 41	10·2	9·1 [1]	HS (100 mg/day, 10 days) + placebo EPO (10 days)	? 2·5 ± 0·7	?	?	6·9	7
Bernabeu Wittel *et al.* [20] Hip fracture repair TTS: 2 days	FCM: 103	11·0	10·0 [1]	FCM (1000 mg) + EPO placebo	53 (52) 1·3 ± 1·3	12[c]	5·8	7	9
	FCM+EPO:100	11·0	10·3 [1]	FCM (1000 mg)+EPO (40 000 IU)	52 (52) 1·2 ± 1·2	12	14·0	8	9
	Placebo:100	11·0	9·7 [1]	Placebo	54 (54) 1·3 ± 1·4	10	9·0	8	8
Observational studies									
Blanco Rubio *et al.* [21] Case-control	IS: 57	≤11 (7)[d] >11 (50) ≤11 (18)	?	IS (200 mg/48 h, max. 600 mg)	14 [25]* 0·6 ± 1·2*	1·8*	47·4[e]	?	?
Hip fracture repair TTS: 4 days	SC: 63	>11 (45)	?	No iron	34 (54) 1·4 ± 1·5	15·9		?	?
Muñoz *et al.* [13] Pool analysis Hip fracture repair TTS: 4 days	IS: 1000	13·1	10·3 [1]	IS (200 mg/48 h, 1–3 doses) + EPO (40 000 IU, if Hb <13 g/dl)	324 [32]* 0·7 ± 1·3*	4·8*	41·3[e] 10·7*	11·9*	0
	SC: 361	13·0	10·7 [1]	No iron	176 (49) 1·2 ± 1·5	9·4	26·9	13·4	0

?, not specifically reported; EPO, recombinant human erythropoietin; FCM, ferric carboxymaltose; Hb, haemoglobin; IIM, iron isomaltoside; IS, iron sucrose; RCT, randomized controlled trial; SC, standard care; TTS, mean time-to- surgery from admission.

*$P < 0{\cdot}05$.

[a]Treatment-related.

[b]Transfusion rates in subgroup analysis: postoperative transfusion (10% vs. 21%, $P = 0{\cdot}048$), subcapital hip fracture (14·3% vs. 45·7%, $P = 0{\cdot}004$) o baseline Hb <12 g/dl (18·3% vs. 36%, $P = 0{\cdot}049$), favourable to intravenous iron.

[c]60 days postoperative mortality.

[d]Mean Hb values not given (*n*).

[e]85% were urinary tract infections.

bjh guideline

British Committee for Standards in Haematology Guidelines on the Identification and Management of Pre-Operative Anaemia

Alwyn Kotzé,[1] Andrea Harris,[2] Charles Baker,[3] Tariq Iqbal,[4] Nick Lavies,[5] Toby Richards,[6] Kate Ryan,[7] Craig Taylor[8] and Dafydd Thomas[9]

Opzioni terapeutiche per la carenza di ferro	
pazienti anemici con carenza di ferro assoluta o funzionale	(grado 1B).
Il ferro orale è indicato nei pazienti anemici con carenza di ferro il cui intervento chirurgico non è urgente	(grado 1B).
La terapia con ferro è indicata per i pazienti non anemici con basse riserve di ferro (ferritina <100 µg/l e saturazione della transferrina <20%) destinati a sottoporsi ad intervento chirurgico con **prevista perdita eritrocitaria totale perioperatoria >30 g/l** (>1200 ml in un 70 kg adulto),	(grado 1C).
Ferro per via endovenosa è indicata in caso di carenza funzionale di ferro o quando si prevede che l'intervallo tra il rilevamento dell'anemia e l'intervento chirurgico sia breve.	Grado 2B
Laddove il tempo necessario all'intervento chirurgico è breve e/o quando è più praticabile, sono appropriati agenti che consentano il trattamento a dose singola.	(Grado 2C).

Contents lists available at ScienceDirect

Transfusion Medicine Reviews

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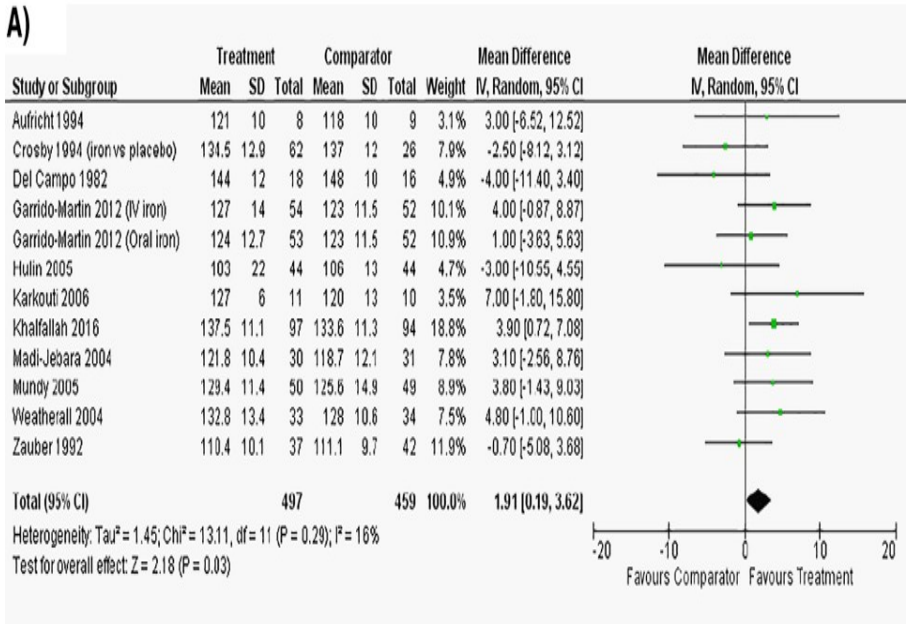
The Efficacy of Postoperative Iron Therapy in Improving Clinical and Patient-Centered Outcomes Following Surgery: A Systematic Review and Meta-Analysis

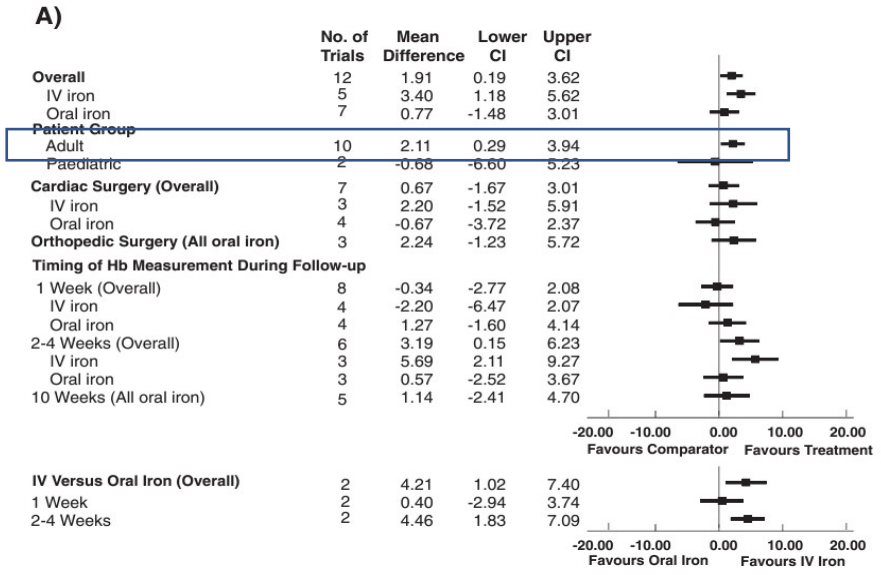


11 studi randomizzati,

497 pazienti randomizzati al trattamento con ferro per via orale o endovenosa

459 pazienti randomizzati a un gruppo di confronto.

→terapia marziale **ha aumentato i livelli di emoglobina in media di 1,91 g/L** (IC 95%: 0,19-3,62) rispetto al placebo o a nessun intervento



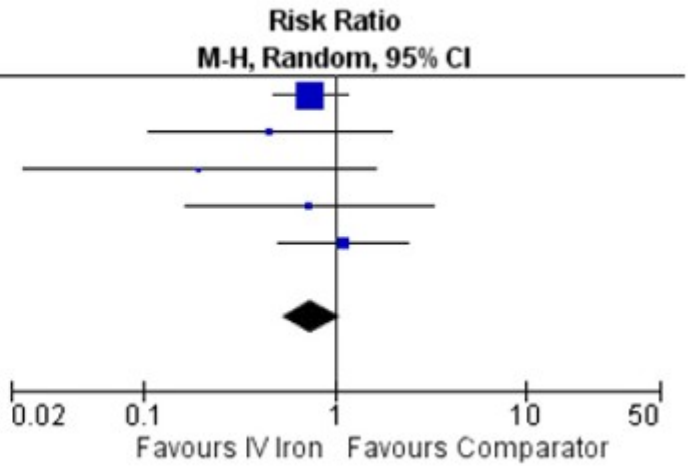
End point secondari riduzione delle sacche

5 studi randomizzati → (n = 419) pazienti che assumevano terapia con ferro per via endovenosa
409 pazienti che ricevevano placebo
La terapia marziale endovenosa ha ridotto il rischio di trasfusione di sangue del 25% (RR = 0,75; IC 95%: 0,53-1,07

A)

Study or Subgroup	IV Iron Events	IV Iron Total	Comparator Events	Comparator Total	Weight	Risk Ratio M-H, Random, 95% CI
Garrido-Martin 2012 (IV iron)	20	54	26	52	65.1%	0.74 [0.48, 1.15]
Karkouti 2006	2	11	4	10	5.9%	0.45 [0.10, 1.97]
Khalfallah 2016	1	97	5	94	2.8%	0.19 [0.02, 1.63]
Kim 2017	3	217	4	213	5.7%	0.74 [0.17, 3.25]
Madi-Jebara 2004	10	40	9	40	20.5%	1.11 [0.51, 2.44]
Total (95% CI)		**419**		**409**	**100.0%**	**0.75 [0.53, 1.07]**
Total events	36		48			

Heterogeneity: Tau² = 0.00; Chi² = 3.00, df = 4 (*P* = .56); I² = 0%
Test for overall effect: Z = 1.56 (*P* = .12)



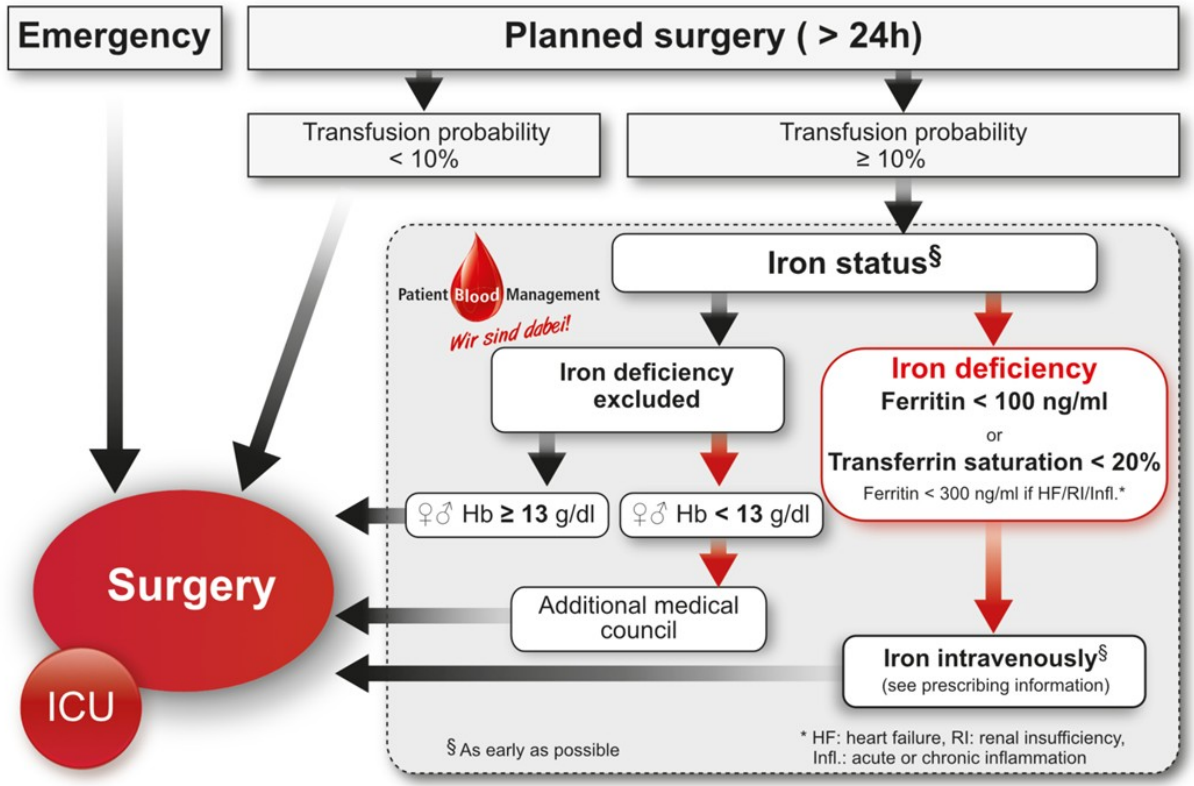
Esperienza del nostro reparto

Policlinico San Martino di Genova
U.O Ortopedia e Traumatologia(dott. F. Santolini)
Clinica ortopedica (prof M. Formica)
SS Ortogeriatria

1090 pazienti consecutivi
Pazienti ricoverati dal pronto soccorso

Età > 75 anni con frattura prossimale di femore

Esami di ortogeriatria
Emocromo , funzionalità renale, profilo marziale completo



Il calcolo della carenza marziale deve essere fatto secondo la formula:

(emoglobina target-emoglobina attuale) x peso (Kg) x 0,24

Si ricorda di aggiungere 10mg/kg di ferro e.v. per ricostituire il deposito di ferro.

In PTO sono presenti ferro gluconato (Ferlixit fiale 62,5 mg) e Carbossimaltosio ferrico (Ferinject fiale 500 mg)

FFN ITALIA
Fragility Fracture Network

Fenotipo clinico della nostra realtà

	Pazientei genn 2021- dic 2022
Età media(anni) media DS	85.97(6.65)
Femmine, N(%)	825 (75,69%)
Barthel Index media(DS)	73.22(25.15)
MNA_SF (DS)	9.90(2.85)
CIRS(indice di comorbidità),media(DS)	3.90(1.79)
CIRS(indice di severità),media(DS)	1.82(0.47)
Clinical frailty Scale,media(DS)	4,74(1.66)
SPMSQ(Risposte errate)	3,72(3.20)
Numero di farmaci, media (DS)	5.71(3.12)

Andamento della degenza

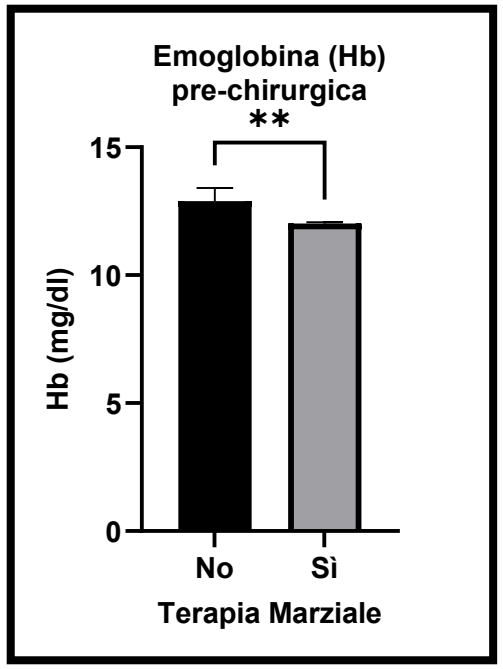
	Pazienti genn 2021-dic2022 (N=1090
Intervento entro le 48 ore, N(%)	775 di 1069 (72.5%)
Durata degenza(giorni), media (DS)	12.88(4.45)
Almeno una complicanza post operatoria,N(%)	984(90.28%)
Anemia pre chirurgica, N(%)	441 di 1001(44.06%)
Anemia post chirurgica, N(%)	849(77.89%)
Delirium, N(%)	343(31.47%)
Avvio al passo/verticalizzazione entro 24 ore	633 di 980(64.59)
Mortalità intra-ospedaliera, N(%)	14(1.28%)
Ferro carbossimaltosio(FCM),N(%)	863 di 1073(80.43%)
Dosaggio FCM(mg) medio (DS)	822,68(401.24)

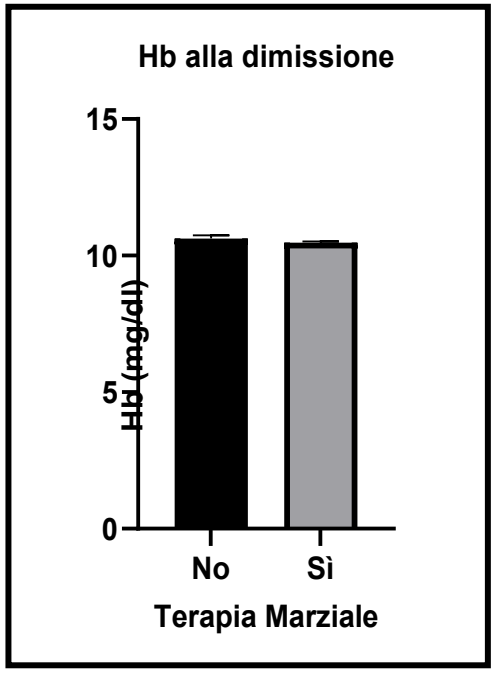
Confronto fra pazienti che hanno ricevuto FCM e non

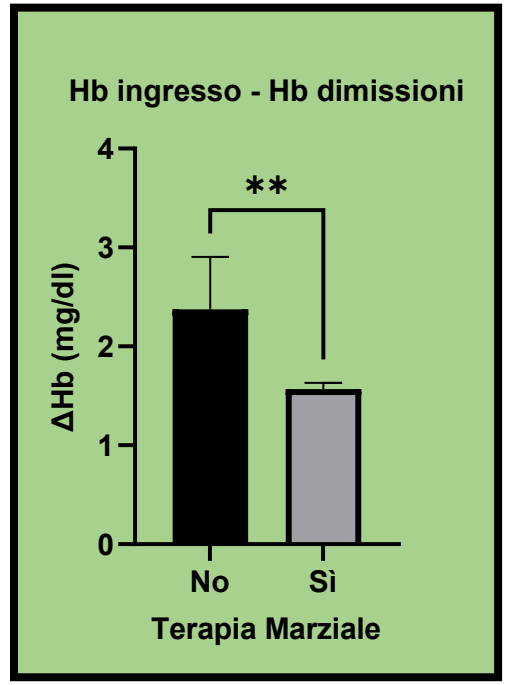
Non ci sono differenze significative tra i due gruppi di pazienti (effettuato terapia marziale e non effettuata) per :

- fragilità clinica e autonomie funzionali pre-ricovero
- tempo alla prima verticalizzazione
- durata della degenza
- numero di sacche di emazie effettuate
- complicanze post-operatorie (delirium e scompenso cardiaco-infezioni)

Trend dei valori di emoglobina







p=0.0057

Anaesthesia
Peri-operative medicine, critical care and pain
Association of Anaesthetists

Review Article | Free Access

Optimisation of pre-operative anaemia in patients before elective major surgery – why, who, when and how?

K. E. Munting, A. A. Klein

Why	*La somministrazione di FCM ai pazienti sideropenici permette di minimizzare il calo dell'Hb in seguito all'evento fratturativo, portando i pazienti su valori di Hb in dimissione accettabili per ridurre le complicanze simili a chi non è sideropenico*
Who	*Tutti I pazienti sottoposti a interventi di chirurgia maggiore* *→concentrazione di emoglobina è inferiore a 130 g.l il giorno della valutazione preoperatoria),* *→il tipo di frattura* *→ la perdita di sangue prevista (definita > 500 ml prevista o possibile)*
When	*Il prima possibile(nelle prime 24 ore) per consentire tempo sufficiente per l'ottimizzazione.*
How	*Somministrazione endovenosa*

Grazie per l’attenzione

Journal of Clinical Orthopaedics and Trauma
Volume 16, May 2021, Pages 239-243

The hidden blood loss in proximal femur fractures is sizeable and significant

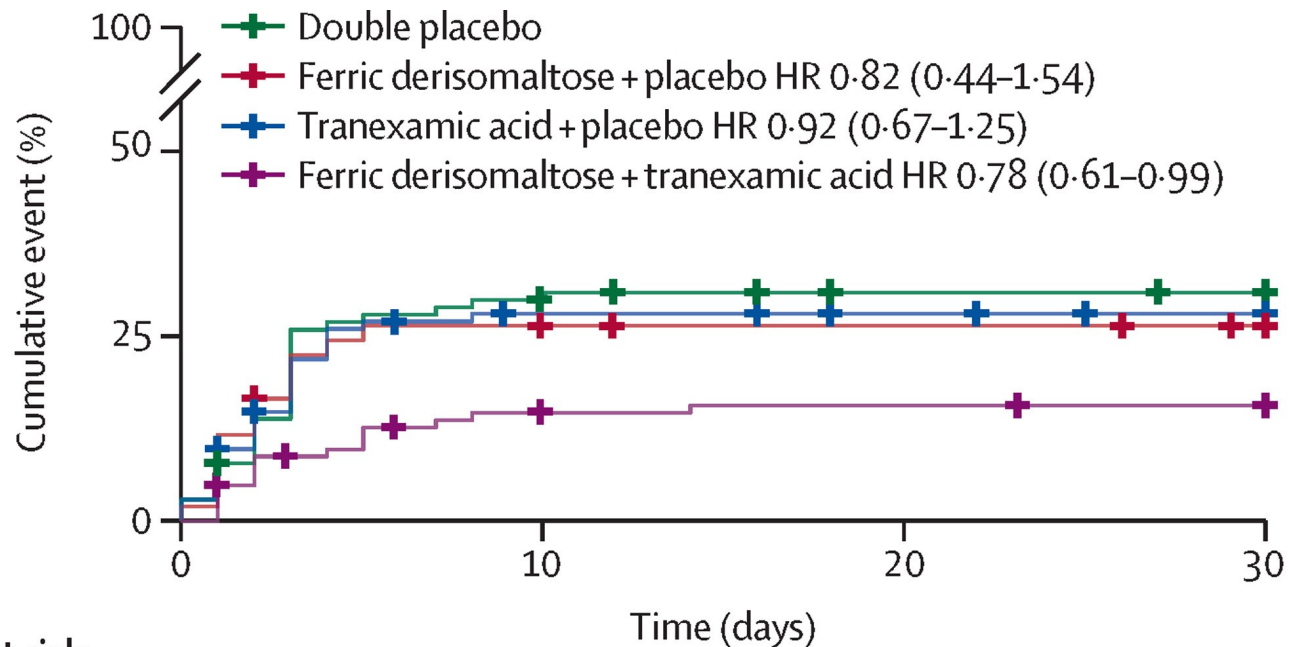
L'identificazione dei pazienti a rischio di anemia preoperatoria

Quantificare la perdita di sangue attribuibile solo alla frattura,

livelli di emoglobina all'ammissione

tempo trascorso dal ricovero all'intervento chirurgic
predittivo di un aumento del calo dell'emoglobina (p
0,01)

L’obiettivo primario → identificare i fattori di rischio predittivi di una maggiore perdita di sangue.
Gli obiettivi secondari → quantificare la perdita di sangue prevista per varie fratture prossimali del femore, indipendentemente dall'intervento chirurgico (perdita di sangue nascosta).

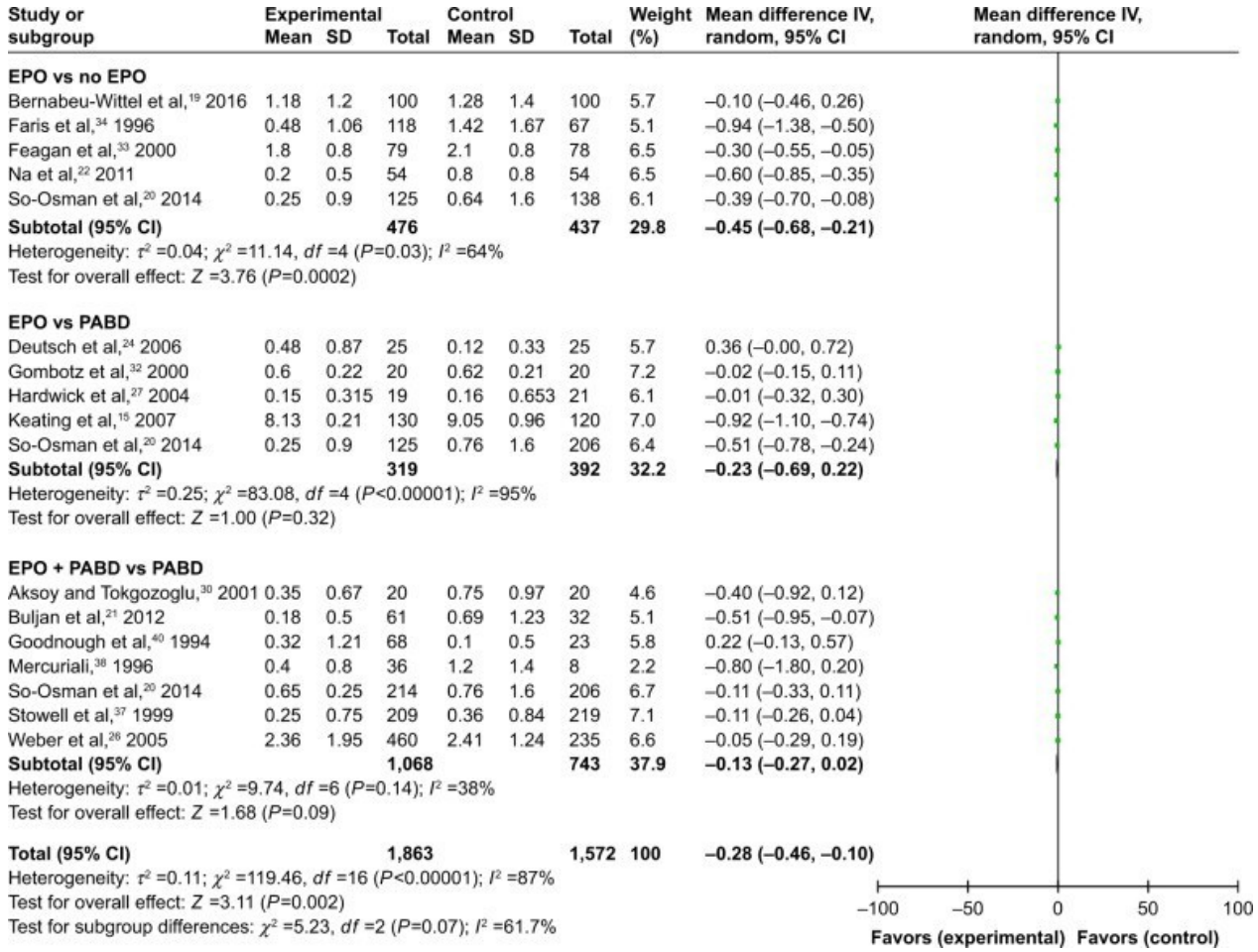


Number at risk (number censored)				
Double placebo	103 (0)	70 (4)	65 (7)	64 (72)
Ferric derisomaltose + placebo	103 (0)	75 (2)	72 (4)	70 (76)
Tranexamic acid + placebo	103 (0)	69 (6)	67 (8)	65 (75)
Ferric derisomaltose + tranexamic acid	104 (0)	86 (4)	84 (4)	83 (88)

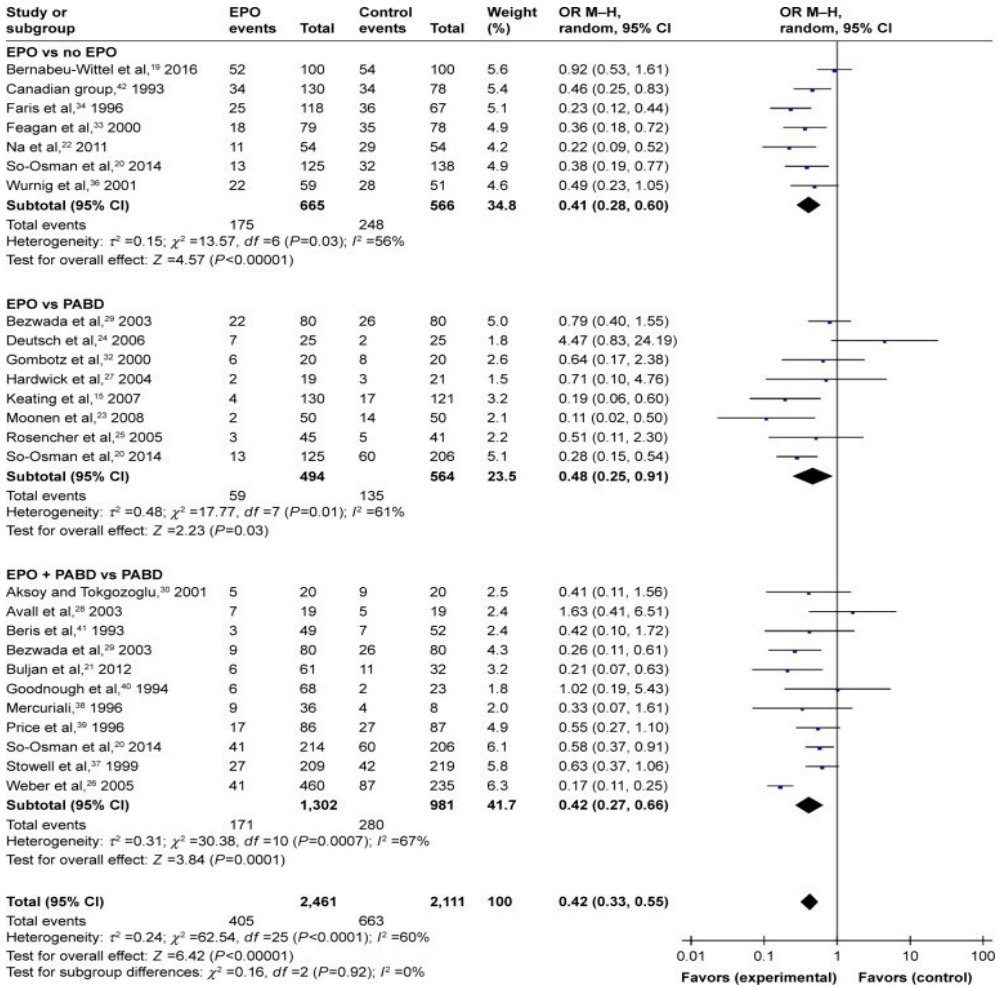
Table 4 Secondary endpoints from randomisation to 6 weeks after operation and all-cause mortality to 6 months after operation. The data are reported per intervention group (iron or placebo) (n=143). CI, confidence interval; IQR, inter-quartile range. * Incidence rate ratios (for continuous outcome variables) and odds ratios (for categorical outcome variables) were adjusted for preoperative haemoglobin concentration (g L^{-1}), age (yr), and surgical procedure. † Missing data at 6 weeks.

	I.V. iron (n=70)	Placebo (n=73)	Placebo *vs* iron (95% CI), *P*-value	Placebo *vs* iron (95% CI), *P*-value
Length of acute stay (days)			1.28 (−0.15 to 2.71); *P*=0.08	1.41 (−0.01 to 2.83); *P*=0.05
Median (IQR)	5.5 (3)	7 (4)	—	—
Range	2–24	2–25	—	—
Length of rehabilitation stay (days)			0.98 (−5.79 to 7.76); P=0.77	0.15 (−7.15 to 7.44); P=0.97
Median (IQR)	8 (16.5)	1 (22)	—	—
Range	0–49	0–62	—	—
Had any infection by 6 weeks, *n* (%)	24/67 (36)	30/68 (44)	1.41 (0.71–2.83), P=0.33	1.28 (0.63–2.61), P=0.50
Home to home by 6 weeks, *n* (%)	31/53 (58)	37/54 (69)	1.54 (0.70–3.41), P=0.28	1.96 (0.79–4.87), P=0.15
Haemoglobin concentration ≥100 (g L^{-1}) at 6 weeks, *n* (%)	50/58 (86)	40/59 (68)	0.34 (0.13–0.85), P=0.02	0.40 (0.15–1.09), P=0.07
Haemoglobin concentration (g L^{-1}) at 6 weeks			−9.11 (−14.12 to −4.09); P<0.001	−6.89 (−11.69 to −2.08); P=0.01
Median (IQR)	116 (21)	108 (17)	—	—
Range	87–145	87–130	—	—
Deceased at 6 months, *n* (%)	10/70 (14)	15/73 (21)	1.55 (0.65–3.73), P=0.33	1.56 (0.63–3.84), P=0.34

Dalla procedura indice di follow-up a 6 settimane, sono stati riportati risultati clinici simili in entrambi i gruppi di intervento, compresi i tassi di infezioni postoperatorie (36% ferro contro 44% placebo; Tabella 4) e il ritorno a casa (58% ferro contro 69% placebo; Tabella 4). Ci sono stati otto decessi (due nel gruppo ferro i.v. e sei nel gruppo placebo). Recupero funzionale, misurato dalla variazione del Ka modificato. Le attività della vita quotidiana (ADL) erano simili tra i gruppi (60 pazienti). Altri pazienti da thei.v. il gruppo ferro aveva una concentrazione di emoglobina pari a 100 gL 1 a 6 settimane (86%) rispetto ai pazienti del gruppo placebo (68%; Tabella 4). I pazienti nella terapia i.v. era anche probabile che il gruppo ferro avesse una concentrazione di emoglobina più elevata a 6 settimane (aumento dell'emoglobina ferro rispetto al placebo 9,11 gL 1; IC 95% 4,09-14,12; P <0,001; Tabella 4) (Fig2), anche dopo aggiustamento per le covariate (aumento aggiustato 6,89 g L 1; IC 95% 2,08-11,69; P = 0. 01). Al follow-up a 6 mesi, si sono verificati ulteriori 15 decessi di pazienti (sette nel gruppo trattato con ferro e.v., otto nel gruppo placebo). Anche l'odd ratio della mortalità a 6 mesi era simile tra i gruppi (odd ratio [morte nel gruppo placebo vs ferro] 1,55; IC al 95% 0,65-3,73; P = 0,33; Tabella 4). Questo non era diverso dopo aver aggiustato la concentrazione di emoglobina preoperatoria (gL 1), l'età (anni) e la procedura chirurgica (odds ratio aggiustato [placebovsiron] 1,56;IC al 95%0,63e3,84; P¼0,34). La durata della degenza ospedaliera per acuto variava da 2 a 25 giorni e il tempo in riabilitazione da 0 a 62 giorni, con notevole variabilità tra i partecipanti allo studio. La durata media della degenza acuta è stata di 5,5 giorni nel gruppo che ha ricevuto ferro e 7 giorni nel gruppo placebo (Tabella 4).



Units of allogeneic blood transfused.



Patients needing ABT.