XI congresso nazionale

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ROMA 24-26 MAGGIO 2018

Hip fracture Fast-track: dall'osso al midollo

Introduzione

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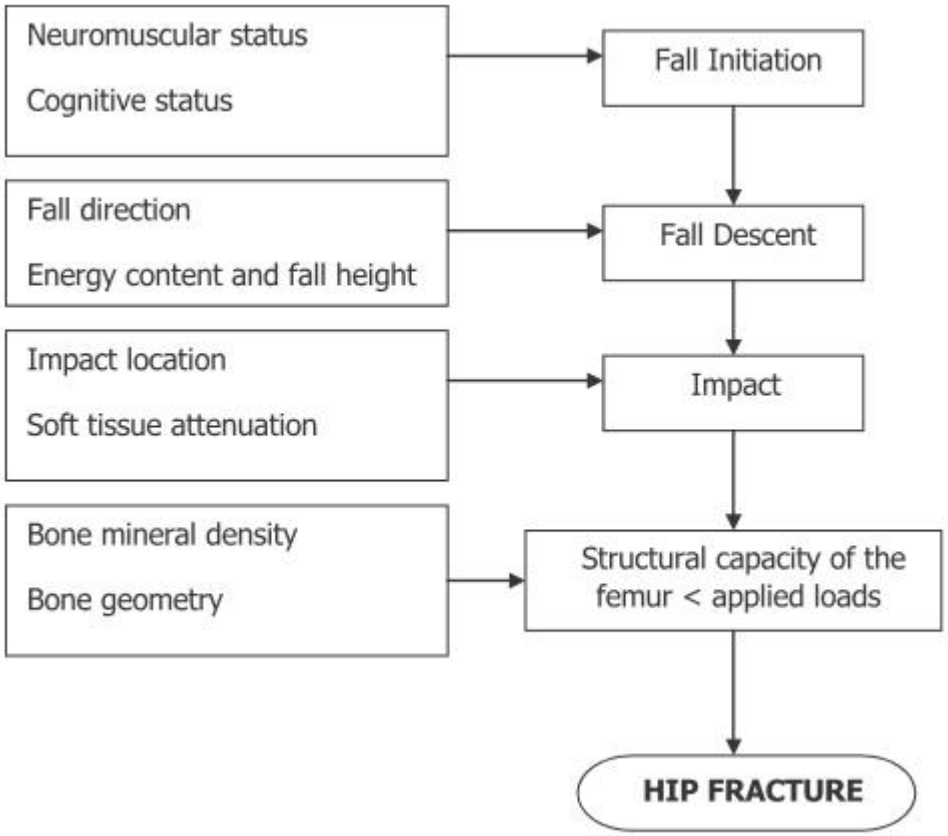
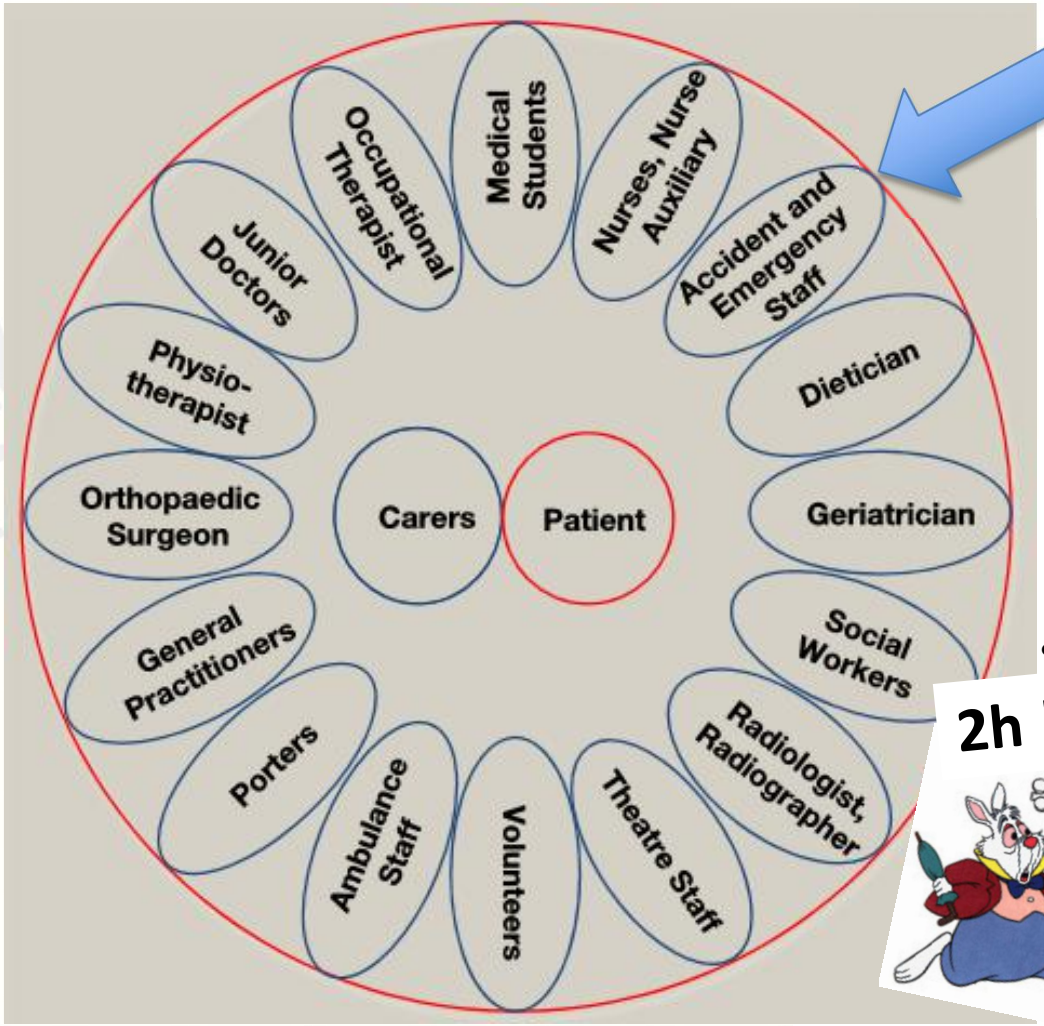
EPIDEMIOLOGIA



Griffiths R. et al. Anaesthesia 2012, 67, 85–98

98% → Chirurgia

APPROCCIO MULTIDISCIPLINARE



- Analgesia
- Lesioni da decubito
- Bilancio idroelettrico
- Controllo temperatura

- Comorbilità
- Stato mentale
- Stato sociale
- Abilità/autonomia

- Avvio iter diagnostico-radiologico

MORBILITA' e MORTALITA'

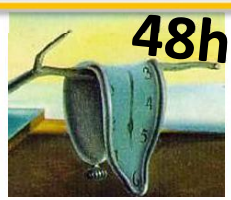
- Dopo 6 mesi solo 50% riprende completa autonomia
- Rischio 5 volte maggiore di istituzionalizzazione a 1 anno
- Mortalità= 17-35% a 1 anno (IVU, polmoniti, TEV, ulcere da decubito…)

NON MODIFICABILI

- Tipo di frattura
- Comorbilità
- ♂
- età

MODIFICABILI

- Alcool
- BMI
- ↑ Creatinina
- Anemia
- Stato nutrizionale
- Ipoalbuminemia
- Intervento chirurgico ritardato



Hip fracture & Anemia

Hip fracture & Anemia

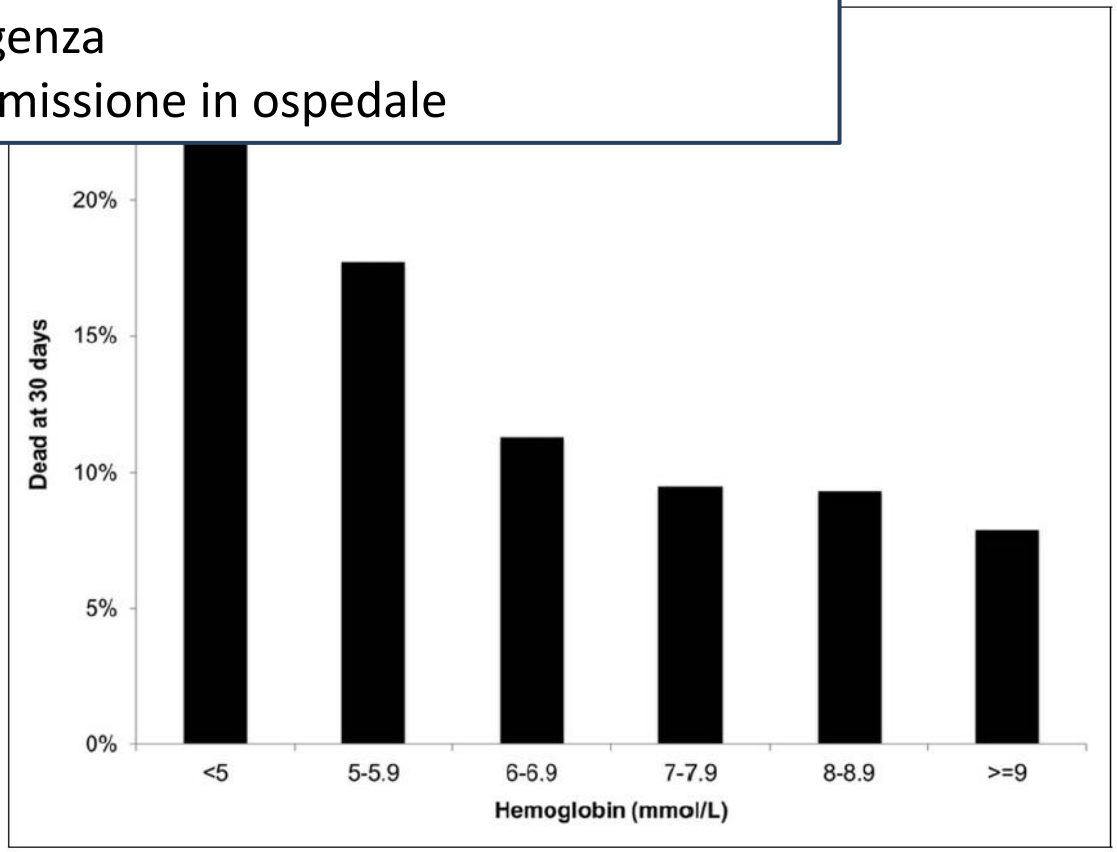
CAPITOLO 2

Low Levels of Hemoglobin at Admission Are Associated With Increased 30-Day Mortality in Patients With Hip Fracture

Geriatric Orthopaedic Surgery
& Rehabilitation
2016, Vol. 7(3) 115-120

DOI: 10.1177/2151458516647989
gos.sagepub.com
SAGE

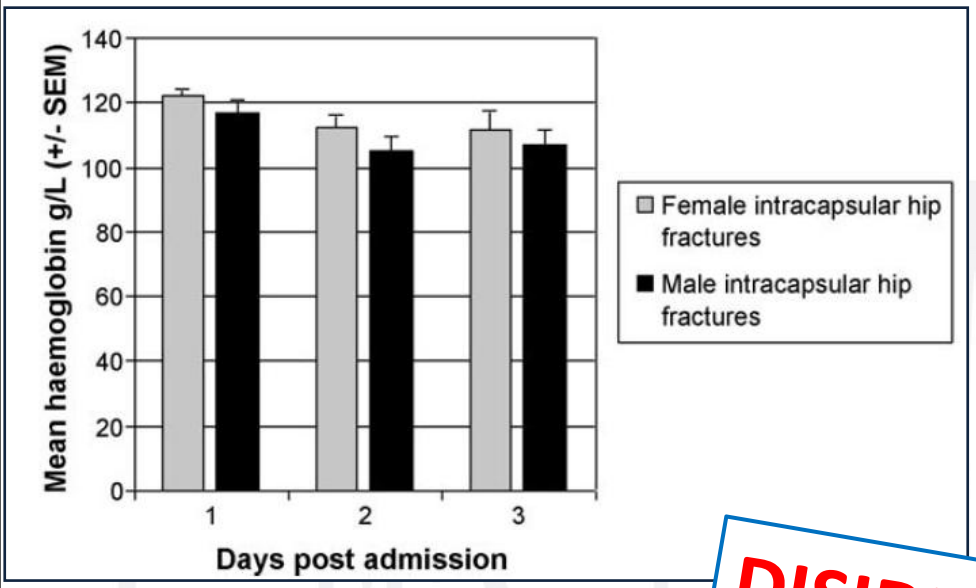
Livelli di Hb maggiori nel post-operatorio sono associati a:
-Miglior recupero funzionale
-Minor tempo di degenza
-Minor tasso di riammissione in ospedale

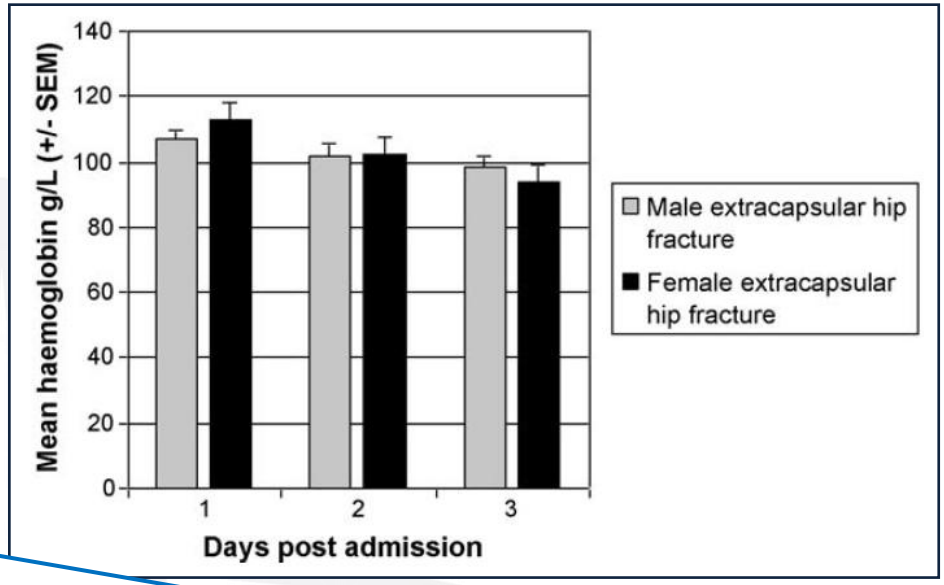


The 30-day mortality decreases for every increase in hemoglobin of 1.0 mmol/L in a univariate analysis ($P < .0001$).

Hip fracture & Anemia

CAPITOLO 2





Smith (

DISIDRATAZIONE

VALORI DI EMOGLOBINA (HB) ALL'INGRESSO E DUPO DELL'INTERVENTO)

Number of patients					
Hb[a] level in g/dL	≥10	<10	<9	<8	<7
Hb on admission	120	4	0	0	0
Hb on repeat test	98	11	10	4	1

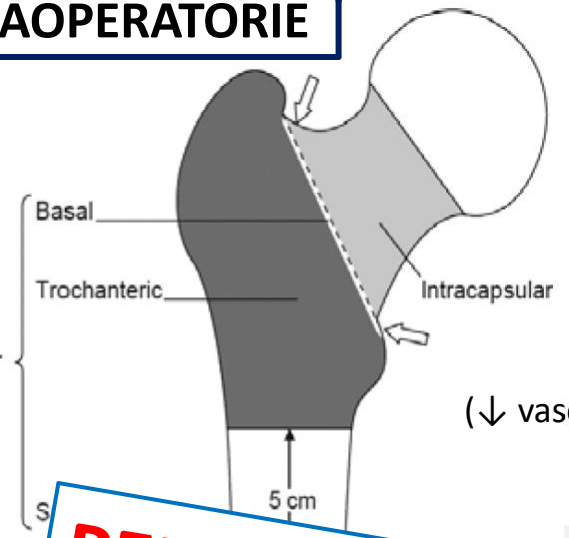
Kumar D et al. Injury, Int. J. Care Injured 42 (2011) 167–170

1L soluzione fisiologica ogni 8h

Hip fracture & Anemia

CAPITOLO 2

PERDITE EMATICHE INTRAOPERATORIE



FRATTURE EXTRACAPSULARI

↑ sanguinamento

(anche >1L)

FRATTURE INTRACAPSULARI

↓ sanguinamento

(↓ vascolarizzazione, tamponamento della capsula)

PERDITE OCCULTE

Perdite Ematiche Totali 6 Volte > Perdite Em… …ocedura Chirurgica

-Trauma *per se* (fratture extracapsulari)
-Emostasi insufficiente
-Anticoagulanti
-Altri sanguinamenti (tratto gastroenterico)

Foss N.B. et al. J Bone Joint Surg 2006; 88 – B: 1053-9

Hip fracture & Anemia

CAPITOLO 2

Hidden blood loss after surgery for hip fracture

N. B. Foss,
H. Kehlet

From Hvidovre University Hospital, Copenhagen, Denmark

patients.

Regional anaesthesia has been associated with decreased blood loss,[29] but the implications for our results are minimal because of the almost universal application of regional anaesthesia. A factor which was significantly and independently associated with increased blood loss was a measured intra-operative mean arterial pressure below 60 mmHg, which is in contrast to the reduced blood loss which is expected with hypotensive anaesthesia in hip replacement surgery.[30] A possible explanation could be that the excessive pre- and intra-operative blood loss may have caused more profound hypotension intra-operatively. Alternatively, it may be that profound hypotension decreased the quality of surgical haemostasis resulting in increased post-operative blood loss. Gastro-intestinal haemorrhage or ulceration was included in the multivariate analysis despite the fact that its association with total blood loss could be

Hip fracture & Anemia

CAPITOLO 2

Published in final edited form as:
J Trauma Acute Care Surg. 2015 July ; 79(1): 91–97. doi:10.1097/TA.0000000000000686.

Chronic Restraint Stress after Injury and Shock is Associated with Persistent Anemia despite Prolonged Elevation in Erythropoietin Levels

Disfunzione del midollo osseo
- Suscettibilità alle infezioni
- Anemia

> 14 gg

Citochine proinfiammatorie

↓

Trauma-Shock-Stress → ↑ Catecolamine → Disfunzione Midollo Osseo

Inibizione diretta de cellule progenitori eritroidi

Alterazione metabolismo ferro

Hip fracture & Anemia

CAPITOLO 2

Chronic Restraint Stress after Injury and Shock is Associated with Persistent Anemia despite Prolonged Elevation in Erythropoietin Levels *J Trauma Acute Care Surg.* 2015 July ; 79(1): 91–97.

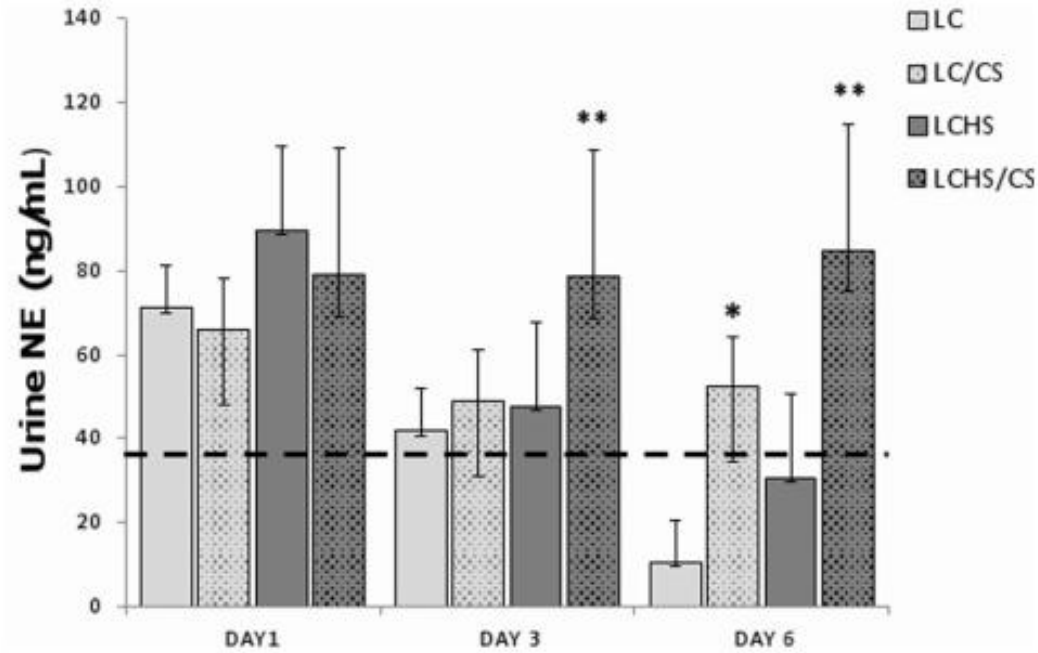


Figure 1. Urinary NE levels one, three, and six days after injury, shock, and chronic stress
On day 1 all groups have elevated unnary NE levels compared to control animals (represented by the dashed line). The addition of CS to LC and LCHS results in significantly increased urinary NE levels on day 6. (LC=lung contusion alone, LC/CS=lung contusion followed by CS; LCHS=lung contusion followed by hemorrhagic shock; LCHS/CS=LCHS followed by CS). * p<0 05 vs. LC alone, ** p<0.05 vs. LCHS alone. Dashed line represents control level.

Hip fracture & Anemia

CAPITOLO 2

Chronic Restraint Stress after Injury and Shock is Associated with Persistent Anemia despite Prolonged Elevation in Erythropoietin Levels

J Trauma Acute Care Surg. 2015 July ; 79(1): 91–97.

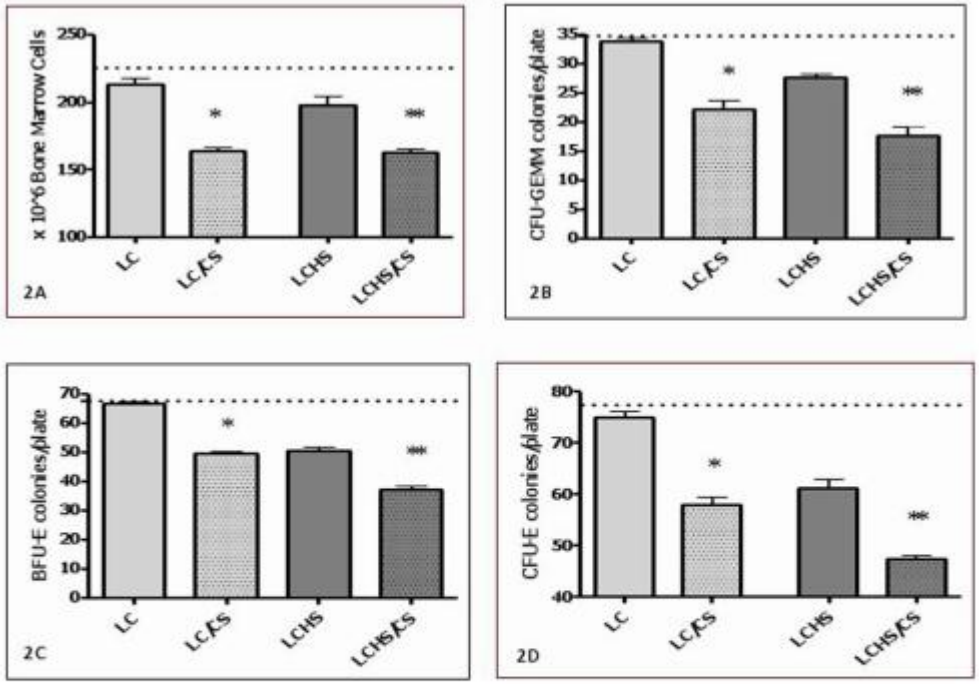


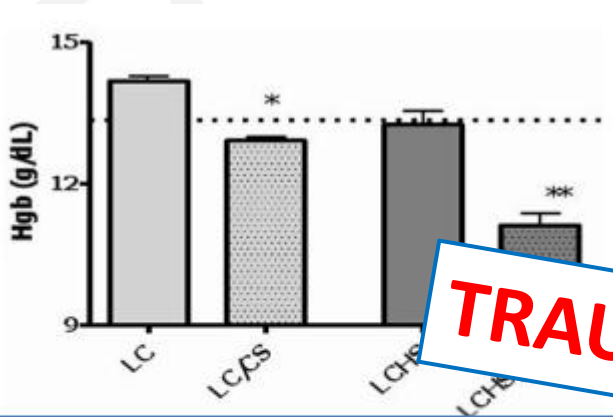
Figure 2. A–D. BM cellularity and HPC colony growth seven days after injury, shock, and chronic stress

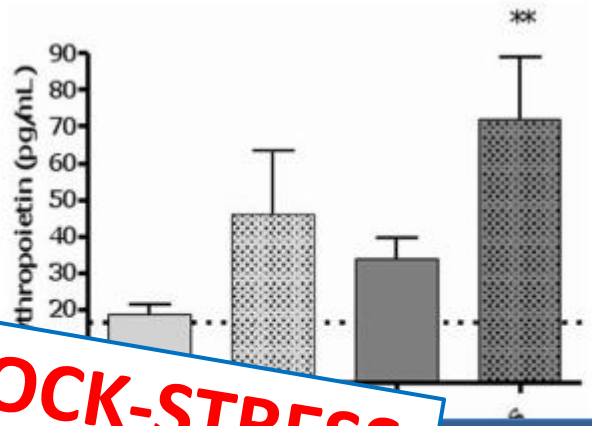
In 2A, the addition of CS after LC or LCHS causes a significant reduction in BM cellularity compared to LC or LCHS alone In Figures 2B–D, The addition of CS after LC or LCHS causes a further significant reduction in BM CFU-GEMM, BFU-E and CFU-E colony growth compared to LC or LCHS alone. (BM = bone marrow; LC = lung contusion alone; LC/CS = lung contusion followed by CS; LCHS=lung contusion followed by hemorrhagic shock, LCHS/CS=LCHS followed by CS). * $p<0.05$ vs. LC and ** $p<0.05$ vs. LCHS. Dashed line represents control levels.

Hip fracture & Anemia

CAPITOLO 2

Chronic Restraint Stress after Injury and Shock is Associated with Persistent Anemia despite Prolonged Elevation in Erythropoietin Levels *J Trauma Acute Care Surg.* 2015 July ; 79(1): 91–97.





TRAUMA-SHOCK-STRESS

Trauma-Shock-Stress → ↑ Catecolamine → Disfunzione Midollo Osseo

hemorrhagic shock; LCHS/CS=LCHS followed by CS). ** p<0.05 vs. LCHS alone. Dashed line represents control level.

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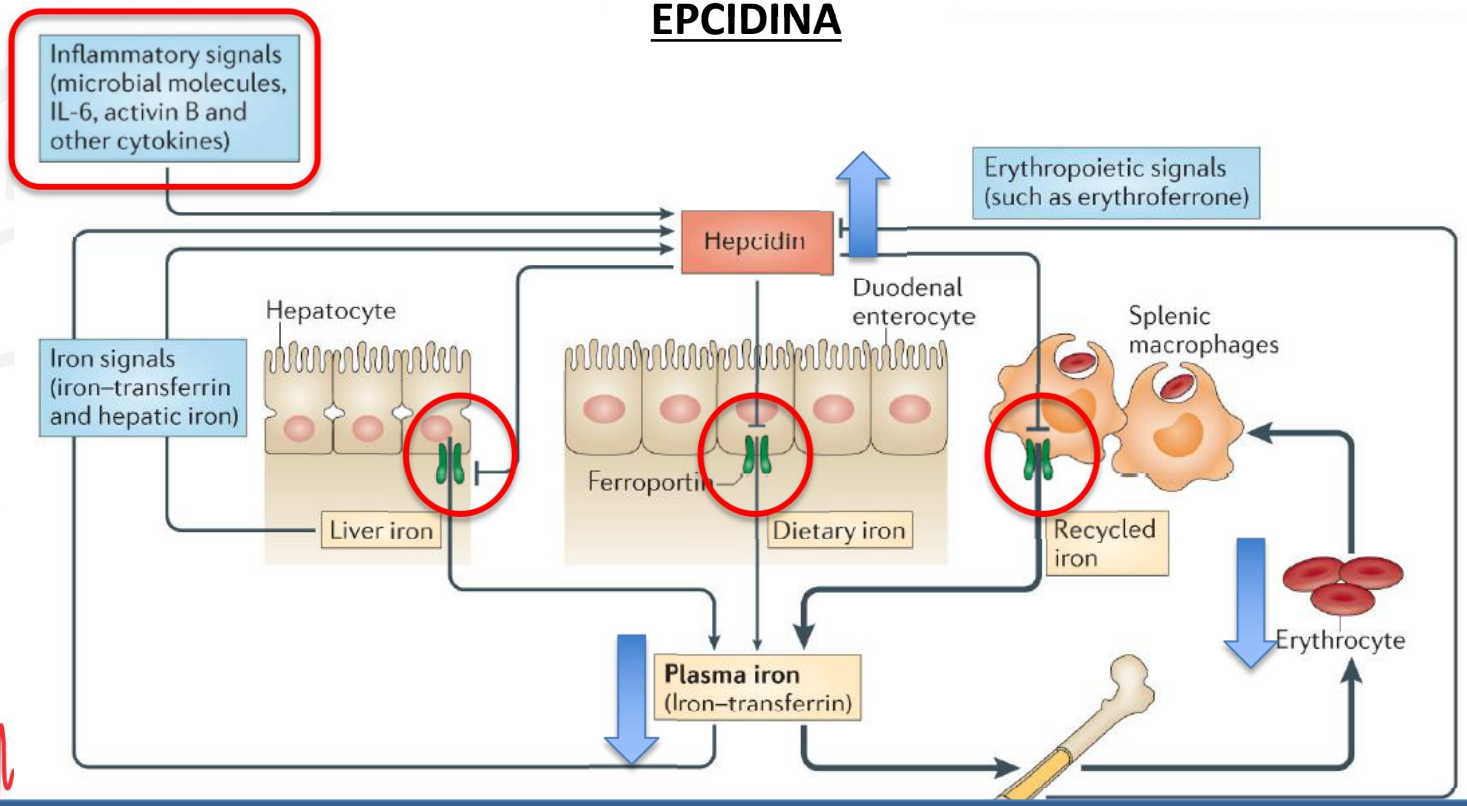
METABOLISMO DEL FERRO

EPCIDINA

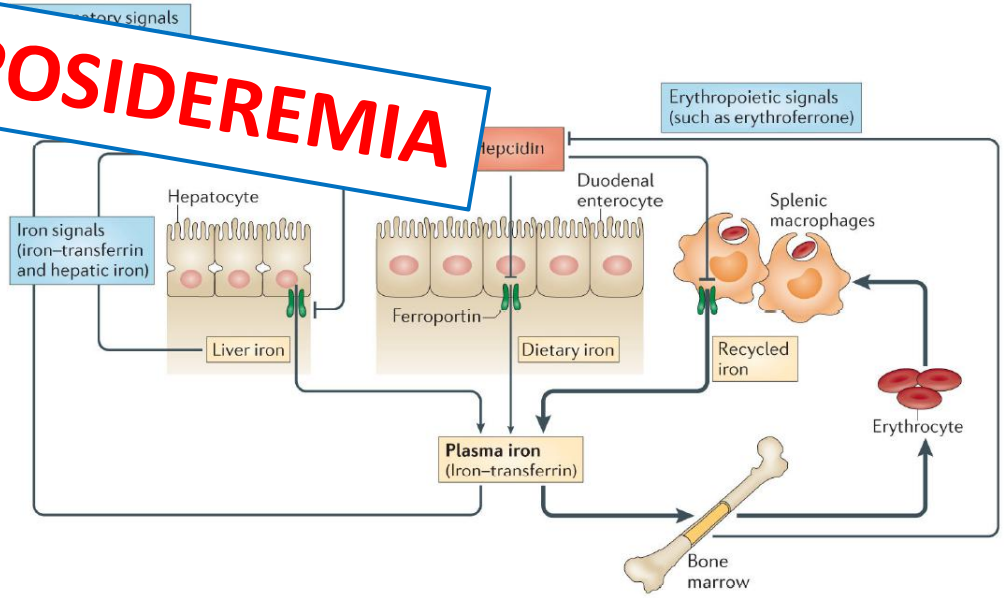


CONSIDERANDO CHE I MICROORGANISMI UTILIZZANO IL FERRO PER LA LORO SOPORAVVIVENZA, L'IPOSIDEREMIA INDOTTA DALLE INFEZIONI E DALL'INFIAMMAZIONE POTREBBE ESSERE UN MECCANISMO DI DIFESA

METABOLISMO DEL FERRO

INFIAMMAZIONE → ↑ EPDICINA

IPOSIDEREMIA



DISIDRATAZIONE

PERDITE OCCULTE

Hip fracture & Anemia

TRAUMA-SHOCK-STRESS

IPOSIDEREMIA

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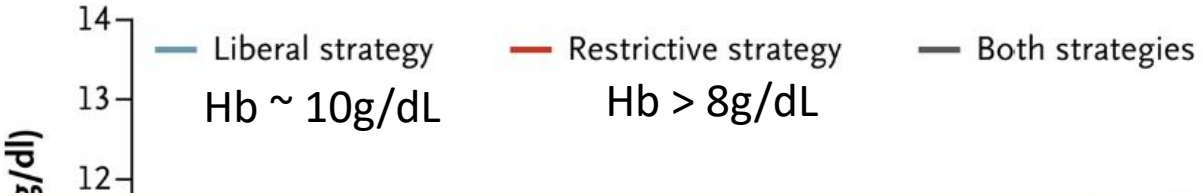
Hip fracture & Emotrasfusione

Hip fracture & Emotrasfusione

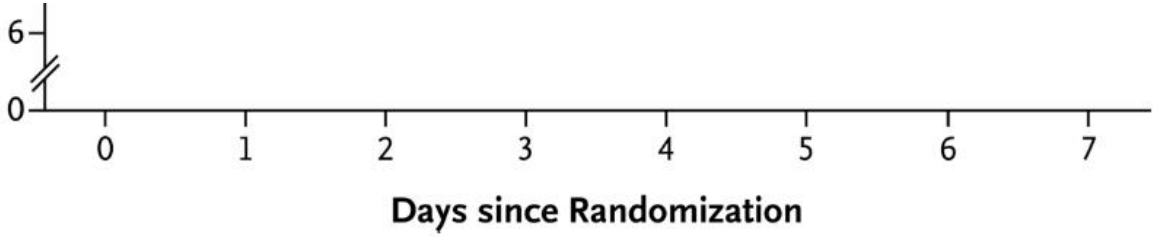
CAPITOLO 3

Published in final edited form as:
N Engl J Med. 2011 December 29; 365(26): 2453–2462. doi:10.1056/NEJMoa1012452.

Liberal or Restrictive Transfusion in High-Risk Patients after Hip Surgery



In summary, we found that a liberal transfusion strategy, as compared with a restrictive strategy, did not result in reduced rates of death or an inability to walk on 60-day follow-up or in significant reductions in rates of in-hospital complications in this population at increased cardiovascular risk. Our findings suggest that it is reasonable to withhold transfusion in patients who have undergone surgery in the absence of symptoms of anemia or a decline in the hemoglobin level below 8 g per deciliter, even in elderly patients with underlying cardiovascular disease or risk factors.



Hip fracture & Emotrasfusione

Martinsen *et al. BMC Res Notes (2016) 9:75*
DOI 10.1186/s13104-016-1885-x

BMC Research Notes

CAPITOLO 3

SHORT REPORT Open Access

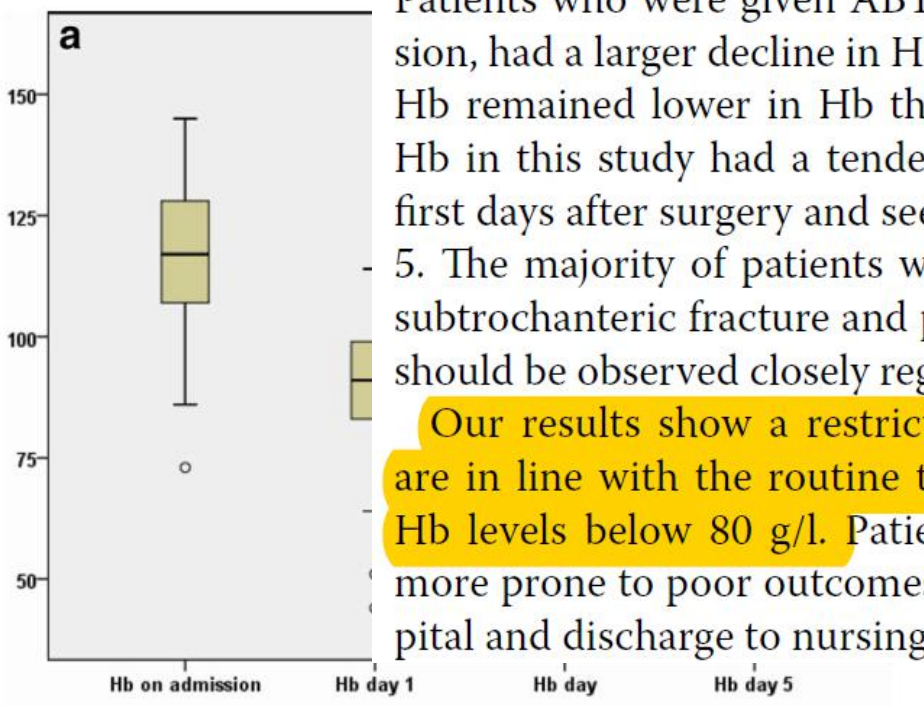
A restrictive policy for red blood cell transfusion in older hip fracture patients: experiences from a patient register

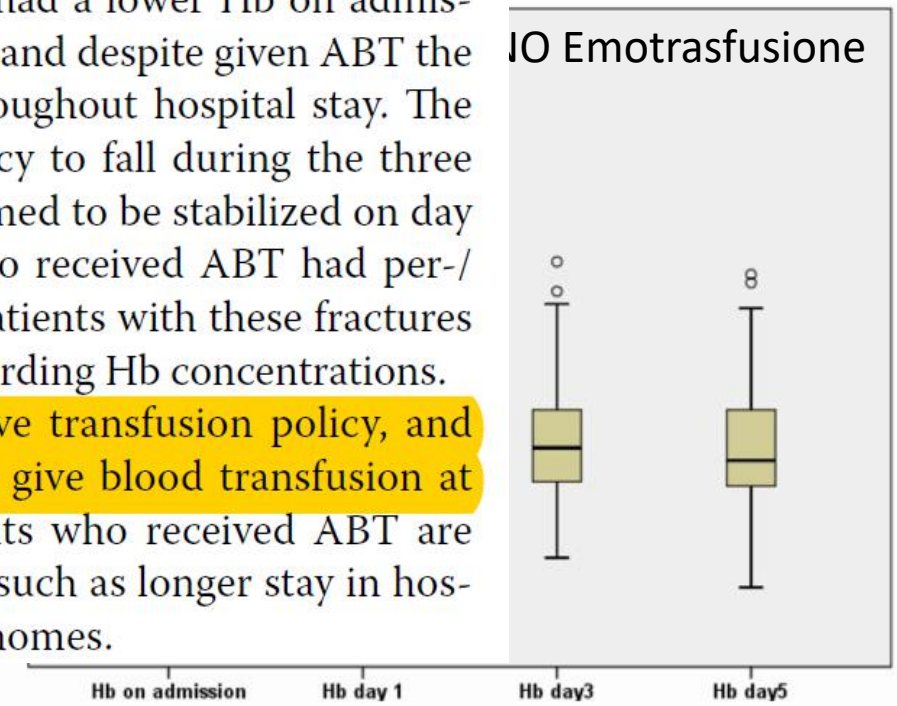
Emotrasfusione <8g/dL

Conclusion

Patients who were given ABT had a lower Hb on admission, had a larger decline in Hb and despite given ABT the Hb remained lower in Hb throughout hospital stay. The Hb in this study had a tendency to fall during the three first days after surgery and seemed to be stabilized on day 5. The majority of patients who received ABT had per-/subtrochanteric fracture and patients with these fractures should be observed closely regarding Hb concentrations.

Our results show a restrictive transfusion policy, and are in line with the routine to give blood transfusion at Hb levels below 80 g/l. Patients who received ABT are more prone to poor outcomes such as longer stay in hospital and discharge to nursing homes.





Hip fracture & Emotrasfusione

Martinsen *et al. BMC Res Notes (2016) 9:75*
DOI 10.1186/s13104-016-1885-x

BMC Research Notes

CAPITOLO 3

SHORT REPORT Open Access

A restrictive policy for red blood cell transfusion in older hip fracture patients: experiences from a patient register

Table 2 Proportions and risk ratios of postoperative complications and case fatality according to receiving ABT in older hip fracture patients (n = 491)

	Received ABT (n = 106)	No ABT (n = 385)	Crude RR (95 % CI) of complications in ABT recipients	p value[a]
Urinary tract infection, n (%)	24 (22.6)	55 (14.3)	1.58 (1.03–2.43)	0.035
Respiratory tract infection, n (%)	19 (17.9)	38 (9.9)	1.82 (1.09–3.02)	0.021
Delirium, n (%)	44 (41.5)	106 (27.5)	1.51 (1.14–1.99)	0.004
Cardio vascular complications	8 (7.5)	20 (5.2)	0.91 (0.45–1.83)	0.79
Pressure ulcer, n (%)	4 (3.8)	16 (4.2)	0.91 (0.31–2.66)	0.86
Surgical wound infection, n (%)	6 (5.7)	12 (3.1)	1.82 (0.70–4.72)	0.22
In-hospital case fatality, n (%)	3 (2.8)	5 (1.3)	2.18 (0.53–8.97)	0.28
30-day case fatality, n (%)	9 (8.5)	29 (7.5)	1.07 (0.52–2.20)	0.69
1-year case fatality, n (%)	40 (37.7)	97 (25.2)	1.50 (1.110–2.02)	0.008

are in line with the routine to give blood transfusion at Hb levels below 80 g/l. Patients who received ABT are more prone to poor outcomes such as longer stay in hospital and discharge to nursing homes.

Hip fracture & Emotrasfusione

CAPITOLO 3

COMPLICANZE DELL'EMOTRASFUSIONE

Table 6. Inf
Transfusio

ú frequenti

Complication
Hepatitis B virus
Hepatitis C virus
Human T-lympho 1 or 2
Human immunod
Creutzfeldt-Jakob
Human herpesvirus
Malaria and babesi
Pandemic influenza
West Nile virus

*—Exact risk unknown.

Information from referen

ne

versus-host disease

usion-related immunomodulation

Adapted with permission from Hendrickson JE, Hillyer CD. Noninfectious serious hazards of transfusion. Anesth Analg. 2009;108(3):760.

Hip fracture & Terapia Marziale

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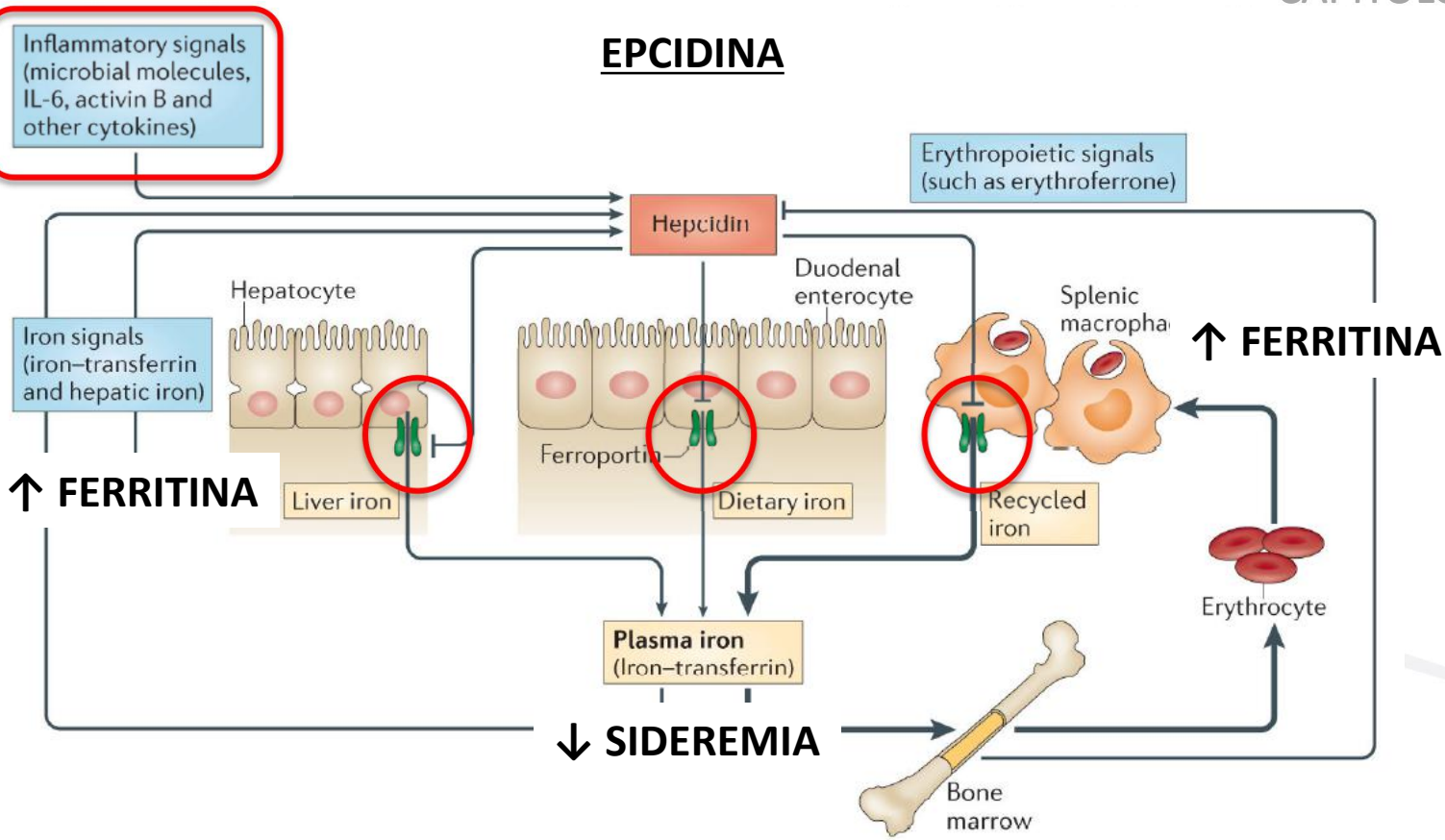
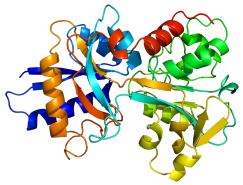
Hip fracture & Anemia

CAPITOLO 2

EPCIDINA



TRANSFERRINA



%TSAT: Sideremia / (Transferrina x 1,42) x 100

v.n. <20%

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CAPITOLO 4

Original Article Clinics in Orthopedic Surgery 2018;10:20-25 • https://doi.org/10.4055/cios.2018.10.1.20

Postoperative Intravenous Ferric Carboxymaltose Reduces Transfusion Amounts after Orthopedic Hip Surgery

Sun Ki Kim, MD, Won Yeong Seo, MD, Hee Joong Kim, MD, Jeong Joon Yoo, MD

- Hb<10g/dL
- ↓ Hb >3g/dL

→ FERRO CARBOSSIMALTOSIO 1gr

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Hip fracture & Terapia Marziale

Postoperative Intravenous Ferric Carboxymaltose Reduces Transfusion Amounts after Orthopedic Hip Surgery

Table 2. Postoperative Clinical Outcomes in the Two Study Groups

Variable	Control group	IV-FCM group	*p*-value
Perioperative blood loss (mL)	815 ± 666	915 ± 508	0.143
No. of patients transfused	92 (61)	70 (47)	NA
No. of units transfused (pack)	1.7 ± 2.7	1.0 ± 1.2	0.002*
Length of hospital stay (day)	11.8 ± 10.3	7.6 ± 3.3	0*
Follow-up period (mo)	33.3 ± 23.4	20.7 ± 12.0	0*
Postsurgical complication	6 (3)	7 (4)	NA
Periprosthetic joint infection	1	1	NA
Urinary tract and upper respiratory infections	5	4	NA
Venous thromboembolism	0	2	NA

Values are presented as mean ± standard deviation or number (%).
IV-FCM: intravenous ferric carboxymaltose, NA: not significant.
*p-value < 0.05.

↓ EMOTRASFUSIONI

Postoperative Intravenous Ferric Carboxymaltose Reduces Transfusion Amounts after Orthopedic Hip Surgery

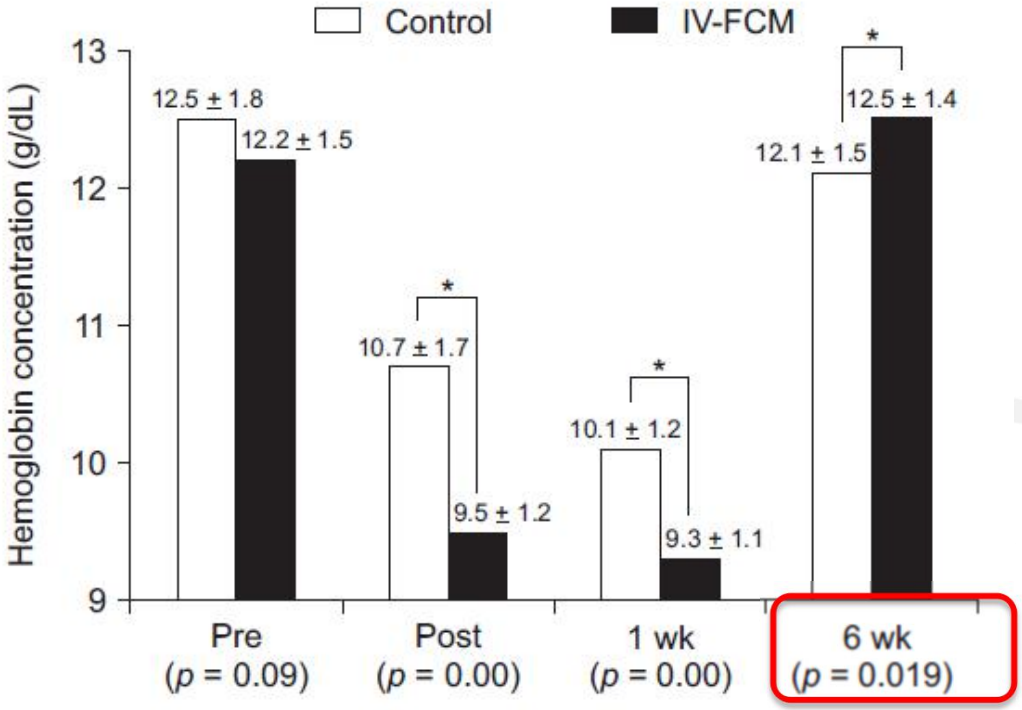

Fig. 1. Graph showing changes in perioperative hemoglobin concentrations in the control and intravenous ferric carboxymaltose (IV-FCM) groups. Values are presented as mean ± standard deviation. Pre: preoperative, Post: immediately after surgery, 1 wk: 1 week after surgery, 6 wk: 6 weeks after surgery. *$p < 0.05$.

Hip fracture & Terapia Marziale

CAPITOLO 4

42,63 euro

187,25 euro

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Hip fracture & Acido Tranexamico

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CAPITOLO 5

Systematic Review and Meta-Analysis

Tranexamic acid reduces blood loss in intertrochanteric fractures
A meta-analysis from randomized co ed trials

Weidong Wang, MB, Jincong Yu, MB*

Medicine® OPEN

BMJ Open

Tranexamic acid in hip fracture patients: a protocol for a randomised, placebo controlled trial on the efficacy of tranexamic acid in reducing blood loss in hip fracture patients

Elizabeth Bishop Ga[illegible] [1] Matthew R Garner,[2] Stephen J Warner,[1] Ashley Levack,[1] And[illegible] [4] Eva Flores,[5] Dean G Lorich[3]

BJCP British Journal of Clinical Pharmacology

Br J Clin Pharmacol (2016) **82** 1458–1470 1458

SYSTEMATIC REVIEW

A systematic review of tranexamic acid in hip fracture surgery

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British Journal of Clinical Pharmacology

Br J Clin Pharmacol (2016) **82** 1458–1470 1458

SYSTEMATIC REVIEW

A systematic review of tranexamic acid in hip fracture surgery

Study or Subgroup	TXA Events	TXA Total	Control Events	Control Total	Weight	Risk Difference M-H, Random, 95% CI
Emara 2014	6	20	1	20	3.3%	0.25 [0.03, 0.47]
Lee 2015	1	84	4	187	25.9%	-0.01 [-0.04, 0.02]
Mohib 2015	0	50	0	50	24.2%	0.00 [-0.04, 0.04]
Tengberg 2016	0	33	2	39	13.7%	-0.05 [-0.14, 0.03]
Vijay 2013	0	45	0	45	23.2%	0.00 [-0.04, 0.04]
Zufferey 2010	9	57	3	53	9.7%	0.10 [-0.01, 0.21]
Total (95% CI)		**289**		**394**	**100.0%**	**0.01 [-0.03, 0.05]**
Total events	16		10			

Heterogeneity: Tau² = 0.00; Chi² = 15.81, df = 5 (P = 0.007); I² = 68%

Test for overall effect: Z = 0.39 (P = 0.69)

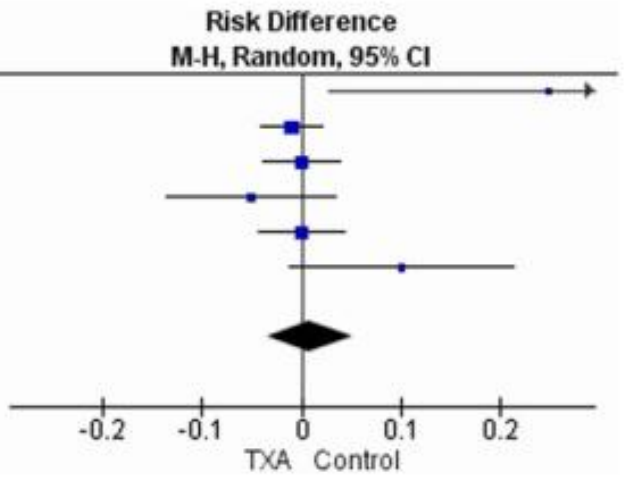

Figure 5

Forest-plot of TXA versus control for thromboembolic events

Hip fracture & Acido Tranexamico

Medicine®

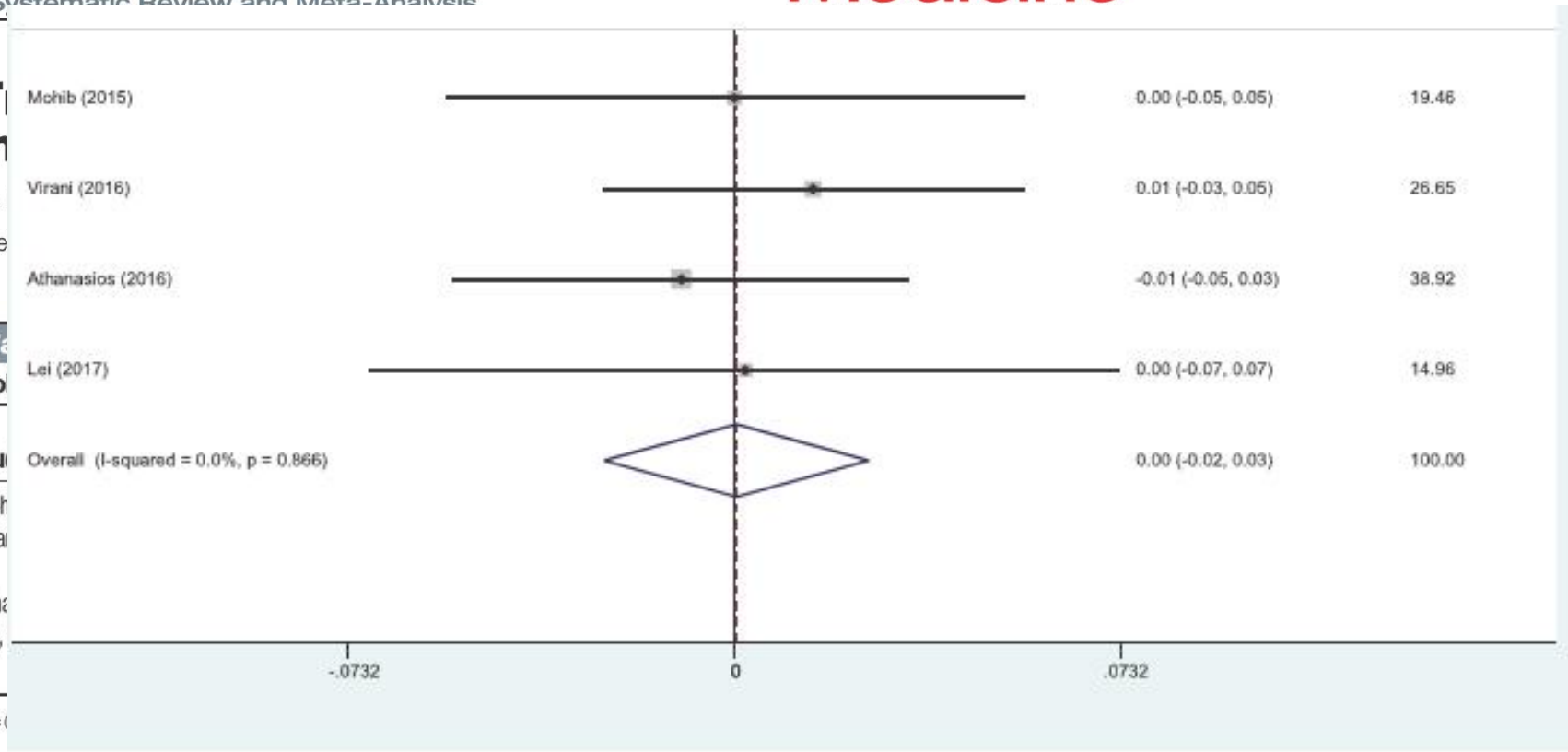

Figure 7. Forest plot diagram showing effect of TXA on the risk of PE.

Figure 4. Forest plot diagram showing effect of TXA on reducing transfusion rate.

Figure 3. Forest plot diagram showing effect of TXA on reducing hemoglobin decline.

Figure 2. Forest plot diagram showing effect of TXA on reducing total blood loss.

Hip fracture & Acido Tranexamico

Lei *et al. Journal of Orthopaedic Surgery and Research* (2017) 12:124
DOI 10.1186/s13018-017-0625-9

Journal of Orthopaedic Surgery and Research

RESEARCH ARTICLE Open Access

Tranexamic acid reduces hidden blood loss in the treatment of intertrochanteric fractures with PFNA: a single-center randomized controlled trial

Table 2 Comparison of postoperative clinical outcomes between the TXA group and NS group

Variables	TXA study group (n = 37)	NS study group (n = 40)	P value
Surgical blood loss (mL)	128.85 ± 123.18	98.30 ± 59.10	0.31
Postoperative day 2 drainage. (mL)	89.50 ± 44.77	89.73 ± 33.30	0.98*
Hemoglobin preop. (g/L)	109.50 ± 15.07	112.15 ± 13.31	0.51*
Hemoglobin postop. day 1 (g/L)	102.70 ± 13.18	115.27 ± 60.93	0.37*
Hemoglobin postop. day 3 (g/L)	101.05 ± 11.91	100.30 ± 12.54	0.83*
Hematocrit preop. (%)	32.63 ± 4.28	33.79 ± 3.83	0.31*
Hematocrit postop. day 1 (%)	30.53 ± 3.81	31.15 ± 3.80	0.56*
Hematocrit postop. day 3(%)	30.23 ± 3.23	29.34 ± 5.87	0.54
Estimated visible RBC loss day 3 (mL)	69.26 ± 44.77	58.55 ± 22.10	0.33*
Transfusion rate (%)	11/39 (28.20%)	23/41 (56.09%)	0.01†
Transfusion units (U)	24	56	
Estimated total RBC loss day 3 (mL)	279.35 ± 209.11	417.89 ± 289.56	0.049*
Estimated hidden RBC loss day 3 (mL)	210.09 ± 202.14	359.35 ± 290.12	0.049*

*Two-sided Student's *t* test; †chi-squared test; *TXA* tranexamic acid, *NS* normal-saline

TAKE HOME MESSAGE

- L'ANEMIA NELLA HIP FRACTURE E' PIU' FREQUENTE E PIU' GRAVE DI QUANTO IMMAGINIAMO
- MONITORIZZA I VALORI DELLA Hb NEL PRE- E POST OPERATORIO

"Well, there don't seem to be any broken bones. ... Ha! I've always wanted to say that."

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Grazie