CORSO HEMS 2016 VENETO

Gestione dell'ipovolemia nel trauma in ambiente estremo

Dott. Giuseppe Misuraca

Dott. Libero Mileti

Le dimensioni del Problema

Il Trauma è una delle principali cause di morte tra i 5 e i 44 anni

Il Sanguinamento non controllato è la principale causa di morte prevenibile

50% dei decessi avviene sul luogo dell' incidente

30% nelle prime 24 ore

20% durante il ricovero in ospedale

Emorragia Massiva

60% Emorragia degli arti

Danno d'organo

Alterazione Coagulazione

Il Problema

Il Problema

Il Problema

Il Problema

Il Problema


TACTICAL COMBAT CASUALTY CARE
PREHOSPITAL TRAUMA LIFE SUPPORT

Premesse Fisiopatologiche

"STOP BLEEDING CAMPAIGN"

- linee guida pubblicate per la prima volta nel 2007, aggiornate nel 2010 e successivamente nel 2013, che hanno l'obiettivo di ***ridurre le perdite***, *ripristinare la perfusione tissutale e garantire la stabilità emodinamica*, con la finalità di ridurre la morbilità e la mortalità associate all'emorragia post-traumatica.

Management of bleeding and coagulopathy following major trauma: an updated European guideline. Critical Care 2013, 17:R76

Premesse Fisiopatologiche

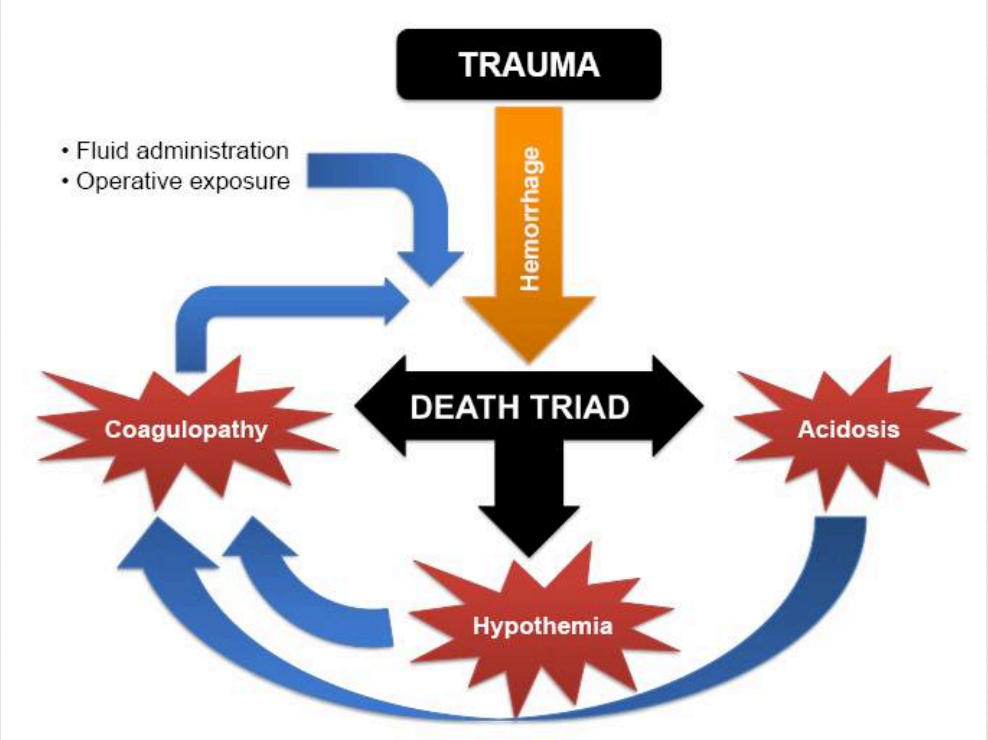
Spahn et al. Critical Care 2013, 17:R076
http://ccforum.com/content/17/2/R076

CRITICAL CARE

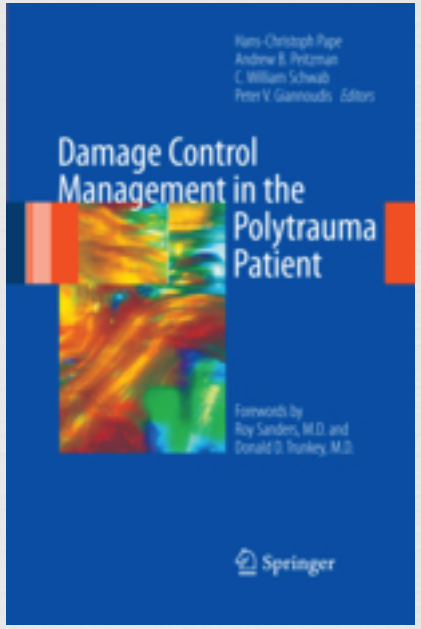
RESEARCH Open Access

Management of bleeding and coagulopathy following major trauma: an updated European guideline

Donat R Spahn[1], Bertil Bouillon[2], Vladimir Cerny[3,4], Timothy J Coats[5], Jacques Duranteau[6], Enrique Fernández-Mondéjar[7], Daniela Filipescu[8], Beverley J Hunt[9], Radko Komadina[10], Giuseppe Nardi[11], Edmund Neugebauer[12], Yves Ozier[13], Louis Riddez[14], Arthur Schultz[15], Jean-Louis Vincent[16] and Rolf Rossaint[17]*



TIC



Premesse Fisiopatologiche

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HOAJ
Herbert Open Access Journals

Original Open Access

Prevention and treatment of trauma induced coagulopathy (TIC). An intended protocol from the Italian trauma update research group

Giuseppe Nardi[1*], Vanessa Agostini[2], Beatrice Rondinelli Maria[3], Grazia Bocci[4], Stefano Di Bartolomeo[5], Giovanni Bini[6], Osvaldo Chiara[7], Emiliano Cingolani[1], Elvio De Blasio[8], Giovanni Gordini[9], Carlo Coniglio[9], Concetta Pellegrin[8], Luigi Targa[10] and Annalisa Volpi[10]

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[4]Department of Intensive Care, Catholic University, Roma, Italy.
[5]Department of Anesthesia and Intensive Care, Hospital and University, Udine, Regional Health Agency Emilia-Romagna, Italy.
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[10]Department of Anesthesia and Intensive Care, Maggiore Hospital, Parma, Italy.

Abstract

In recent years, a strong focus has been put on the need to assure early coagulation support in order to prevent and treat coagulopathy in patients with severe trauma, and to improve survival. Aggressive plasma administration with high plasma/red blood cells ratio is increasingly used worldwide. However, plasma transfusion is associated with increased risks of multiple organ dysfunction syndrome (MODS), adult respiratory distress syndrome (ARDS) and infection, which may prolong hospital stay and the need for artificial ventilation. Moreover, in the majority of European hospitals plasma cannot be immediately available and therefore it has been reported a significant delay in coagulation support. This has lead to the proposal of using clotting factors as an alternative to plasma. However, strong evidence to define the best strategy is still missing, and the only published protocols are Institution-specific, thus depending on the local organization and the available resources. The Italian Trauma Centers Network (TUN) recently developed a treatment protocol aiming at shortening the interval before the onset of coagulation support and at reducing the use of plasma. We present this protocol-Early Coagulation Support (ECS) Protocol - and discuss its rationale. Its implications for the trauma-team workflow and hospital organization are also addressed. The ECS protocol must be considered as an integrated part of a comprehensive Damage Control Strategy. The impact of the ECS Protocol on blood products consumption, trauma mortality and morbidity as well as its financial aspects, will be strictly monitored by the TUN hospitals.

Keywords: Trauma, coagulopathy, transfusion, plasma, clotting factors, protocol, multicenter

Background

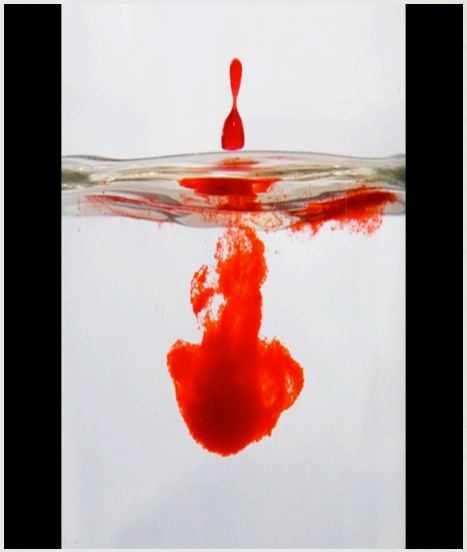
Haemorrhage is the principal cause of death in the first few hours following severe injury. Coagulopathy is a frequent complication of haemorrhage and may occur in up to 25% of patients, even before hospital admission [1]. In recent years, international guidelines [2] that aim at preventing and treating trauma-induced coagulopathy (TIC), have been developed. However, due to the heterogeneous availability of haemocomponents and clotting factors in different countries and to the lack of sound data in the literature, there is not a widely agreed clinical strategy yet. Moreover, due to the aging population in western countries, elderly people with cardiovascular comorbidities and on antiplatelets agents or oral anticoagulants are increasingly represented. Therefore, a comprehensive protocol to treat the bleeding patients should also include strategies to quickly reverse the effect of these drugs.

Any strategy should rapidly tackle acute traumatic coagulopathy through the early replacement of clotting factors. Haemostasis is critically dependent on fibrinogen as a substrate for clot formation. Fibrinogen is the single factor which is more and earlier affected in case of TIC. Many bleeding trauma patients with TIC present with a depletion of fibrinogen below levels currently recommended for therapeutic supplementation [2]. In a recent study, hypotension, increasing shock severity (as measured by the base deficit) and high degree of injury (ISS ≥25), were all associated with a reduction in fibrinogen levels [3]. Fibrinogen depletion is associated with poor outcomes and survival improves with the amounts of fibrinogen administered [4]. Plasma has traditionally been used as a source of fibrinogen. However, until few years ago plasma transfusion was not recommended in absence of a prolongation of PT or INR or fibrinogen decrease to less than 1.5 gr/L. More recently, retrospective evidence from both military [5] and civilian [6] practice suggested improved outcomes in patients with massive bleeding after the adoption of a massive-transfusion protocol (MTP), including the early administration of high-dose plasma therapy. Although the first reports based on the military experience suggested a 1:1 plasma/packed red

Reduced Fibrinogen Utilization

Systemic Anticoagulation

Hyperfibrinolisis



J Trauma. 2008 May;64(5):1211-7; discussion 1217. doi: 10.1097/TA.0b013e318169cd3c.

Acute coagulopathy of trauma: hypoperfusion induces systemic anticoagulation and hyperfibrinolysis.

Brohi K[1], Cohen MJ, Ganter MT, Schultz MJ, Levi M, Mackersie RC, Pittet JF.

BACKGROUND: Coagulopathy is present at admission in 25% of trauma patients, is associated with shock and a 5-fold increase in mortality. The coagulopathy has recently been associated with systemic activation of the protein C pathway. This study was designed to characterize the thrombotic, coagulant and fibrinolytic derangements of trauma-induced shock.

Management

Crit Care. 2013 Apr 19;17(2):R76. doi: 10.1186/cc12685.

Management of bleeding and coagulopathy following major trauma: an updated European guideline.

Spahn DR, Bouillon B, Cerny V, Coats TJ, Duranteau J, Fernández-Mondéjar E, Filipescu D, Hunt BJ, Komadina R, Nardi G, Neugebauer E, Ozier Y, Riddez L, Schultz A, Vincent JL, Rossaint R.

Recommendation 1 **We recommend that the time elapsed between injury and operation be minimised for patients in need of urgent surgical bleeding control. (Grade 1A)**

Recommendation 2 **We recommend adjunct tourniquet use to stop life-threatening bleeding from open extremity injuries in the pre-surgical setting. (Grade 1B)**

Recommendation 3 **We recommend initial normoventilation of trauma patients if there are no signs of imminent cerebral herniation. (Grade 1C)**

Recommendation 4 **We recommend that the physician clinically assess the extent of traumatic hemorrhage using a combination of patient physiology, anatomical injury pattern, mechanism of injury and the patient's response to initial resuscitation. (Grade 1C)**

Recommendation 5 **We recommend that patients presenting with haemorrhagic shock and an identified source of bleeding undergo an immediate bleeding control procedure unless initial resuscitation measures are successful. (Grade 1B)**

Recommendation 6 **We recommend that patients presenting with haemorrhagic shock and an unidentified source of bleeding undergo immediate further investigation. (Grade 1B)**

Management

Recommendation 13 **We recommend a target systolic blood pressure of 80 to 90 mmHg until major bleeding has been stopped in the initial phase following trauma without brain injury. (Grade 1C)**

Recommendation 14 **We recommend that fluid therapy be initiated in the hypotensive bleeding trauma patient. (Grade 1A)**

Recommendation 15 **We suggest administration of vasopressors to maintain target arterial pressure in the absence of a response to fluid therapy. (Grade 2C)**

We suggest infusion of an inotropic agent in the presence of myocardial dysfunction. (Grade 2C)

Temperature management

Recommendation 16 **We recommend early application of measures to reduce heat loss and warm the hypothermic patient in order to achieve and maintain normothermia. (Grade 1C)**

Coagulation support

Recommendation 24 **We recommend that tranexamic acid be administered as early as possible to the trauma patient who is bleeding or at risk of significant hemorrhage at a loading dose of 1 g infused over 10 minutes, followed by an intravenous infusion of 1 g over 8 h. (Grade 1A)**

Pelvic ring closure and stabilisation

Recommendation 19 **We recommend that patients with pelvic ring disruption in haemorrhagic shock undergo immediate pelvic ring closure and stabilisation. (Grade 1B)**

CONCLUSIONS: A comprehensive, multidisciplinary approach to trauma care and mechanisms with which to ensure that established protocols are consistently implemented will ensure a uniform and high standard of care across Europe and beyond.

Management

Shock
Controllato - Controllabile

Shock
Incontrollato

Scoop & Run

Stay & Play

Load, Go & Play

	Class I	Class II	Class III	Class IV
Blood Loss	< 750	750-1500	1500-2000	> 2000
% Blood Vol.	< 15%	15 – 30%	30 – 40%	> 40%
Pulse	< 100	**> 100**	> 120	> 140
Blood Pressure	Normal	Normal	**Decreased**	**Decreased**
Pulse Pressure	Normal	**Decreased**	**Decreased**	**Decreased**
Resp. Rate	14 – 20	**20 – 30**	**30 – 40**	**> 40**
UOP	> 30	**20 – 30**	**5 – 15**	**negligible**
Mental Status	sl. Anxious	mildly anx	**confused**	**lethargic**
Fluid	crystalloid	crystalloid	**blood**	**blood**

Emostasi Meccanica

BENDAGGIO COMPRESSIVO: da utilizzare su tutti i siti emorragici comprimibili, previo lavaggio con soluzione fisiologica della ferita. Il bendaggio non deve essere rimosso fino all' arrivo al Trauma Center.

CAT (Combat Application Tourniquet): è considerato un presidio salvavita, è raccomandato nelle emorragie pericolose per la vita nelle lesioni aperte degli arti

E' stato eliminato il tempo massimo di 1H va comunque rimosso il prima possibile

INDICARE SEMPRE L'ORARIO DI POSIZIONAMENTO

J R Army Med Corps. 2014 Nov 11. pii: jramc-2014-000339. doi: 10.1136/jramc-2014-000339. [Epub ahead of print]

An evaluation of combat application tourniquets on training military personnel: changes in application times and success rates in three successive phases.

Unlu A[1], Kaya E[2], Guvenc I[3], Kaymak S[1], Cetinkaya RA[4], Lapsekili EO[1], Ozer MT[1], Guler A[2], Yildiz R[1], Petrone P[5], Harlak A[1], Kilic S[6].

Emostasi Chimica

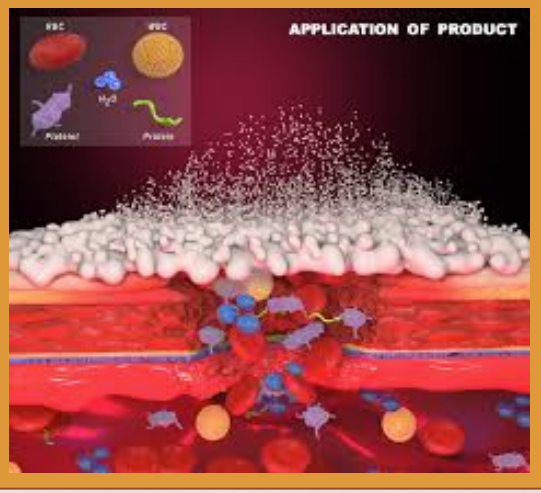
J Thromb Haemost. 2015 Jun;13(6):978-88. doi: 10.1111/jth.12919. Epub 2015 May 9.

Early hemostatic responses to trauma identified with hierarchical clustering analysis.

White NJ[1], Contaifer D Jr[2], Martin EJ[2], Newton JC[2], Mohammed BM[2,3], Bostic JL[2], Brophy GM[4], Spiess BD[5], Pusateri AE[6], Ward KR[7], Brophy DF[2].

Author information

- Capacità di fermare emorragie di grandi arterie e vene entro 2 min.
- Utilizzabili durante l'emorragia
- Pronta all'uso, che non richieda una miscelazione del preparato
- Sia di semplice applicazione sia da operatori che per autosoccorso
- Di durata minimo di 2 anni
- Capacità di resistenza a temperature avverse (idealmente 10-55 °C)
- Senza rischi di reazioni avverse, non lesiva e poco costosa



Fluid Therapy

The NEW ENGLAND JOURNAL of MEDICINE

REVIEW ARTICLE

CRITICAL CARE MEDICINE

Simon R. Finfer, M.D., and Jean-Louis Vincent, M.D., Ph.D., *Editors*

Resuscitation Fluids

John A. Myburgh, M.B., B.Ch., Ph.D., and Michael G. Mythen, M.D., M.B., B.S.

- Espandere lo spazio intravascolare e richiamare liquidi dallo spazio extravascolare
- Migliorare gli scambi gassosi
- Ripristino Gittata Cardiaca per ripristino DO2
- Migliorare il Preload Cardiaco e quindi l'Afterload
- Migliorare perfusione periferica riducendo sofferenza tissutale e quindi l'acidosi
- In caso di Plasma rifornisce di fattori importanti
- In caso di Emazie, migliora il trasporto di O2

THE IDEAL RESUSCITATION FLUID

- Determinare espansione volemica plasmatica prevedibile e riproducibile
- Composizione dei fluidi molto simile a quella dei fluidi extracellulari
- Completamente metabolizzato
- No fenomeni avversi
- Rapporto Costo-Efficacia favorevole
- No alterazioni coagulative

Fluid Therapy

TABLE 27-5 Plasma Expansion, Duration of Action, and Main Side Effects of Plasma Expanders

Products	Plasma Expansion (%)	Duration of Action (h)	Allergy	Coagulation
Crystalloids	25	Short	0	Neutral
Gelatins	80–100	3	+++	Neutral
HES 200 (6%)				
MSR 0.6	>100	12–24	+	Neutral if
MSR 0.5	>100	4–8	+	<30 mL/kg
Dextrans				
40 (10%)	180–200	3	++	Platelet adhesivity
40 (3.5%)	100	4	—	Fibrinolysis
Albumin	90	6–8	+	Neutral

ABBREVIATIONS: HES, hydroxyethyl starch; MSR, molar substitution rate.

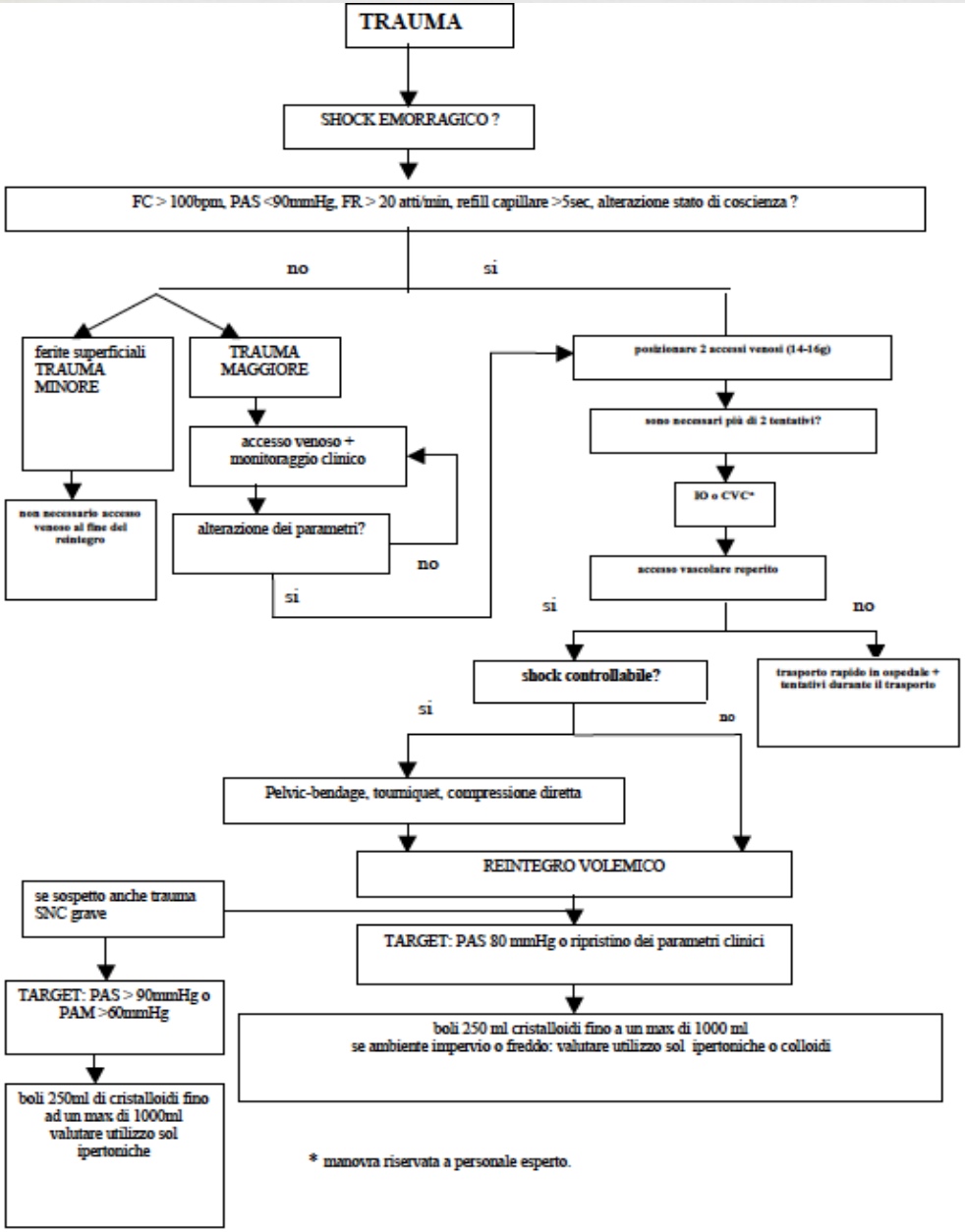
JAMA. 2013 Nov 6;310(17):1809-17. doi: 10.1001/jama.2013.280502.

Effects of fluid resuscitation with colloids vs crystalloids on mortality in critically ill patients presenting with hypovolemic shock: the CRISTAL randomized trial.

Annane D[1], Siami S, Jaber S, Martin C, Elatrous S, Declère AD, Preiser JC, Outin H, Troché G, Charpentier C, Trouillet JL, Kimmoun A, Forceville X, Darmon M, Lesur O, Reignier J, Abroug F, Berger P, Clec'h C, Cousson J, Thibault L, Chevret S; CRISTAL Investigators.

CONCLUSIONS AND RELEVANCE: Among ICU patients with hypovolemia, the use of colloids vs crystalloids did not result in a significant difference in 28-day mortality. Although 90-day mortality was lower among patients receiving colloids, this finding should be considered exploratory and requires further study before reaching conclusions about efficacy.

Fluid Therapy



HEMS ASSOCIATION

Il trattamento infusivo sul territorio

- Nessuna superiorità tra i vari cristalloidi e colloidi
- La scelta subisce l'influenza delle preferenze individuali
- Appena possibile effettuare il rimpiazzo volemico con emoderivati
- Migliore infusione a boli rispetto all'infusione continua
- Trauma penetrante "Delayed Fluid Resuscitation"
- Accesso venoso periferico (14-16 G)
- CVC o intraosseo (40ml/min)

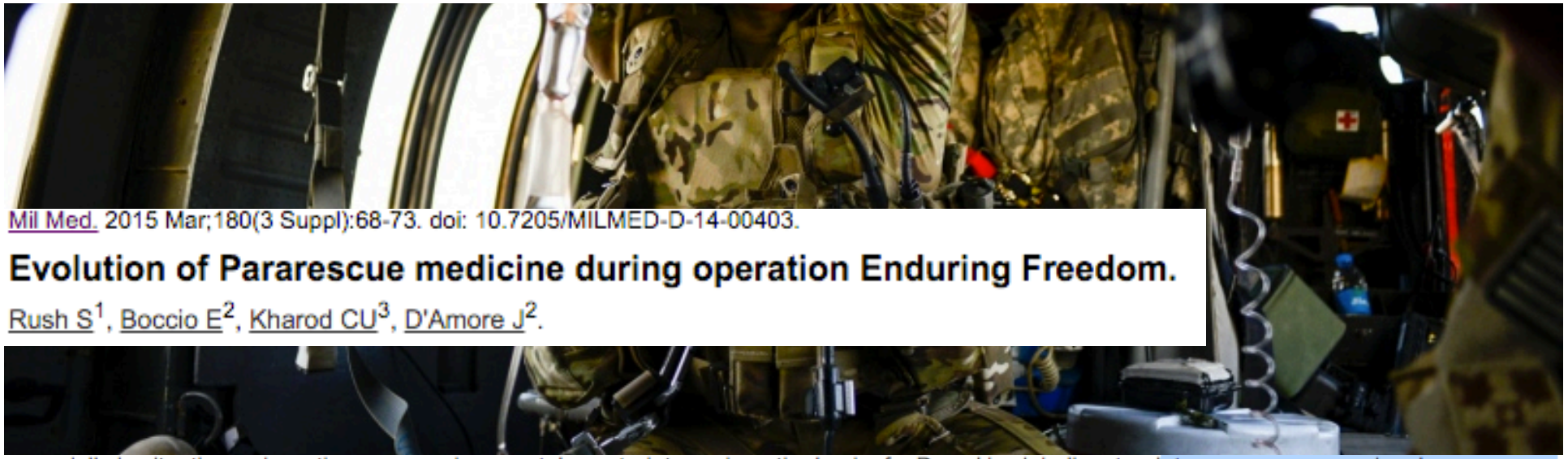
Fluid Therapy

Air Med J. 1998 Jul-Sep;17(3):105-8.

Blood usage in rotor-wing transport.

Berns KS[1], Zietlow SP.

CONCLUSIONS: Selected RW patients will benefit from in-flight blood transfusions. Proximity of blood storage to the helicopter is mandatory to avoid delays in transport. A close working relationship with blood bank personnel ensures ready availability of current O-negative blood.



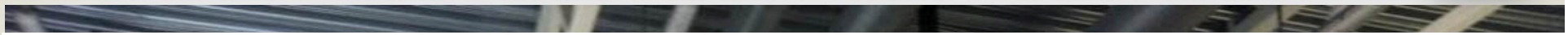
Mil Med. 2015 Mar;180(3 Suppl):68-73. doi: 10.7205/MILMED-D-14-00403.

Evolution of Pararescue medicine during operation Enduring Freedom.

Rush S[1], Boccio E[2], Kharod CU[3], D'Amore J[2].

especially in situations where there are environmental constraints such as the back of a Pave Hawk helicopter. Intraosseous access has become popular to treat and control hemorrhagic shock when peripheral intravenous access is impractical or impossible. Revisions to patient treatment cards

Fluid Therapy



J Trauma Acute Care Surg. 2015 Jun;78(6 Suppl 1):S26-30. doi: 10.1097/TA.0000000000000633.

Freeze dried plasma and fresh red blood cells for civilian prehospital hemorrhagic shock resuscitation.

Sunde GA[1], Vikenes B, Strandenes G, Flo KC, Hervig TA, Kristoffersen EK, Heltne JK.

CONCLUSION: Our small study indicates that introduction of FDP into civilian HEMS seems feasible and may be safe and that logistical and safety issues for the implementation of RBCs are solvable. FDP ensures both coagulation factors and volume replacement, has a potentially favorable safety profile, and may be superior to other types of plasma for prehospital use. Further prospective studies are needed to clarify the role of FDP (and RBCs) in civilian prehospital hemorrhagic shock resuscitation and to aid the development of standardized protocols for prehospital use of blood products.

Prehosp Emerg Care. 2015 January-March;19(1):1-9. Epub 2014 Jun 16.

Prehospital Transfusion of Plasma and Red Blood Cells in Trauma Patients.

Holcomb JB, Donathan DP, Cotton BA, Del Junco DJ, Brown G, Wenckstern TV, Podbielski JM, Camp EA, Hobbs R, Bai Y, Brito M, Hartwell E, Duke JR, Wade CE.

differences in 24-hour (odds ratio 0.57, p = 0.117) or 30-day mortality (odds ratio 0.71, p = 0.441) between LF and OA. Conclusions. Prehospital plasma and RBC transfusion was associated with improved early outcomes, negligible blood products wastage, but not an overall survival advantage. Similar to the data published from the ongoing war, improved early outcomes are associated with placing blood products prehospital, allowing earlier infusion of life-saving products to critically injured patients.

J Am Coll Surg. 2015 May;220(5):797-808. doi: 10.1016/j.jamcollsurg.2015.01.006. Epub 2015 Jan 24.

Pre-trauma center red blood cell transfusion is associated with improved early outcomes in air medical trauma patients.

Brown JB[1], Sperry JL[2], Fombona A[1], Billiar TR[1], Peitzman AB[1], Guyette FX[3].

CONCLUSIONS: Pre-trauma center RBC was associated with an increased probability of 24-hour survival, decreased risk of shock, and lower 24-hour RBC requirement. Pre-trauma center RBC appears beneficial in severely injured air medical trauma patients and prospective study is warranted as PTC RBC transfusion becomes more readily available.

Coagulation Support

Studio che ha coinvolto complessivamente 20211 pazienti evidenziando (Lancet 2010) :

- **ac. Tranexamico** (TXA) riduce la mortalità connessa col sanguinamento del 15% (RR=0.85, 95% CI 0.76 to 0.96; P=0.0077).
- Infusione precoce (≤ 3 ore) è più efficace che l'uso ritardato (>3 ore).
- Non ci sono evidenze che il TXA aumenti il rischio di eventi trombotici o il n.° d'interventi chirurgici.
- Non ha mostrato particolare correlazione sul n.° di trasfusioni necessarie rispetto al controllo con placebo.

Quando?	Dose	Diluizione/velocità
Carico (<3h...)	1g (2fl)	100ml/10min
Mantenimento (entro 8h)	1g (2fl)	1g → 8h

.....Immediate further investigation

La Focused Assessment with Sonography for Trauma rappresenta storicamente la più nota applicazione dell'Emergency Ultrasound (EU), di cui si propone come una sorta di "manifesto" che sintetizza efficacemente il modello di indagine:

- *focalizzata*
- *rapida*
- *ad elevato impatto gestionale*

Recommendation 6 **We recommend that patients presenting with haemorrhagic shock and an unidentified source of bleeding undergo immediate further investigation. (Grade 1B)**

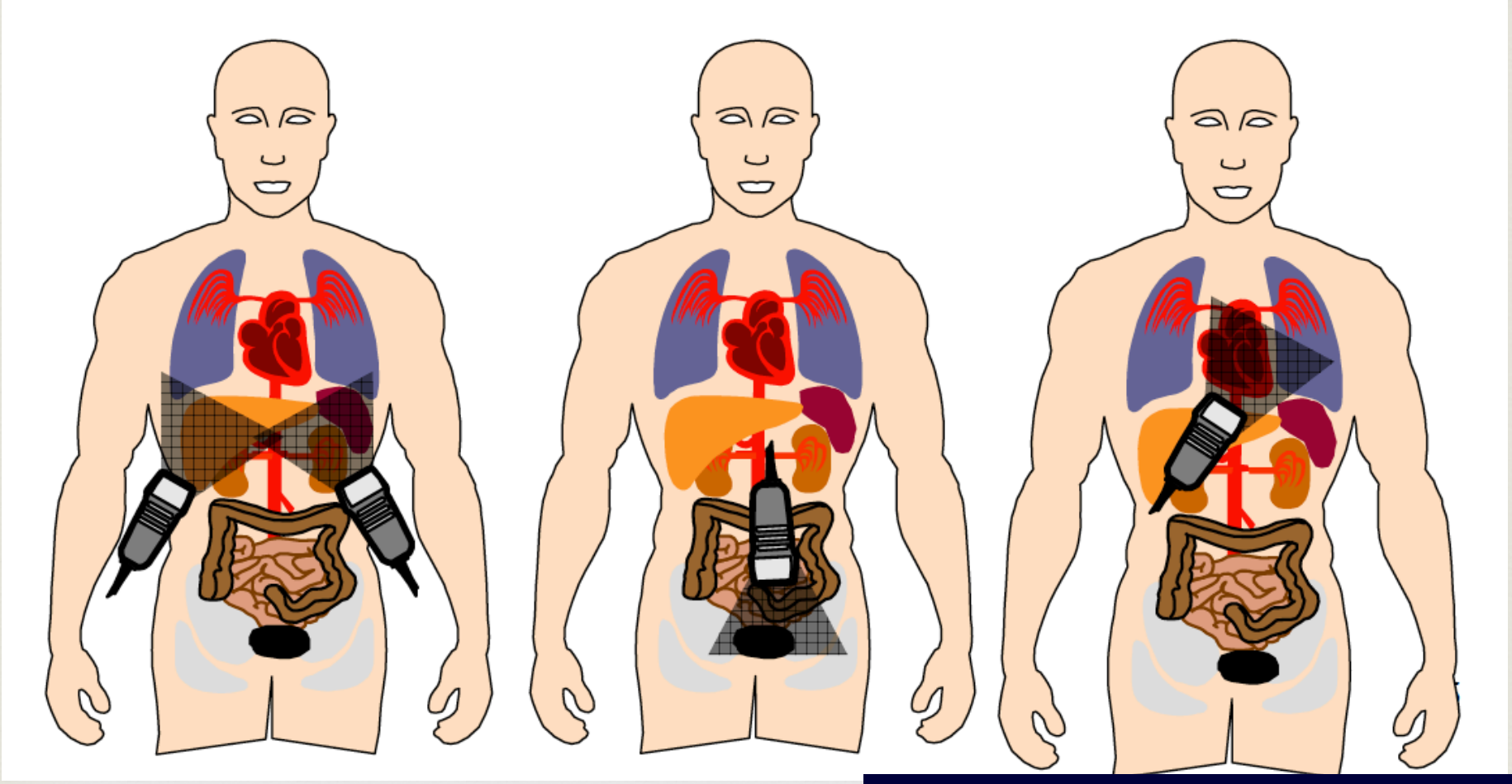
.....Immediate further investigation

C'è liquido libero intraperitoneale ?

C'è versamento pleurico o intratoracico ?

C'è versamento pericardico ?

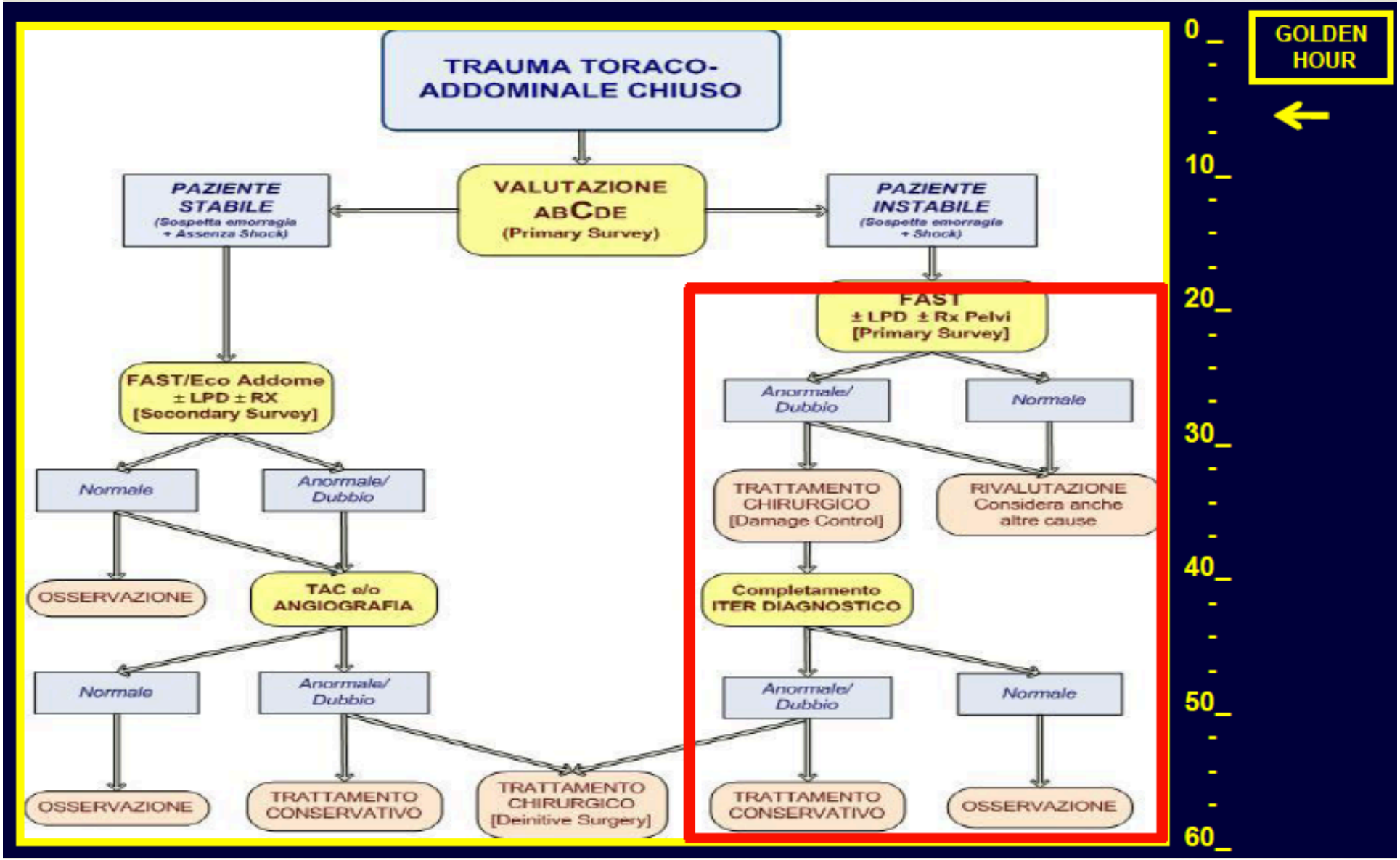
.....Immediate further investigation



TECNICA A 4 PUNTI

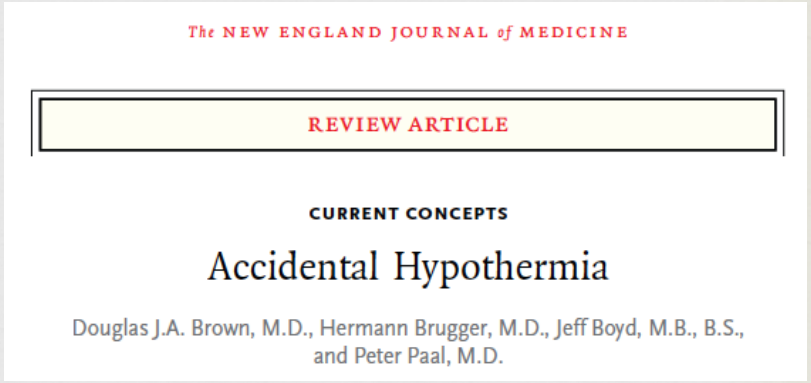
Rothlin, 1993
Ambacher,, 2000

.....Immediate further investigation



Temperature Management

- Aumento della Morbilità e Mortalità
- Coagulopatia
- Alterazioni emodinamiche, cognitive, arresto cardiaco
- Si instaura più precocemente nei pazienti con lesioni cerebro-spinali
- I pazienti vittime di trauma disperdono temperatura sul luogo dell'evento, durante il trasporto e nel dipartimento di emergenza


The NEW ENGLAND JOURNAL of MEDICINE

REVIEW ARTICLE

CURRENT CONCEPTS

Accidental Hypothermia

Douglas J.A. Brown, M.D., Hermann Brugger, M.D., Jeff Boyd, M.B., B.S., and Peter Paal, M.D.

Temperature Management

- Sistemi di isolamento termico
- Attrezzature per il riscaldamento attivo
- Protocolli per l'isolamento termico
- Termometri per pazienti ipotermici
- Sistemi per preriscaldare i Fluidi

Lundgren *et al. Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine* 2011, **19**:59
http://www.sjtrem.com/content/19/1/59

SCANDINAVIAN JOURNAL OF trauma, resuscitation & emergency medicine

ORIGINAL RESEARCH **Open Access**

The effect of active warming in prehospital trauma care during road and air ambulance transportation - a clinical randomized trial

Peter Lundgren*, Otto Henriksson, Peter Naredi and Ulf Björnstig

Pelvic Ring closure e Stabilisation

JEMS The Conscience of EMS JEMS JOURNAL OF EMERGENCY MEDICAL SERVICES

HOME >> CRITICAL MANAGEMENT OF DEADLY PELVIC INJURIES

Critical Management of Deadly Pelvic Injuries

Tue, Dec 2, 2014 | By Ryan Gerecht, MD, CMTE , Ashley Larrimore, MD , Michael Steuerwald, MD

9% dei pazienti traumatizzati
45% di mortalità nelle fratture open book
Spesso associate a lesioni di altri distretti

Le fratture pelviche si riscontrano prevalentemente nei soggetti giovani tra i 15 e i 28 anni

Le fratture pelviche si riscontrano prevalentemente nei soggetti giovani tra i 15 e i 28 anni

Fratture instabili con Shock ipovolemico gravate da elevata mortalità

Volume pelvi può diventare 3-6 Lt per diastasi di 3-6 cm della sinfisi pubica

Pelvic Ring closure e Stabilisation

Applicazione precoce compressori circonferenziali:

- **Riduce il volume**
- **Riduce il sanguinamento**
- **Riduce necessità di emotrasfusione**
- **Mortalità ?**

Allineamento Pelvico

"L'applicazione precoce di presidi di compressione meccanica esterni nei pazienti con frattura del bacino, riduce l'emorragia associata al trauma al bacino" Grado 2A

ELSEVIER

American Journal of Emergency Medicine

journal homepage: www.elsevier.com/locate/ajem

Original Contribution

Pelvic circumferential compression devices benefit patients with pelvic fractures who need transfers

Chih-Yuan Fu, MD [1], Yu-Tung Wu, MD [1], Chien-Hung Liao, MD *, Shih-Ching Kang, MD, Shang-Yu Wang, MD, Yu-Pao Hsu, MD, Being-Chuan Lin, MD, Kuo-Ching Yuan, MD, I-Ming Kuo, MD, Chun-Hsiang Ouyang, MD

Department of Trauma and Emergency Surgery, Chang Gung Memorial Hospital, Chang Gung University, Taoyuan, Taiwan

Monitoraggi

Risk Score for Transport Patients (modificata per il solo paziente adulto) [23]

Per il RSTP il cut-off che identifica meglio il paziente critico e sembra in grado di meglio predire quali pazienti possano essere suscettibili di complicanze durante il trasporto è RSTP ≥ 7

Condizioni	Score
1.**Emodinamica**	
-Stabile	0
-Moderatamente stabile (volume <15 ml/min)	1
-Instabile (volume >15 ml/min o inotropi/sangue)	2
2.**Aritmie**	
-No	0
-Si, non grave (e IMA >48 h)	1
-Grave (e IMA prime 48 h)	2
3.**Monitoraggio ECG**	
-No	0
-Si (desiderabile)	1
-Si (essenziale)	2
4.**Linea venosa**	
-No	0
-Si	1
-Catetere in arteria polmonare	2
5.**Pace-maker temporaneo**	
-No	0
-Si (esterno) IMA prime 48 h	1
-Si (endocavitario)	2
6.**Respirazione**	
-FR 10-14/min	0
-FR 15-35/min	1
-FR <10 o >36 o dispnea	2
7.**Vie aeree**	
-No	0
-Cann.Guedel	1
-Intubazione/tracheostomia	2
8.**Terapia respiratoria**	
-No	0
-Si (O2 terapia)	1
-Si (ventilazione assistita)	2
9.**Valutazione Neuro**	
-GCS=15	0
-GCS=8-14	1
-GCS= <8 e/o disf.neurologica	2
10.**Supporto tecno-farmacologico**	
-Nessuno	0
-Gruppo I *	1
-Gruppo II	2

Monitoraggi

Defibrillatore con monitor multiparametrico

Monitor ECG
Saturimetria
Pressione Arteriosa non invasiva
EtCO2
Temperatura

Sistema portatile di mantenimento temperatura/riscaldamento infusioni

Kit Infusione Intraossea

Ventilatore Polmonare

Ecografo portatile

Coperta autoriscaldante

Termometro portatile

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