



CONGRESSO
NAZIONALE
IRC 2  22

TRAUMA: NUOVE EVIDENZE E PERCORSI

AUDITORIUM DELLA TECNICA • ROMA • 14-15 OTTOBRE



Italian
Resuscitation
Council

ADVANCED LIFE SUPPORT:

L'EMORRAGIA IN EXTRAOSPEDALIERO

Carlo Coniglio

Dipartimento Emergenza AUSL Bologna – Ospedale Maggiore –

118 -HEMS



Italian
Resuscitation
Council

Time is Blood?

- 25% Traumi maggiori = Emorragia + Coagulopatia
- 50% Mortalità

Damage Control Resuscitation

- ***Stop The Bleeding***
- **Limited Fluid Resuscitation & Hypotensive Resus**
- **“Haemostatic” Resus (Acute Traumatic Coagulopathy management)**
- **Damage Control Surgery**
- **Damage Control Intervention**
- ...



(Remote) Damage Control Resuscitation... Start from PreH

- **Stop The Bleeding...or Temporize it!**
- **Limited Fluid Resuscitation & Hypotensive Resus**
- **“Haemostatic” Resus (Acute Traumatic Coagulopathy management)**
- **Prevent Hypothermia**
- ~~**Damage Control Surgery**~~
- ~~**Damage Control Intervention**~~
- **Time is Blood! Scoop & Run to the Right Hospital!**



Paradigm Shift

- C prima di ABC

Stop the Bleeding!!!
***CmH** - ABCDE**

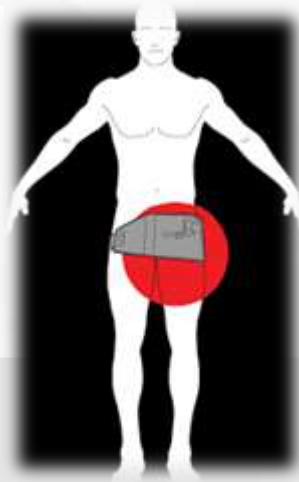


*Control of Massive Hemorrhage

Stop The Bleeding: Emostasi PreH Temporanea

Emorragia esterna

Compressione diretta



Tourniquet



Arti



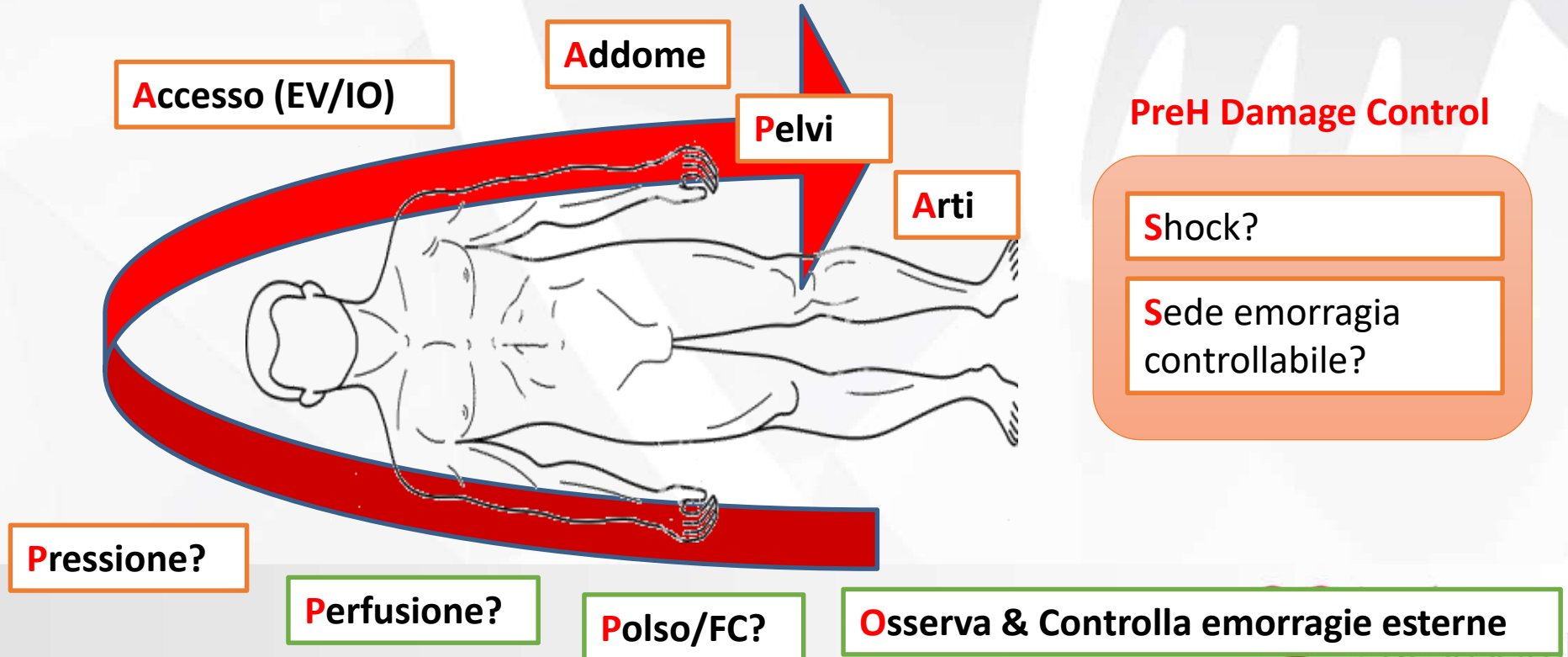
Medicazioni Emostatiche

Sedi "giunzionali"



Emostatici topici: bende, polveri, ecc.

C... Chi?



Identificare lo Shock

Classi di Emorragia				
	I	II	III	IV
Perdita ematica presunta - % (ml)	<15% (<750)	15-30% (750-1500)	31-40% (1500-2000)	>40% (>2000)
Freq. Cardiaca (bpm)	<100	100-120	120-140	>140
Pressione (mmHg)	normale	Ridotta +	Ridotta ++	Ridotta +++
Freq. Resp. (atti/min)	14-20	20-30	30-40	>35
Diuresi (ml/h)	>30	20-30	5-15	-
GCS	Normale	Ansia	Ridotto	Ridotto
Deficit d Basi (mEq/l)	0 - 2	tra -2 e -6	tra -6 e -10	< -10
Necessità di trasfusione	-	Possibile	Si	Trasfusione Massiva



PAS < 90 mmHg*
 o
Shock Index (FC/PAS)
> 0.9



Shock!

* Negli anziani >65aa considerare PAS <110 mmHg; Nei bambini tra 0-10 anni il limite è PAS < (70 mmHg + età in anni x2)

Massive Transfusion (MT) ? =

- ≥10 units of red cells in 24 h after injury or
- ≥3 units in the first hour after injury

ABC SCORE

SCORE < 2 SUGGESTS UNLIKELY NEED FOR MASSIVE TRANSFUSION

SBP ≤ 90 +1

HR ≥ 120 +1

+ FAST +1

PENETRATING TORSO INJURY +1

TASH SCORE
TRAUMA ASSOCIATED SEVERE HEMORRHAGE

score < 9
need for MT < 5%

score > 24
need for MT > 85%

Gender
male (+1)

Blood Pressure
SBP < 100 (+4) < 120 (+1)

Hemoglobin
< 7 (+8) < 9 (+6) < 10 (+4) < 11 (+3) < 12 (+2)

Pulse
> 120 (+2)

Base Excess
< -10 (+4) < -6 (+3) < -2 (+1)

FAST
+3 if positive

Unstable Pelvic fx
+6 if present

Open or dislocated femur fx
+3 if present

RESEARCH

Open Access

Early identification of bleeding in trauma patients: external validation of traumatic bleeding scores in the Swiss Trauma Registry

Alan Costa^{1*}, Pierre-Nicolas Carron¹, Tobias Zingg^{2,4}, Ian Roberts³, François-Xavier Ageron¹ for the Swiss Trauma Registry⁴

Costa et al. *Critical Care* (2022)

Table 1 BATT score

Age	≥ 65 years old	+ 1
	≥ 75 years old	+ 2
Systolic Blood Pressure	< 60 mmHg	+ 14
	≥ 60 and < 100 mmHg	+ 5
Glasgow Coma Scale	≤ 8	+ 4
	> 8 and ≤ 12	+ 3
Respiratory rate	< 10 or ≥ 30/min	+ 2
	Alt: Oxygen saturation < 90	+ 2
Heart rate	> 100/min	+ 1
Penetrating injury	Yes	+ 2
High velocity trauma	Yes	+ 2

The score is not suitable for isolated limb trauma or isolated neck femoral fracture in people older than 65 years

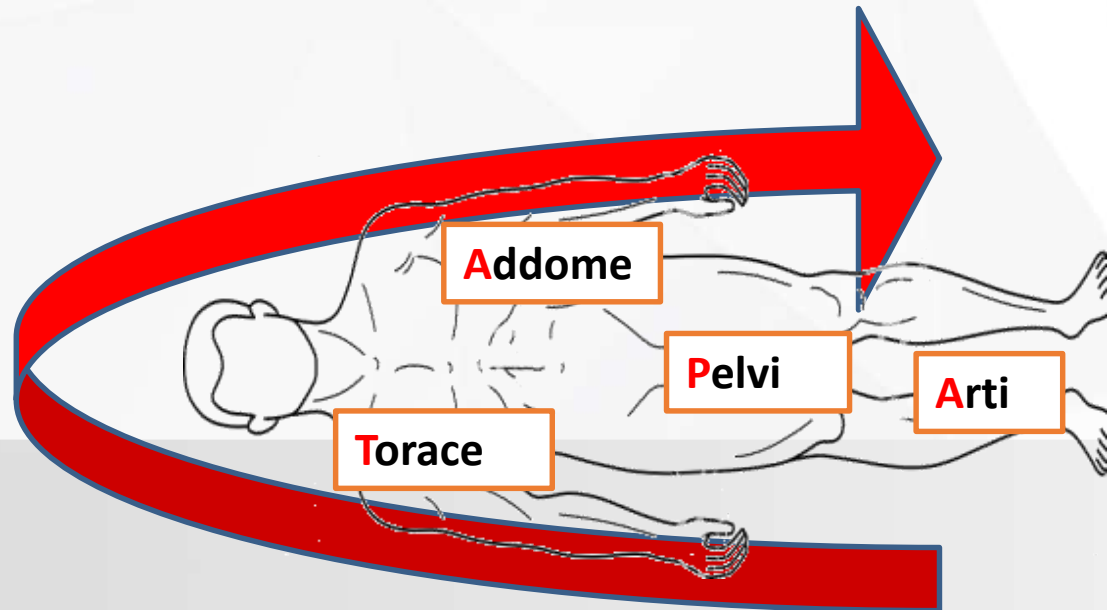
BATT score (≥8)



Italian Resuscitation Council

D... Dove?

1 + 4

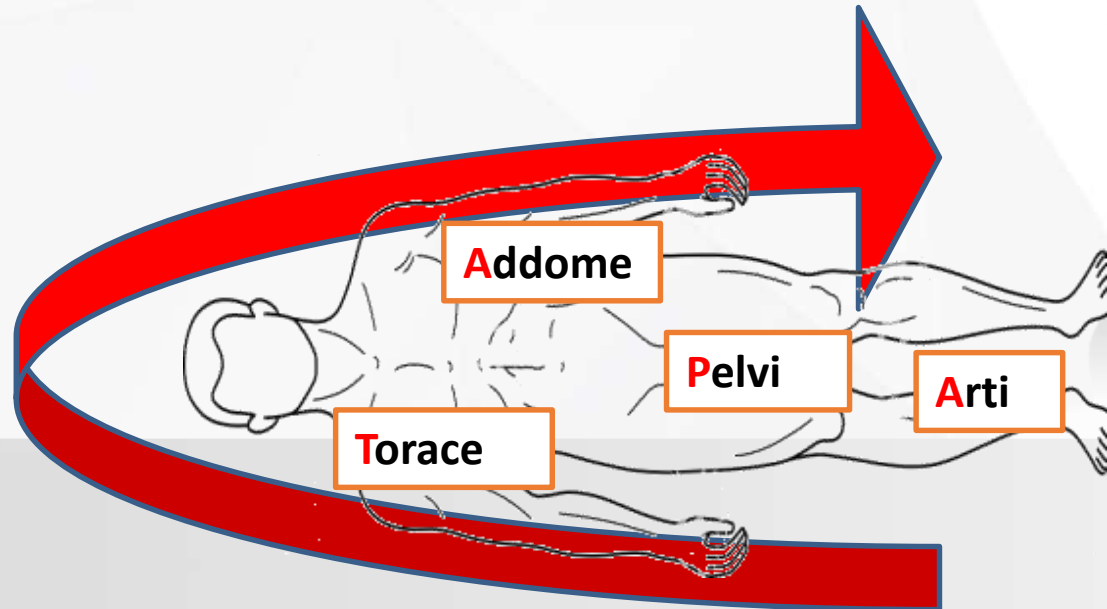


C...
Cosa?



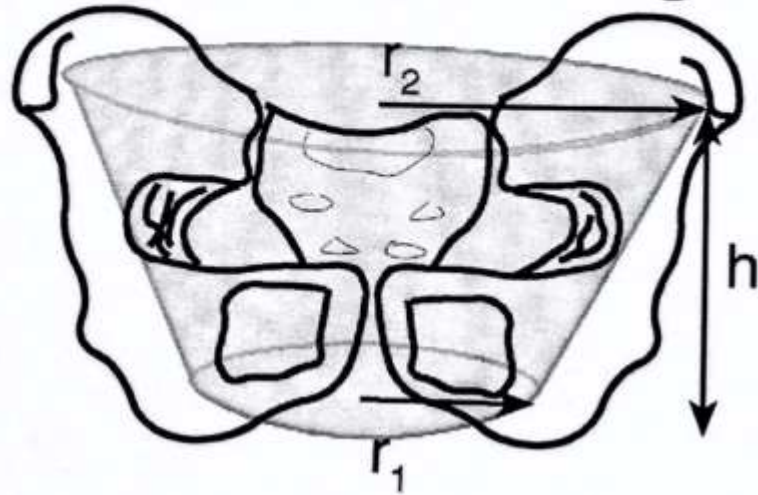
Scoop & Run

C... Controllabile?



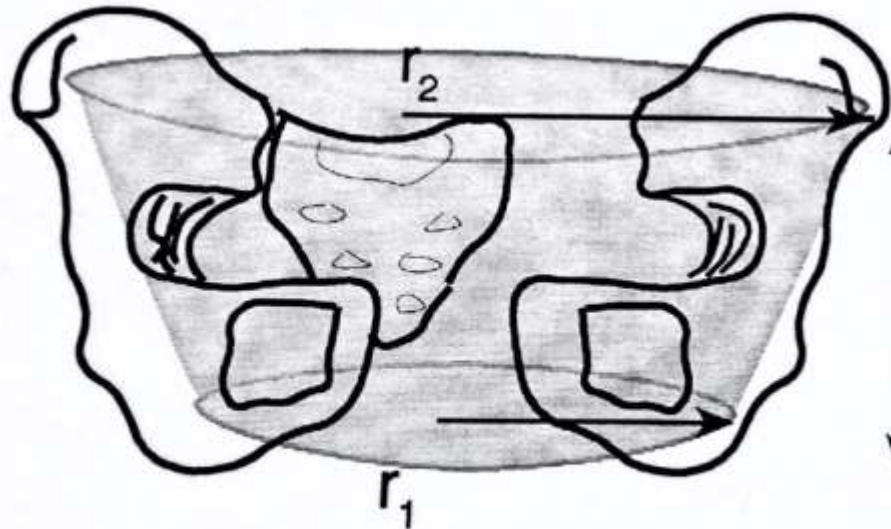
Stop
The
Bleeding!

Pelvic volume change and blood loss



Volume of a Truncated Cone

$$V = \frac{\pi h}{3}(r_1^2 + r_1 r_2 + r_2^2)$$



Increase r_1 & r_2 by 2 cm,
increase pelvic volume 1.3 L.

Increase r_1 & r_2 by 5 cm,
increase pelvic volume 5 L.

Increase h by 50%,
increase volume 50%.

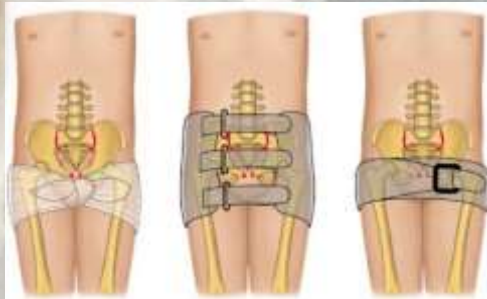
Traumi del BACINO

Shock

Anatomia: Segni
clinici di frattura
pelvica

Dinamica ad alta energia
suggestiva per trauma di
bacino

±



Fascia pelvica





Identifying risk factors for suboptimal pelvic binder placement in major trauma

F. Williamson^{a,b,*}, L.G. Coulthard^{a,b}, C. Hacking^{a,b}, P. Martin-Dines^{b,c}

^a Royal Brisbane & Women's Hospital, Herston, Queensland 4029, Australia

^b Faculty of Medicine, University of Queensland, Herston, Queensland 4006, Australia

^c The Prince Charles Hospital, Chermside, Queensland 4032, Australia



Conclusions

This paper supports previous research that a significant proportion of pelvic binders are sub-optimally placed. Given the application of pelvic binders is aimed at improving haemodynamic management of unstable pelvic injuries it is important to ensure correct fit for optimal efficacy and reduction of complications. Our findings of risk factors for sub-optimal position should be incorporated into education for clinicians applying the binders to highlight trauma patient populations in whom fit is challenging or be considered in the design of future pelvic binders. Equally, clinicians should be confident in their assessment of fit using plain pelvic radiography and ideal positioning for the binder allowing them to adjust the position as clinically required.

Raccomandazioni 10-11 della Linea Guida per la gestione integrata del trauma maggiore dalla scena dell'evento alla cura definitiva

Lista delle raccomandazioni formulate

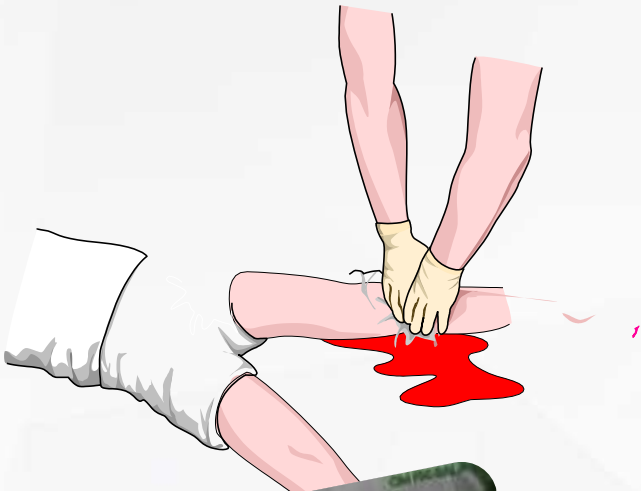
Quesito 6: L'applicazione di dispositivi di compressione pelvica circonferenziali esterni non invasivi (ECD) è costo-efficace e migliora gli esiti clinici nei pazienti con sospetto di frattura pelvica in pre-ospedalizzazione?

Raccomandazione 10. Nei pazienti con sospetta frattura pelvica si suggerisce l'utilizzo dell'ECD in modalità di contenzione rispetto al non posizionamento dell'ECD [raccomandazione condizionata, qualità delle prove molto bassa].

Raccomandazione 11. Nei pazienti in shock emorragico e con sospetta frattura pelvica si suggerisce il posizionamento dell'ECD in modalità di compressione rispetto al non posizionamento dell'ECD [raccomandazione condizionata, qualità delle prove molto bassa].

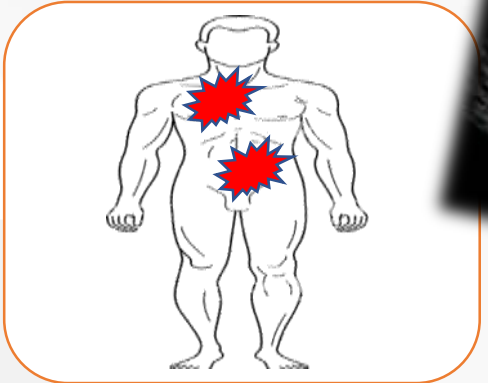
Frattura - Shock → Contenzione

Frattura + Shock → Compressione



Stop
The
Bleeding!

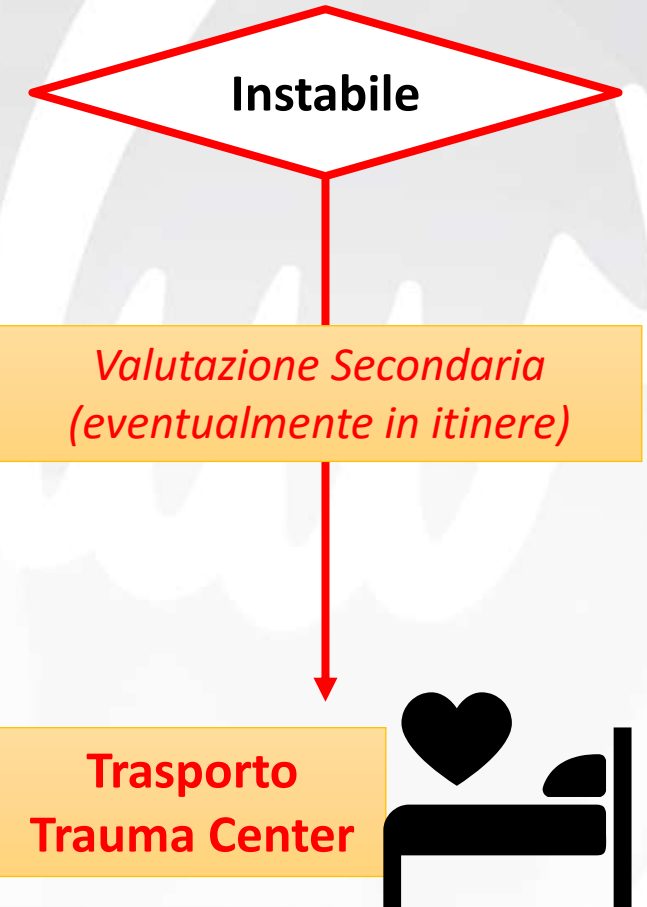
Traumi Penetranti o
Emorragie Interne
«NON» controllabili



C... Cosa?



Scoop & Run
?





**Fast&Clean
&GO!
Time is Blood**



Target Pressori "ipotensione permissiva"



PAS 70 - 90 mmHg
→ Trauma Penetrante/
Chiuso



Obiettivi
PERFUSIONE D'ORGANO, ma...
"no pop the clot" prima
dell'emostasi

PAS 100-110 mmHg
→ Trauma Cranico /
Midollare



*PERFUSIONE CEREBRALE e/o
MIDOLLARE*



Time Limited Fluid Resuscitation



Pre-H Damage Control Resuscitation

Rianimazione Emostatica

Accesso Venoso / IO



Misure "di base"

- **Cristalloidi «riscaldati»** (boli da 250 ml) sino al target (rivalutare dopo ogni bolo)
- **Acido Tranexamico** (1g ev in 10')
- **Attivazione Protocollo Trasfusione Massiva Intra-ospedaliero** (preallertamento)

Misure "avanzate"

- **Emazie / Plasma** (se disponibili)
- **Fibrinogeno** (1-2g ev lenta)
- **REBOA** (paz. in extremis)



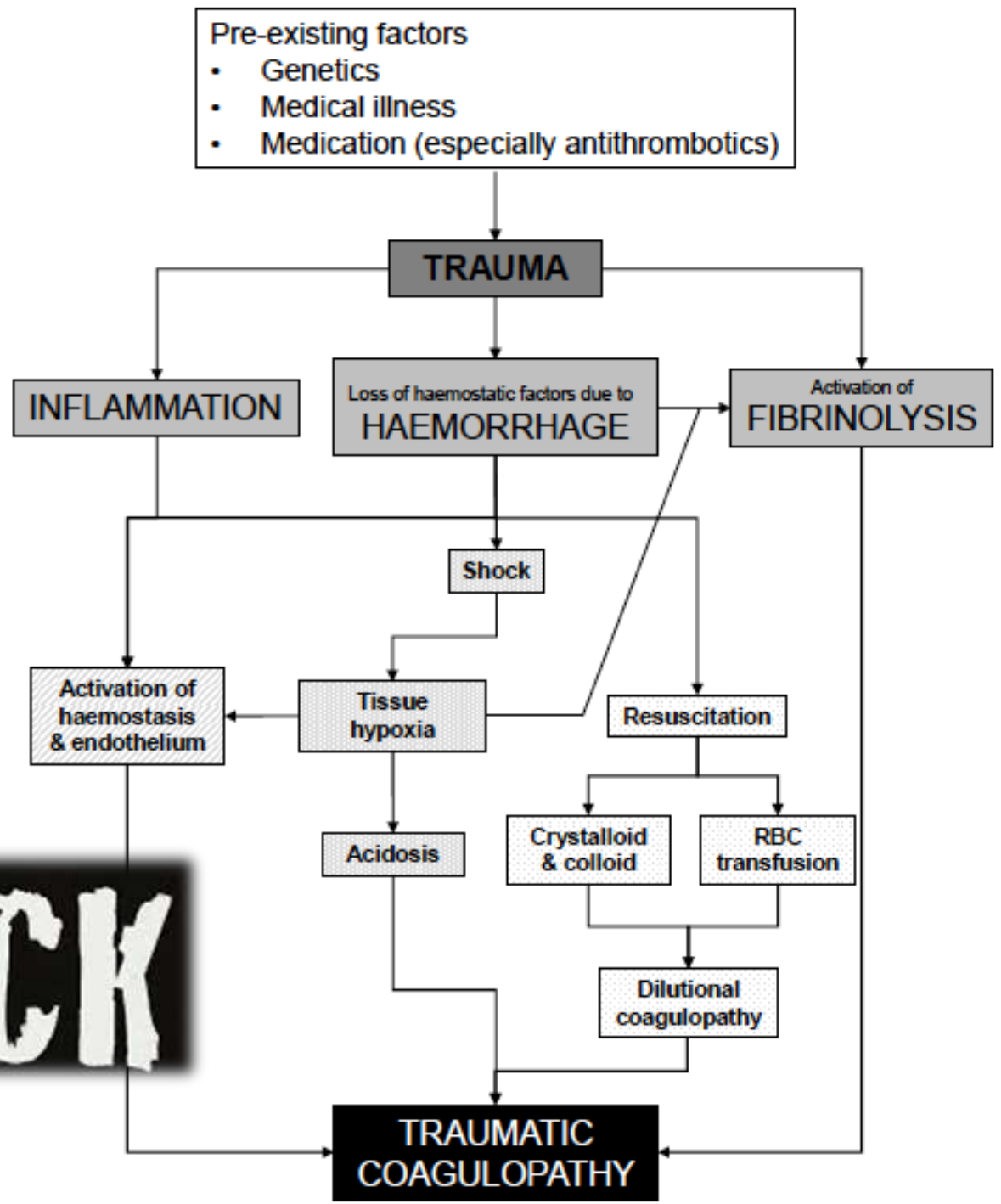


Figure 1 Current concepts of pathogenesis of coagulopathy following traumatic injury. Adapted from [9,10]

“Haemostatic” Resus (Acute Traumatic Coagulopathy management)



Tranex



Fibrinogeno



[Link preH-Trauma Center- Servizio Trasfusionale](#)



Raccomandazioni 23-24 della Linea Guida per la gestione integrata del trauma maggiore dalla scena dell'evento alla cura definitiva

Quesito 12: Qual è il miglior fluido per l'espansione volemica da utilizzare nella rianimazione in corso di shock emorragico?

Raccomandazione 22. Nel paziente traumatizzato con emorragia in sede pre-ospedaliera, quando possibile, considerare la trasfusione di emocomponenti [Raccomandazione condizionata, qualità delle prove bassa].

LG ISS 2021



SPITFIRE

prehoSPItal management OF hypotensive tRauma in hEMs

Nel paziente traumatico ipoteso, quali fattori del soccorso preospedaliero influiscono – e come– sull’outcome a 30 giorni?

Progetto Blod On Board Basi HEMS Bologna – Grosseto

Criteri di inclusione:

- Età > 18 anni;
- Evento traumatico operativo di qualità;
- Shock, ovvero pressione sistolica < 90 mmHg.

Tot Trasfusioni : >30 dal 1/10
Eventi avversi: 0

- della fase preospedaliera (ovvero sono inclusi pazienti ipoteso sin dall’inizio ed anche pazienti che sviluppano shock prima dell’arrivo al Trauma Center);
- Presenza sospetta o certa di emorragia in atto.

Basi HEMS coinvolte: Bologna, Pavullo, Bolzano, Pieve di Cadore, Treviso, Udine, Padova, Verona, Massa, Grosseto, Torino, Borgo Sesia, Cuneo-Levaldigi, Alessandria, Aosta.

Per contatti:
cristian_lupi@yahoo.it
mrc.tartaglione@gmail.com
lorenzo.gamberini86@gmail.com

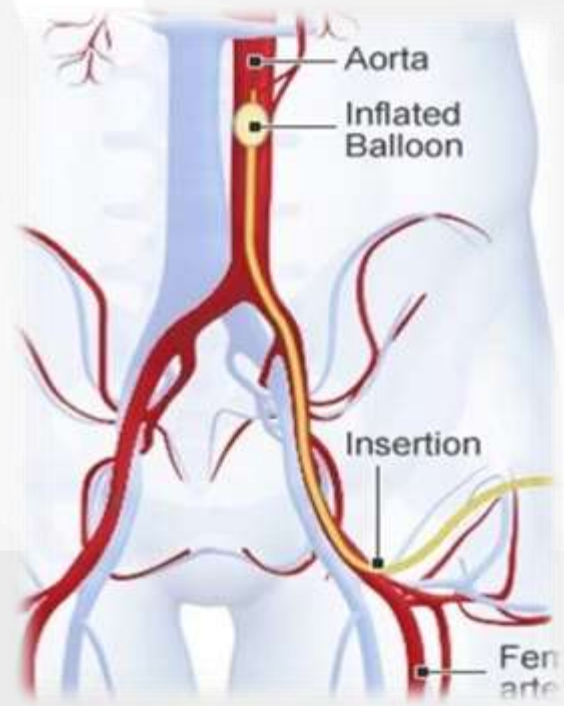
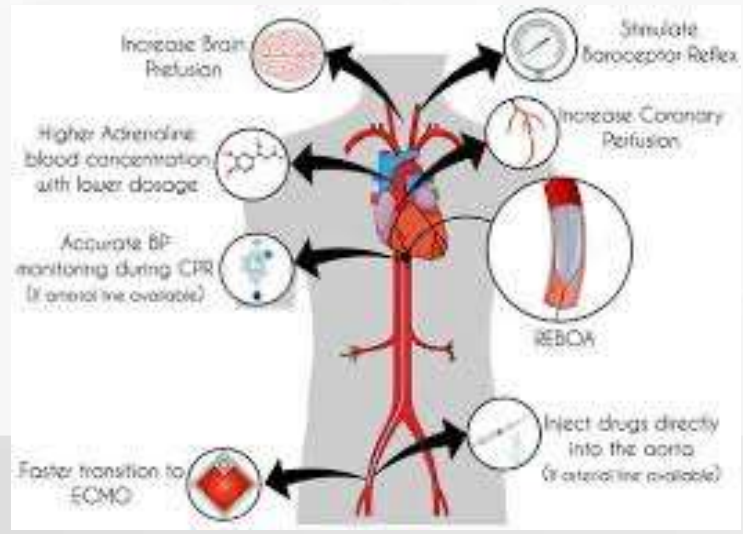
Italian
Resuscitation
Council

Stop The Bleeding!

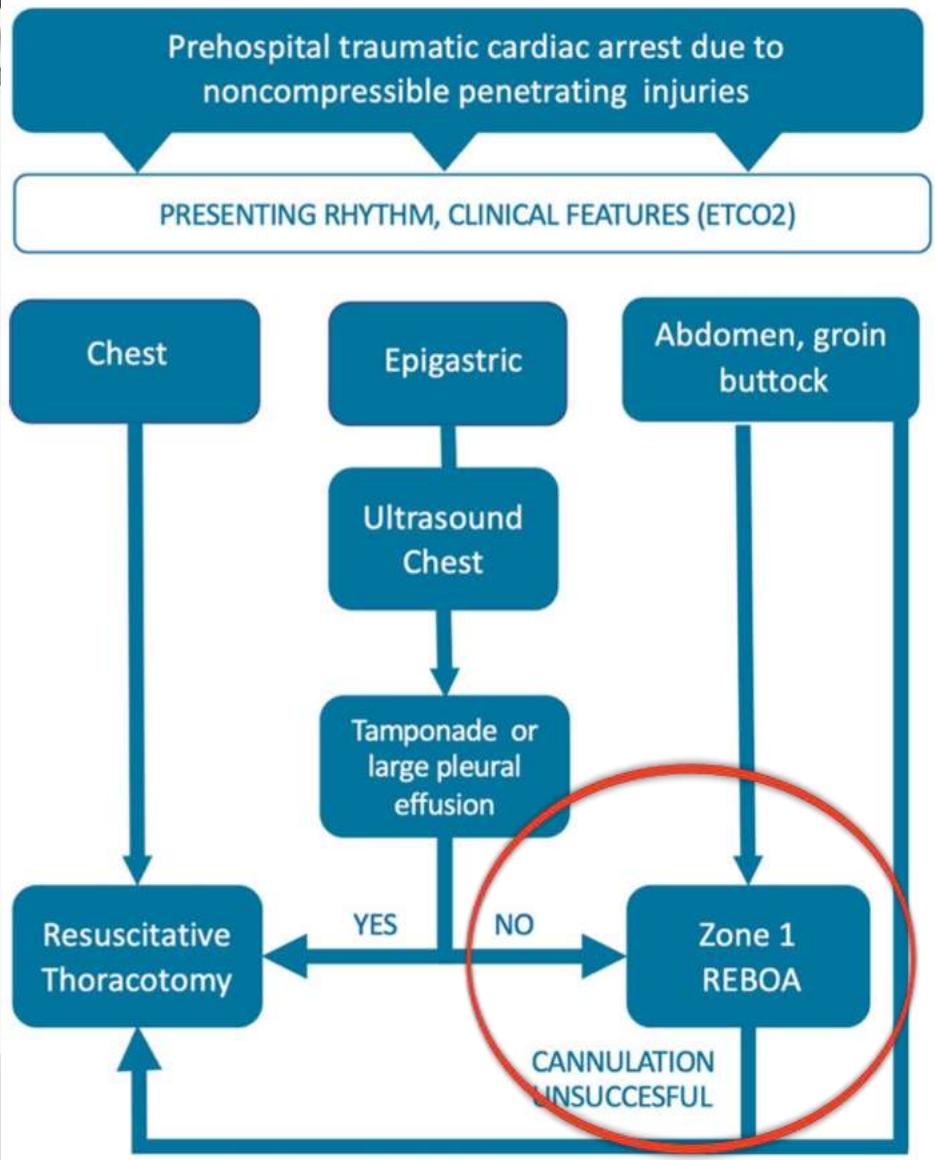
Temporize the Bleeding



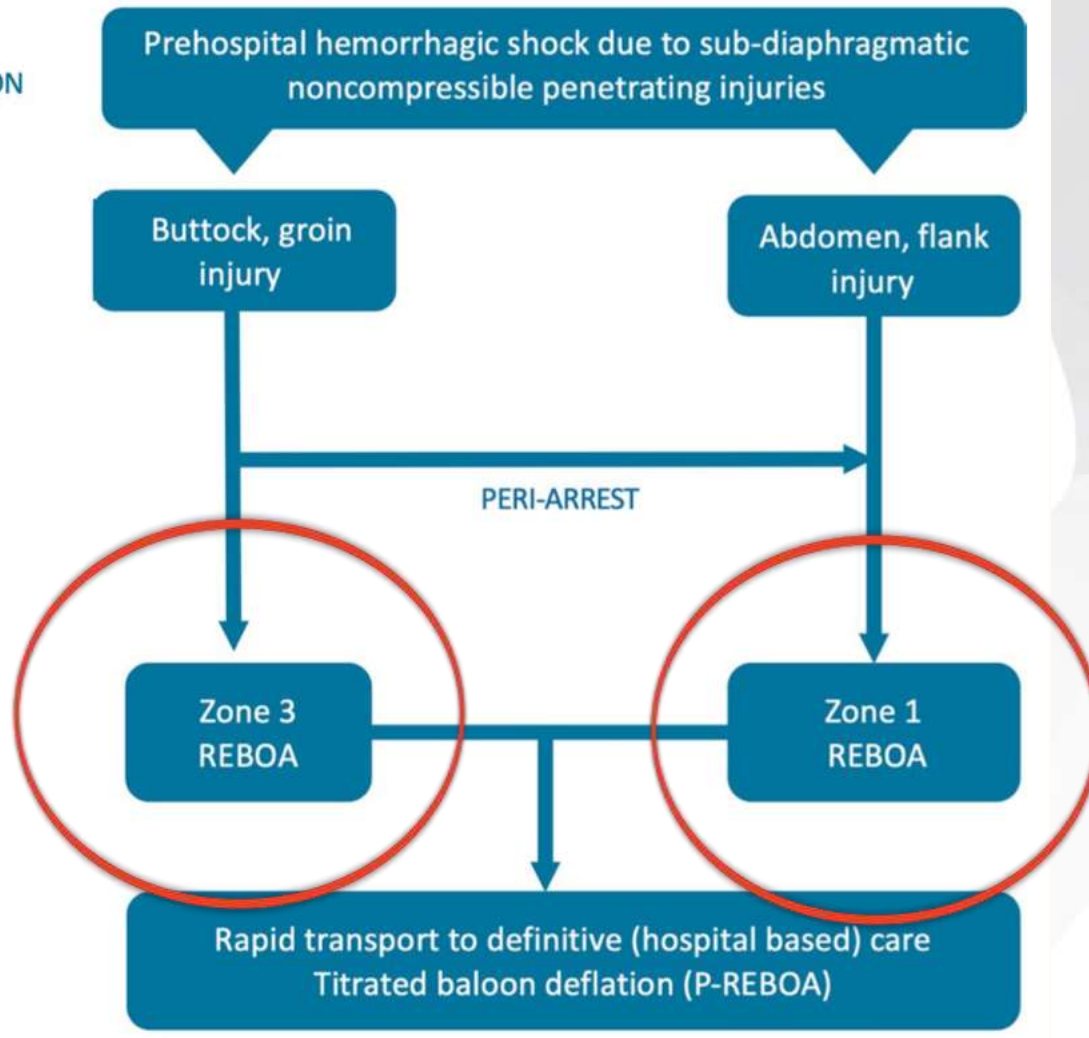
REBOA

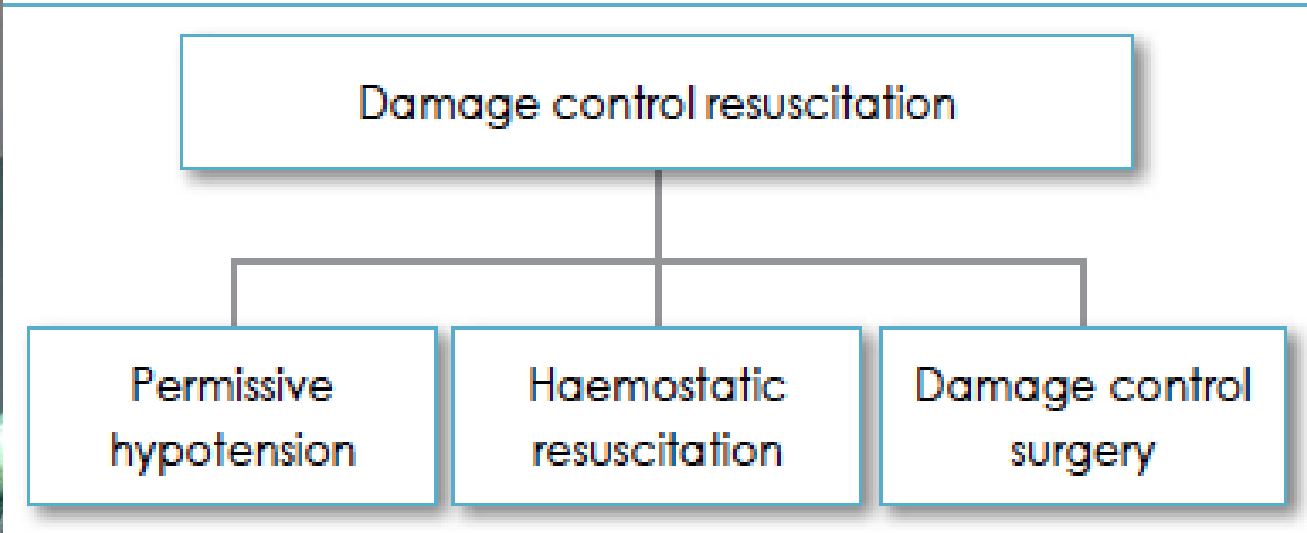
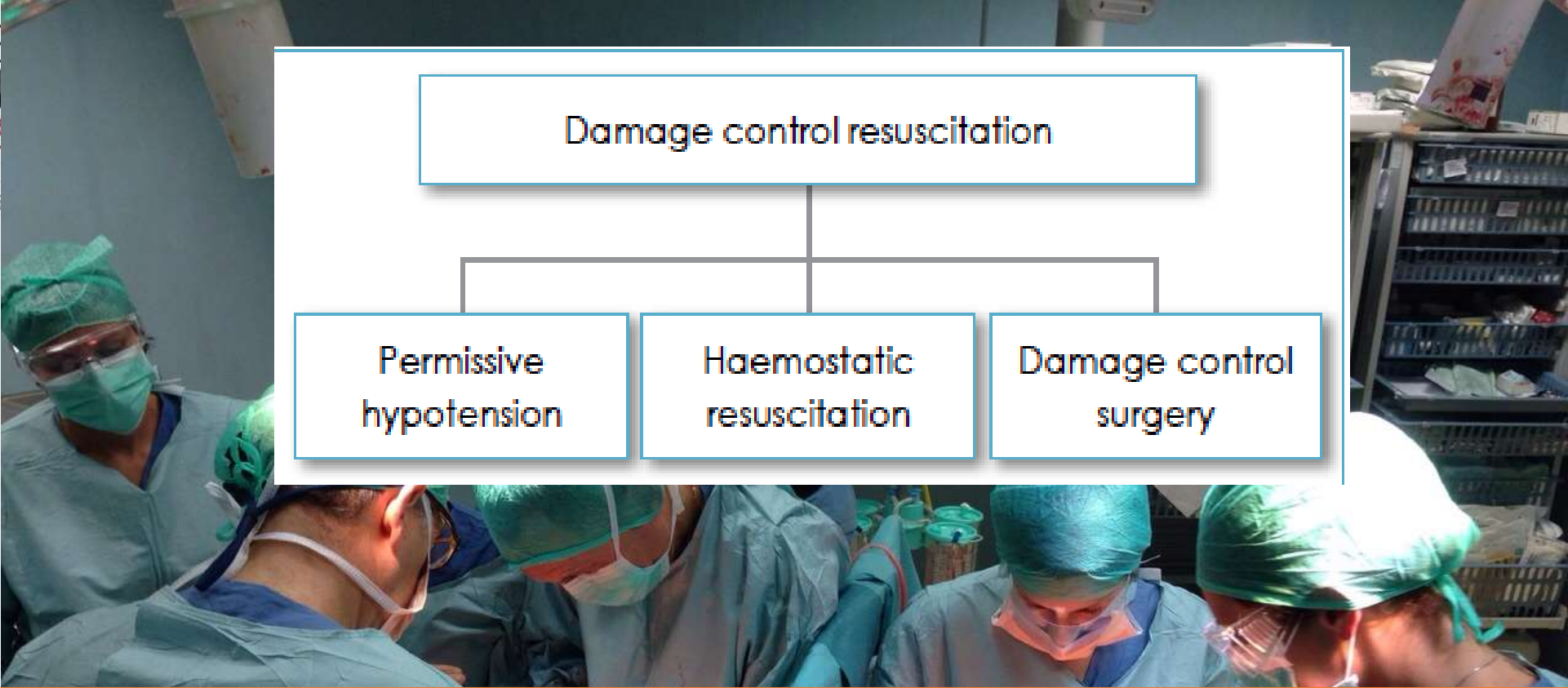


Graphical Abstract



VOLUME RESUSCITATION



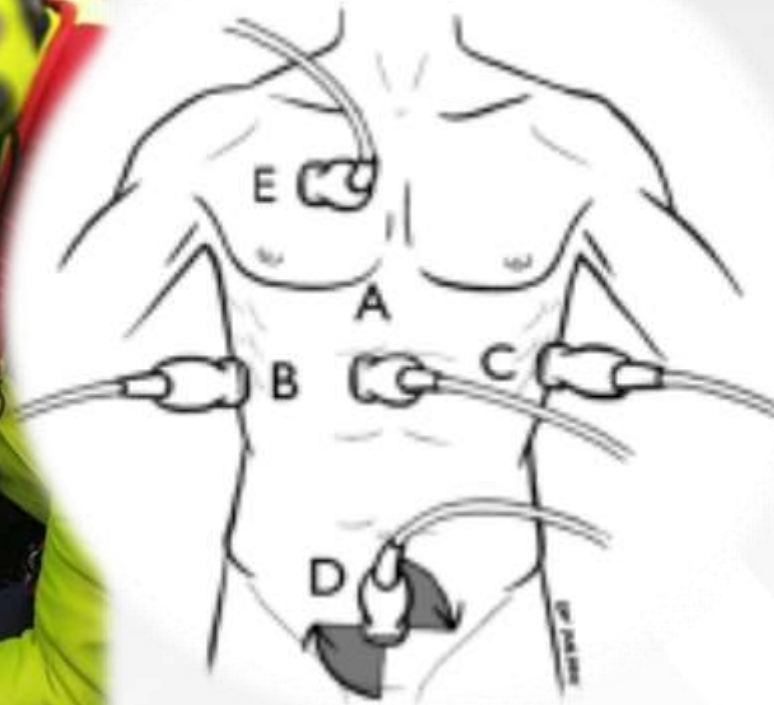


“Surgery does not follow resuscitation, it is part of resuscitation”
Hodgetts T, Turner L. Trauma rules 2. Oxford, Blackwell Publishing 2006



Damage control surgery

Ecografia Pre-Ospedaliera



Extended - FAST

E- FAST - potenziale ruolo:

- PEA vs Low Output
- Ipovolemia
- Prognosi ACR... (es. Asistolia + no versamento)
- Attivazione risorse intraH (es. Trasfusione Massiva, Sala Operatoria)
- Triage se più feriti

NON deve ritardare il trasporto in ospedale!

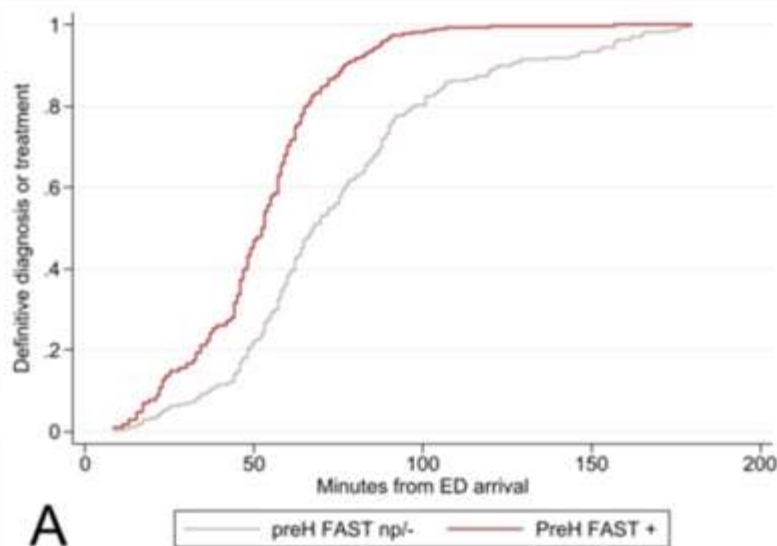
Injury

The role of prehospital ultrasound in reducing time to definitive care in abdominal trauma patients with moderate to severe liver and spleen injuries.

--Manuscript Draft--



Manuscript Number:	
Article Type:	Full length article
Keywords:	injuries, abdominal; Extended Focused Assessment with Sonography for Trauma; Trauma Centres; haemorrhagic shock; emergency surgery
Corresponding Author:	Marco Tartaglione ITALY



199 patients were included in the final analysis. Of these, 44 had a prehospital FAST performed and in 27 of them peritoneal free fluid was detected in the prehospital setting, while 128 out of 199 patients had a positive ED-FAST.

Patients with a positive prehospital FAST reported a significantly lower door-to-CT or door-to-OR median time (46 vs 69 minutes, $p < 0.001$).

Come gestisco Airway&Ventilation?

C problem is an Airway problem?

- Sedazione < meccanismi di compenso allo shock
- Pressione Positiva & < Ritorno Venoso
- Time to H Vs Time delay
- Setting

...more soldiers were killed in WWII by pentothal than bullets.

Drug or Dosage: What is the Important Factor?

It has been frequently said that **more** soldiers were killed in World War II by **pentothal** than by bullets. Indeed, Halford³⁶ wrote a compelling negative critique of the use of **pentothal** following the Pearl Harbor experience. In the same volume of *Anesthesiology*, however, appeared a case report by Adams and Gray³⁷ (and an accompanying editorial) revealing that **pentothal** was not the lethal factor but rather the *dosage* that was typically administered to the traumatized patient.

In general, severely ill patients should not receive **pentothal** or propofol for induction. If the patient is comatose upon arrival of the airway expert to the resuscitation scene, no drug other than oxygen and possibly a neuromuscular blocking drug is required until the patient's blood pressure and heart rate indicate that he or she can tolerate hypnotic agents.

« Aree di Grigio? »

- 27 pre hospital air medical transport services All centers in the United States
- Enrolment from 2014 to October 2017
- 2U Plasma Vs Cristalloidi



The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812

JULY 26, 2018

VOL. 379 NO. 4

Prehospital Plasma during Air Medical Transport in Trauma Patients at Risk for Hemorrhagic Shock

J.L. Sperry, F.X. Guyette, J.B. Brown, M.H. Yazer, D.J. Triulzi, B.J. Early-Young, P.W. Adams, B.J. Daley, R.S. Miller, B.G. Harbrecht, J.A. Claridge, H.A. Phelan, W.R. Witham, A.T. Putnam, T.M. Duane, L.H. Alarcon, C.W. Callaway, B.S. Zuckerbraun, M.D. Neal, M.R. Rosengart, R.M. Forsythe, T.R. Billiar, D.M. Yealy, A.B. Peitzman, and M.S. Zenati, for the PAMPer Study Group*

Authors' Conclusions

- In patients at risk for hemorrhagic shock, the administration of thawed plasma during prehospital air medical transport was safe and resulted in *lower*



Resuscitation with blood products in patients with trauma-related haemorrhagic shock receiving prehospital care (RePHILL): a multicentre, open-label, randomised, controlled, phase 3 trial



Nicholas Crombie, Heidi A Doughty, Jonathan R B Bishop, Amisha Desai, Emily F Dixon, James M Hancox, Mike J Herbert, Caroline Leech, Simon J Lewis, Mark R Nash, David N Naumann, Gemma Slinn, Hazel Smith, Iain M Smith, Rebekah K Wale, Alastair Wilson, Natalie Ives, Gavin D Perkins, on behalf of the RePHILL collaborative group*

Authors' Conclusions

- The trial did **not demonstrate a benefit for a composite outcome of mortality and lactate clearance in trauma patients** with haemorrhagic shock receiving PRBC-LyoPlas compared with 0.9% saline

ORIGINAL ARTICLE**Efficacy of prehospital administration of fibrinogen concentrate in trauma patients bleeding or presumed to bleed (FlinTIC)**

A multicentre, double-blind, placebo-controlled, randomised pilot study

Bernhard Ziegler, Mirjam Bachler, Hubert Haberfellner, Christian Niederwanger, Petra Innerhofer,

53 evaluable trauma patients

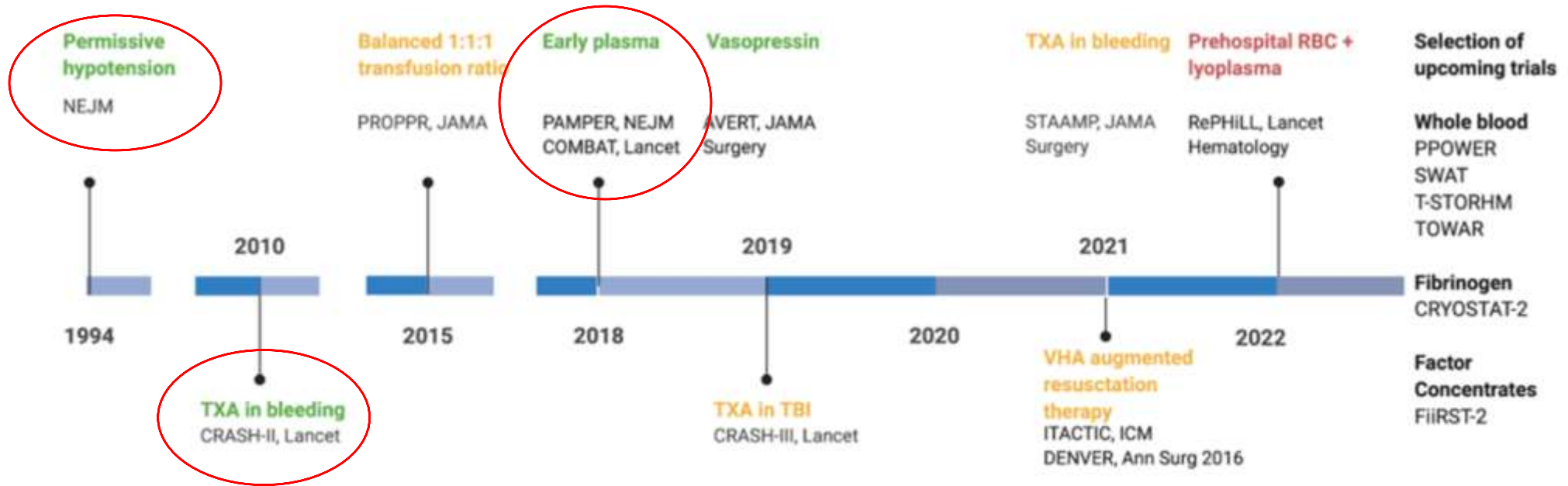
28 FBG Vs 25 placebo

Primary outcome was the assessment of clot stability as reflected by (FIBTEM MCF) before and after administration of the study drug

- feasible in pre-hospital trauma care.
- It protects against early fibrinogen depletion
- promotes rapid blood clot initiation and clot stability

Trauma Resuscitation Trials

ESM Figure S3



ESM Figure S3: Chronologic overview of randomised trials investigating the effectiveness of currently used treatments for trauma resuscitation. The interventions are reported in green for trials [1-5] showing benefit in their primary endpoint. For trials[6-9] that did not show benefit in their primary endpoint but were positive in preplanned post hoc analysis or subgroup analysis, the interventions are reported in orange. The RepHILL trial [10] did not show benefit from prehospital transfusion of red blood cells (RBCs) and lyophilised plasma (in red). COMBAT was negative in the primary outcome, but when data were combined with PAMPER, early plasma was associated with improved survival when transfer times exceeded 20 minutes[11]. A selection of upcoming trials is reported on the far right (*source: clinical trials.gov*). These upcoming trials are investigating whole blood compared to blood components, the early supplementation of fibrinogen or the use of factor concentrates to correct TIC.

Per concludere...

<Cm>ABCDE

Algoritmo decisionale Shock PreH

Valutazione ABCDE (+/- EFAST): Shock?

Shock

Valuta Sede

Accesso Venoso/IO
Fluidi secondo target
Ac. Tranexamico

Emorragie esterne
«controllabili»

Emorragie Interne
«controllabili»

Traumi Penetranti o
Emorragie Interne «NON»
controllabili

Stay & Play

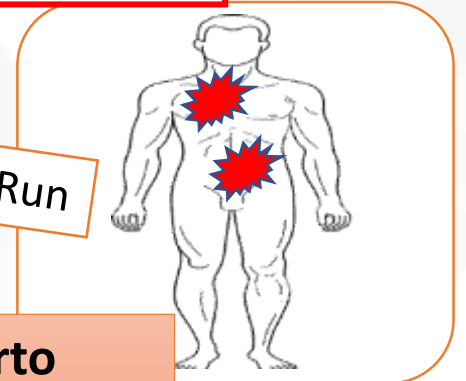
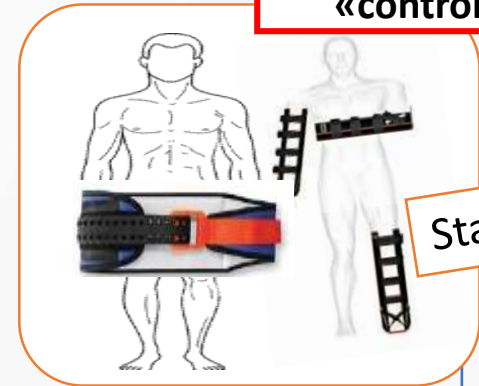
Scoop & Run

Emostasi preH

Centralizzazione + Allertamento
Trauma Center, Trauma TEAM
Protocollo Trasfusione (DCR)

Trasporto
Fast&Clean

Fast&Clean&GO!
Time is Blood



- Intervenire prima... Più vicini al trauma
- Prima della coagulopatia...
- Prima della fase irreversibile dello shock...
- Riducendo i tempi liberi da terapia...

... Se il problema è «C»... Scoop&Run verso il tuo Trauma Center.. Anzi meglio «Fast & Clean»!

Grazie



car.coniglio@gmail.com

*Riva del Garda
020.21.22 settembre 2021*



Italian
Resuscitation
Council

Italian Resuscitation Council

 ircouncil.it