

C O N G R E S S O N A Z I O N A L E



B O L O G N A 1 3 - 1 4 D I C E M B R E 2 0 2 4

Rianimazione Emostatica nel Paziente Traumatizzato: Questione di Cosa o di Quando?

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Rianimazione, 118, HEMS
Ospedale Maggiore
Bologna



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Rianimazione Emostatica... Solo biochimica?

Damage Control =
DC Resuscitation +
DC Surgery/Intervention



Limited Fluid & Hypotensive Resus + **Haemostatic Resus**



Rianimazione Emostatica... Solo biochimica?

- **restore circulating blood volume** for adequate tissue *perfusion and oxygenation*
- maintain and regularly monitor *haemostasis*
- avoid the letal *triad* of **hypothermia, acidaemia and coagulopathy (+ ipoCa++)**.

Obiettivi Rianimazione Emostatica : dove e quando?

PreH

InH

1. Stop the bleeding – preH Vs In H
2. Riconoscere lo shock ... & rischio do coagulopatia
3. Trattarlo → DCR – preH (Remote) e in H
4. Hypotensive Resuscitation & Target Pressori
5. Ottimizzare la perfusione → Trasporto/Disponibilità O2
6. Coagulation & Trasfusion Support → ambiente «clot friendly» fight → acidosi, ipotermia, ipoCa++
7. Centralizzazione!
8. DC Surg & Rad
9. ROSE → Resuscitation → Ottimizzazione & Stabilization in ICU/SICU
10. Extreme Resuscitation...



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1. Stop the bleeding – preH Vs In H

PreH



SAVE A LIFE

InH



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Stop The Bleeding: Emostasi PreH Temporanea

Emorragia esterna

Compressione
diretta



Tourniquet

Arti



Medicazioni Emostatiche

Sedi "giunzionali"



Emostatici
topici: bende,
polveri, ecc.

Tourniquet

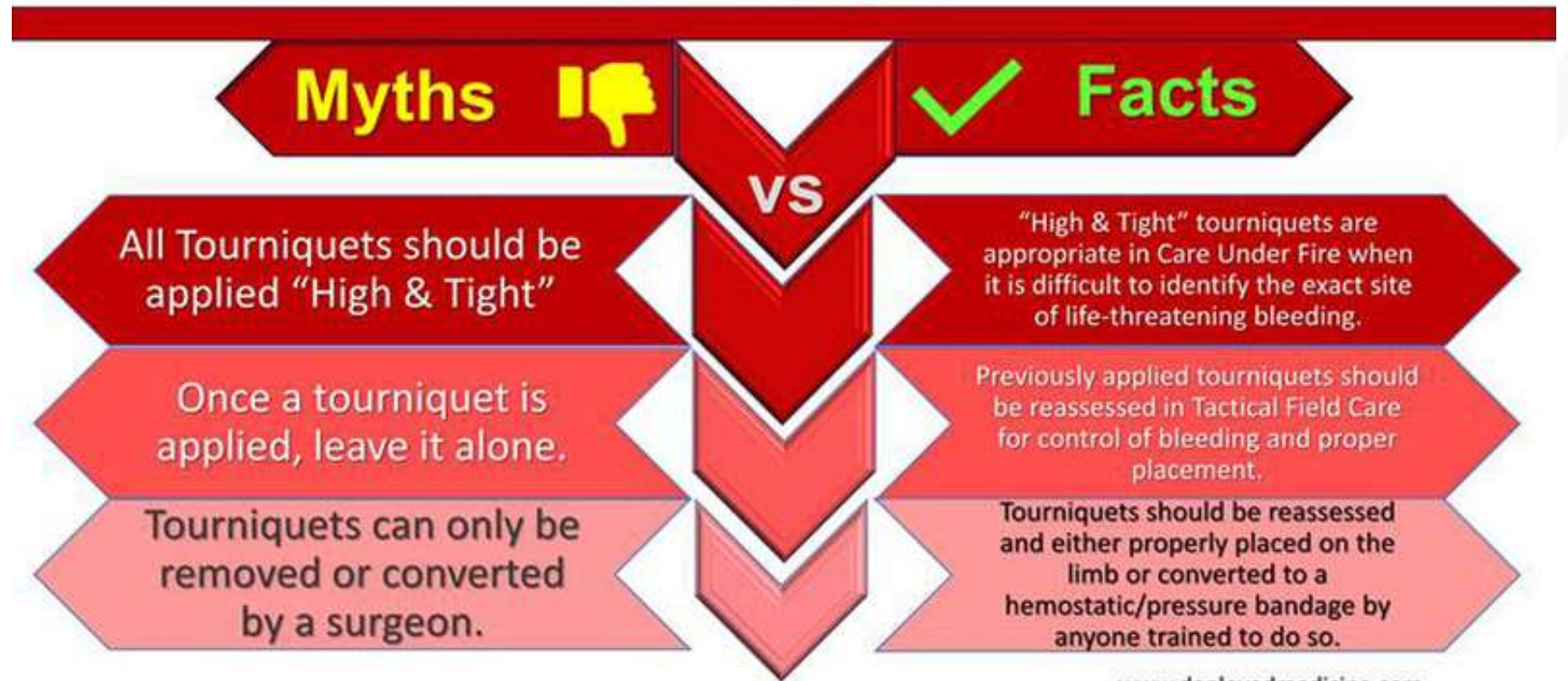


Tactical Combat Casualty Care



MARCH

- **TQ Replacement**
 - <2h
- **TQ Conversion**
 - <2h
- **TQ leave in place**
 - If >6h



www.deployedmedicine.com

Journal of Trauma and Acute Care Surgery [95\(6\):p e54-e60, December 2023.](#) | DOI: 10.1097/TA.0000000000004134



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2. Riconoscere lo shock ... & rischio di coagulopatia

ABC SCORE

SCORE < 2 SUGGESTS UNLIKELY NEED FOR MASSIVE TRANSFUSION

SBP ≤ 90 +1

HR ≥ 120 +1

+ **FAST** +1

PENETRATING +1
TORSO INJURY

PreH

The COAST score (Coagulopathy of Severe Trauma score) >3

Variable	Value	Score
Entrapment	Yes	1
Systolic Blood Pressure	<100 mmHg	1
	<90 mmHg	2
Temperature	< 35C	1
	< 32 C	2
Suspected Chest Trauma	Yes	1
Suspected intra-abdominal or pelvic trauma	Yes	1

The COAST score: Coagulopathy in Severe Trauma

3. Trattare lo Shock → DCR – preH (Remote) e in H



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Algoritmo decisionale Shock PreH

<Cm>ABCDE

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

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

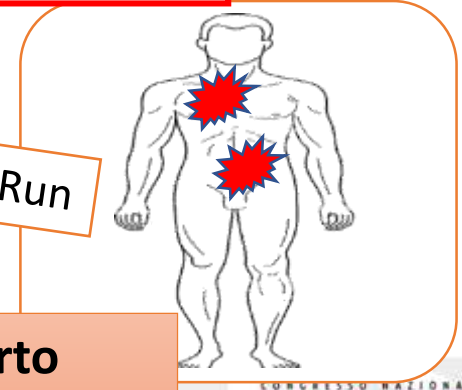
Emostasi preH

Fast&Clean&GO!
Time is Blood

Scoop & Run

Trasporto
Fast&Clean

Stay & Play



4. Hypotensive Resuscitation & Target Pressori

PreH

InH



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Time Limited Fluid Resuscitation

PreH



250 ml



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TARGET PRESSORI

“IPOTENSIONE PERMISSIVA”

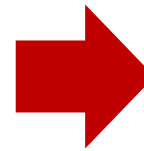


OBIETTIVI



PAS 70 - 90 mmHg

→ Trauma Penetrante/
Chiuso

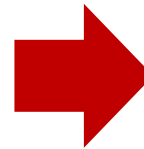


PERFUSIONE D'ORGANO, ma...

*“no pop the clot” prima
dell'emostasi*

**PAS 100-110
mmHg**

→ Trauma Cranico /
Midollare



*PERFUSIONE CEREBRALE e/o
MIDOLLARE*



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5. Ottimizzare la perfusione → Trasporto/Disponibilità O₂

PreH

InH



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**BLOOD IS FOR BLEEDING.
SALTWATER IS FOR
COOKING PASTA.**

-SPINELLA 2017



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Blood on Field?

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

Raccomandazione 23. Nel paziente traumatizzato con emorragia si raccomanda in sede pre-ospedaliera l'utilizzo dei cristalloidi per il recupero della volemia, se gli emocomponenti non sono disponibili [Raccomandazione forte, qualità delle prove bassa].

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



Tranex
Fibrinogeno



6. Coagulation & Trasfusion Support

- ambiente «clot friendly»
- fight → acidosi, ipotermia, ipoCa++





TIC

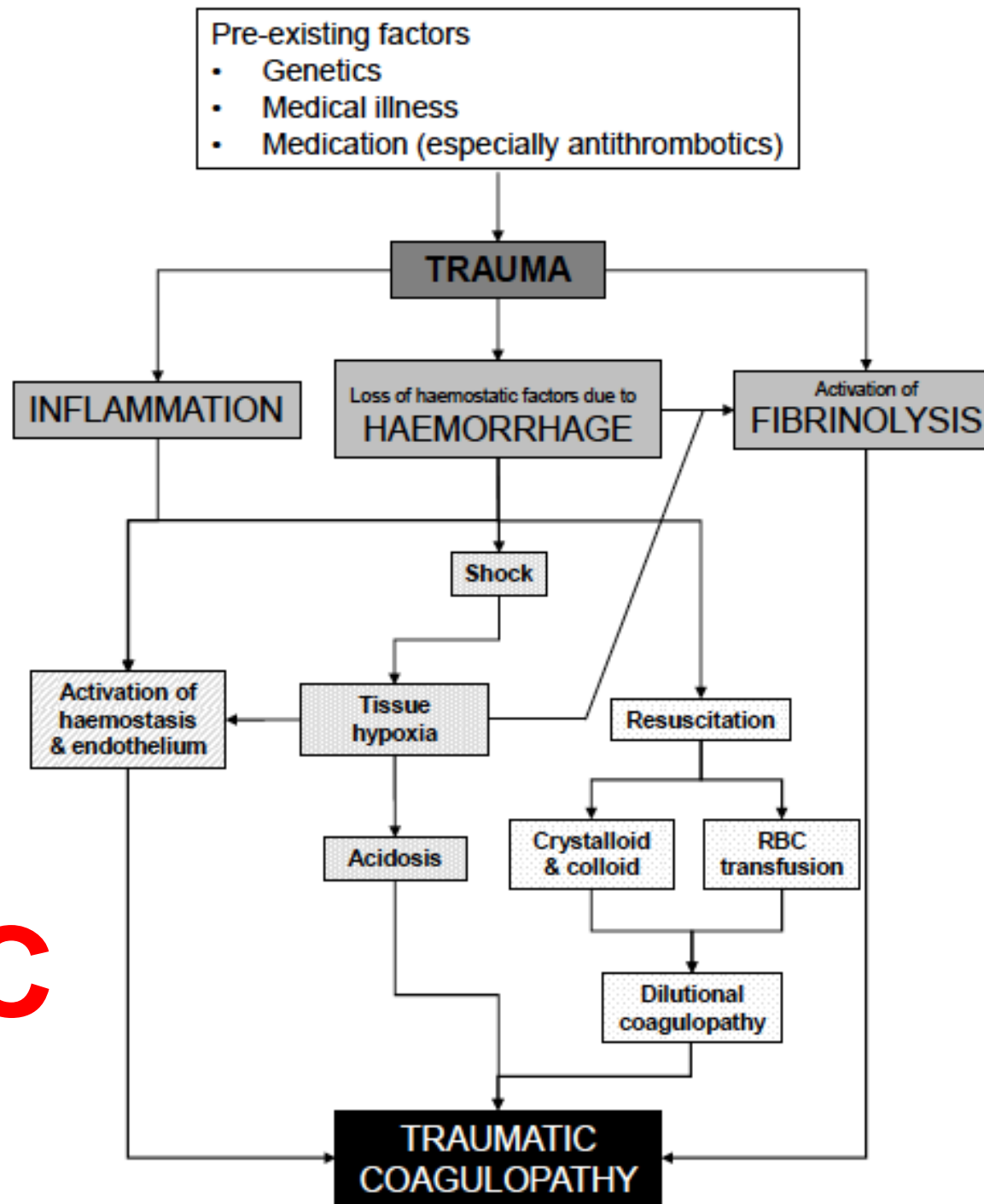


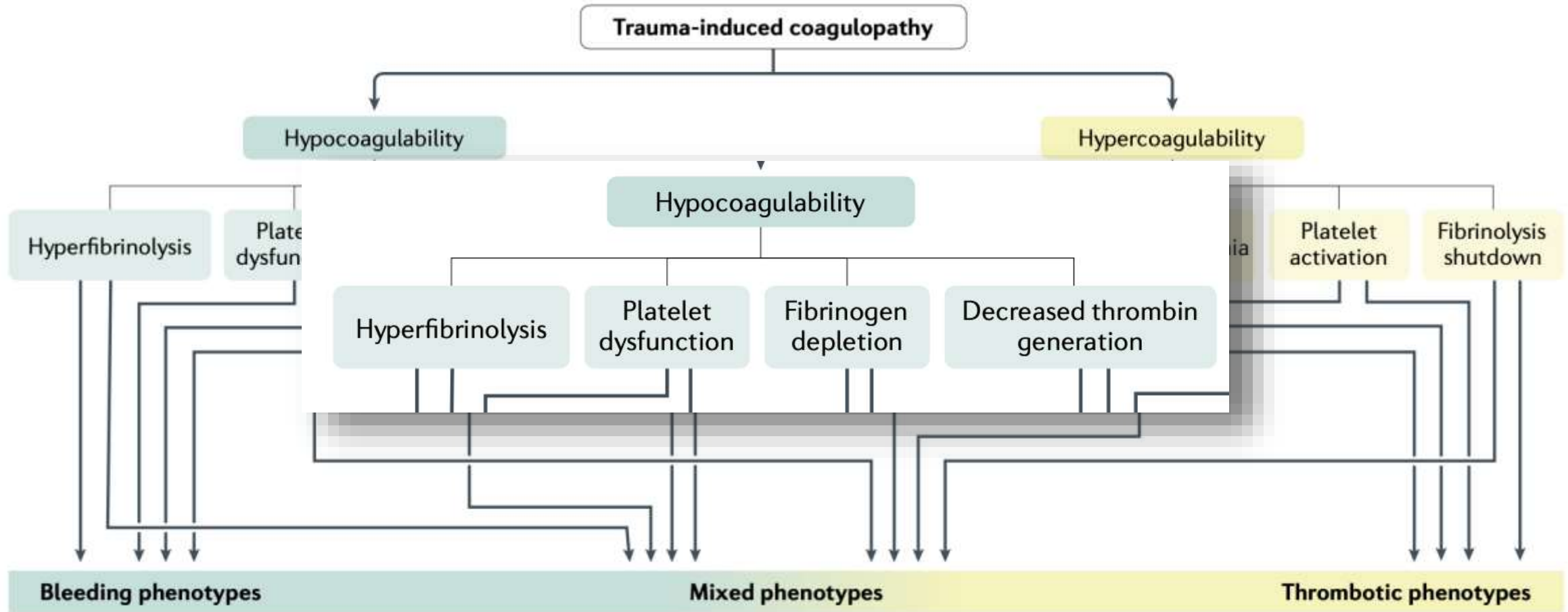
Figure 1 Current concepts of pathogenesis of coagulopathy following traumatic injury. Adapted from [9,10]



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TIC... Ma + Fenotipi



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)**



Acido Tranexanico... Dove e Quando?



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CRASH₂

Clinical Randomisation of an Antifibrinolytic
in Significant Haemorrhage

- CRASH 2 Study
- A large international clinical trial (> 20000 pz)
- improved survival at 30 days compared with placebo in patients deemed at risk of bleeding, when the drug was given early in the clinical course.

1g ev + 1g ic/8h



The NEW ENGLAND
JOURNAL of MEDICINE

ORIGINAL ARTICLE



Prehospital Tranexamic Acid for Severe Trauma

Author: The PATCH-Trauma Investigators and the ANZICS Clinical Trials Group* [Author Info & Affiliations](#)

Published June 14, 2023 | N Engl J Med 2023;389:127-136 | DOI: 10.1056/NEJMoa2215457

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CME



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The COAST score (Coagulopathy of Severe Trauma score) >3

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The COAST score: Coagulopathy in Severe Trauma

The Bottom Line

- The PATCH trial supports the findings of CRASH-2 in that prehospital TXA reduces early death due to haemorrhage in major trauma patients
- However, there are more survivors with poor neurological outcome in the TXA group. This clearly has an impact on patient's quality of life, implications for family and economic implications for a society caring for highly dependent people
- I think on the balance of things, prehospital TXA should continue to be used in patients with major trauma at risk of coagulopathy
- Longer term outcomes would also add to interpretation of this trial

Sangue Intero?

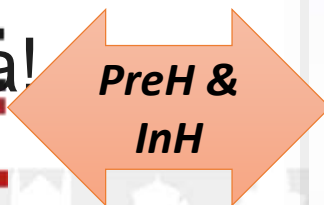
Low-titer group O whole blood (LTOWB)

- Tutti i componenti: emazie, plasma piastrine
- Meno volume (Vs Trasfusione Bilanciata meno additivi)
- > sopravvivenza

• > difficoltà log



CENTRO
NAZIONALE
SANGUE



ONLINE REVIEW ARTICLE

The Efficacy of Low-Titer Group O Whole Blood Compared With Component Therapy in Civilian Trauma Patients: A Meta-Analysis

Morgan, Katrina M. MD, MPH¹; Abou Khalil, Elissa MD²; Feeney, Erin V. MD¹; Spinella, Philip C. MD, FCCM¹; Lucisano, Amelia C. MD, MS¹; Gaines, Barbara A. MD, FACS³; Leeper, Christine M. MD, MS¹

Author Information

Critical Care Medicine 52(7):p e390-e404, July 2024. | DOI: 10.1097/CCM.0000000000006244



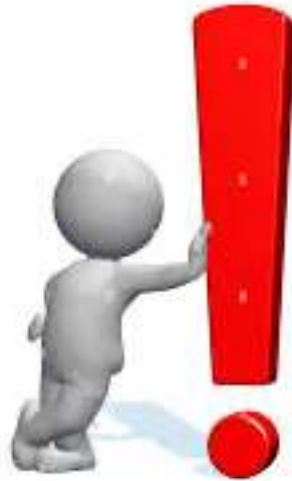
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BFF? Best ~~Friend~~ Fluid Forever in PreH?



PreH



InH



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R x3



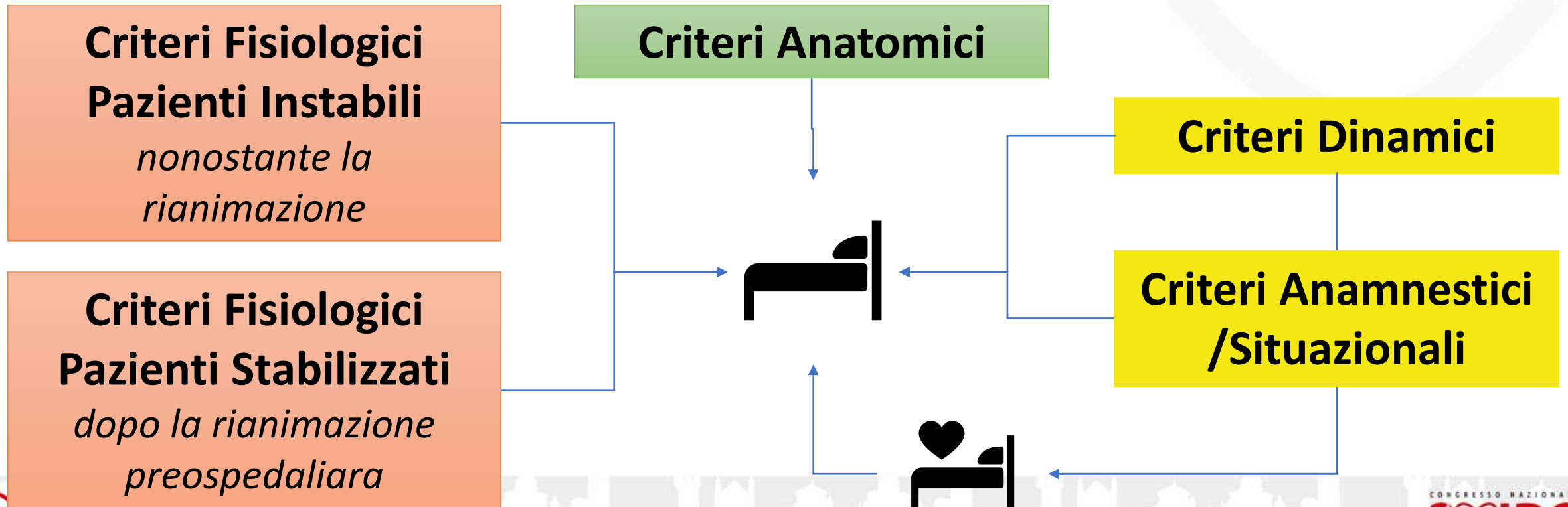
7. Centralizzazione!



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Criteria di Centralizzazione «PreHospital Field Triage»



GRADO A: instabili nonostante la rianimazione

- Pressione sistolica arteriosa < 90 mmHg nonostante l'utilizzo di farmaci vasopressori e più di 1 litro di soluzioni cristalloidi e/o trasfusioni pre-ospedaliere
- SpO2 < 90% nonostante l'utilizzo di ventilazione meccanica o l'utilizzo di maschere facciali ad alto flusso

GRADO B: stabilizzato dopo la rianimazione preospedaliere o criteri anatomici

- Pressione sistolica > 90 mmHg o SpO2 >90% dopo una resuscitazione iniziale
- Lesione cerebrale traumatica isolata con GCS< 13 o GCS sulla risposta motoria <5
- Sospetto di trauma del midollo spinale
- Fratture toraciche multiple e volet costale
- Trauma pelvico severo
- Ferita penetrante
- Amputazione o arto schiacciato

GRADO C: stabile con situazione in potenziale evoluzione o anamnesi medica a rischio

- Caduta da più di sei metri
- Vittima di esplosione o eiettata
- Decesso del passeggero accanto
- Valutazione della velocità: deformazione della vettura, no cintura di sicurezza, no casco
- Anamnesi medica: <5 anni o > 65 anni, in gravidanza, disordini di coagulazione

Gravi & Instabili

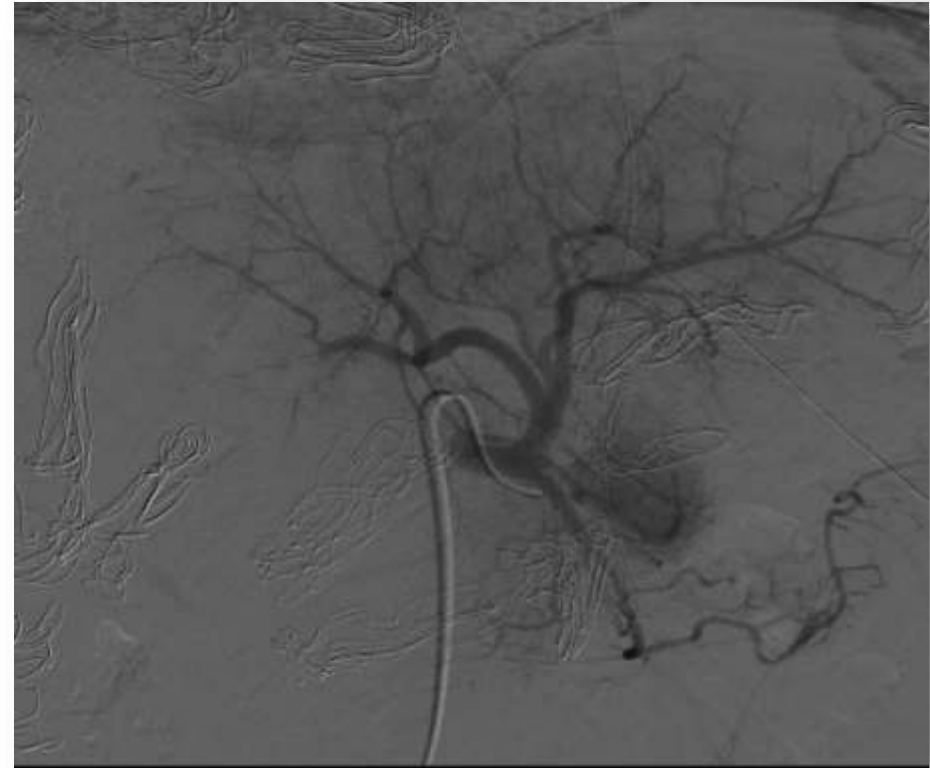
Gravi & Stabili o
Stabilizzati

NON Gravi &
Stabili

Nel sistema TRENAU:

- (1) i pazienti con **grado A** vengono destinati al *trauma center di I, II, III livello piu' vicino*, in caso di sosta tecnica al III livello sono trasferiti piu' rapidamente possibile ai livelli superiori;
- (2) i pazienti con **grado B** vengono avviati al *trauma center di I livello se con GCS<9 o lesione midollare*, al trauma center di I o II livello negli altri casi;
- (3) i pazienti con **grado C** vengono *indifferentemente* destinati ai trauma center di I,II o III livello

8. DC Surgery & Radiology



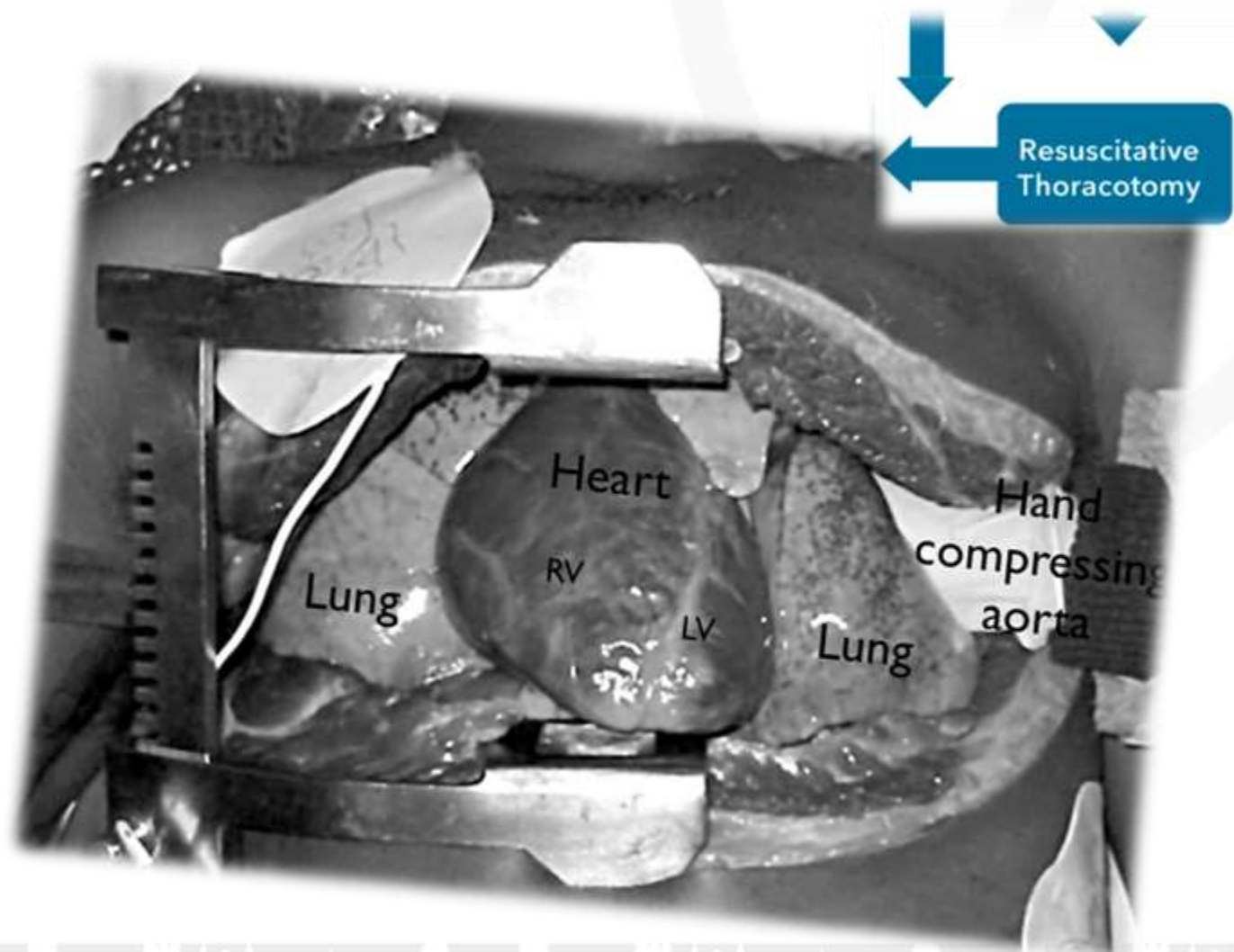
9. Extreme Resuscitation...



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Toracotomia Resuscitativa



Se :

✓ (Elapsed Time) Tempo <10-15'
ACR

✓ **Expertise**

✓ Equipment

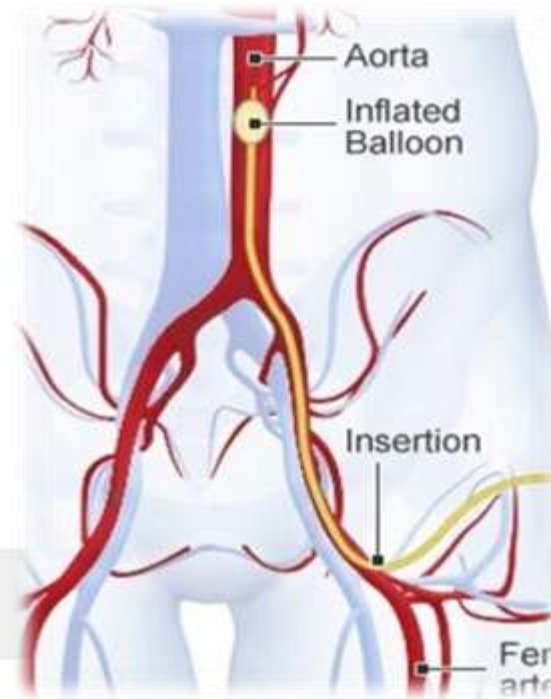
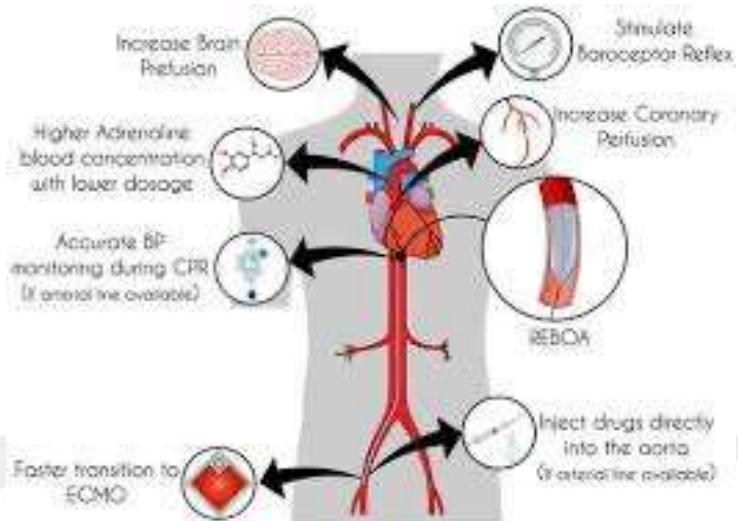
✓ Environment

Temporize the Bleeding



Stop
The
Bleeding!

REBOA



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10. ROSE → Resuscitation → Ottimizzazione & Stabilization in ICU/SICU

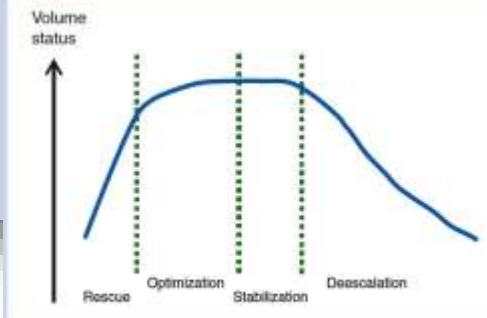
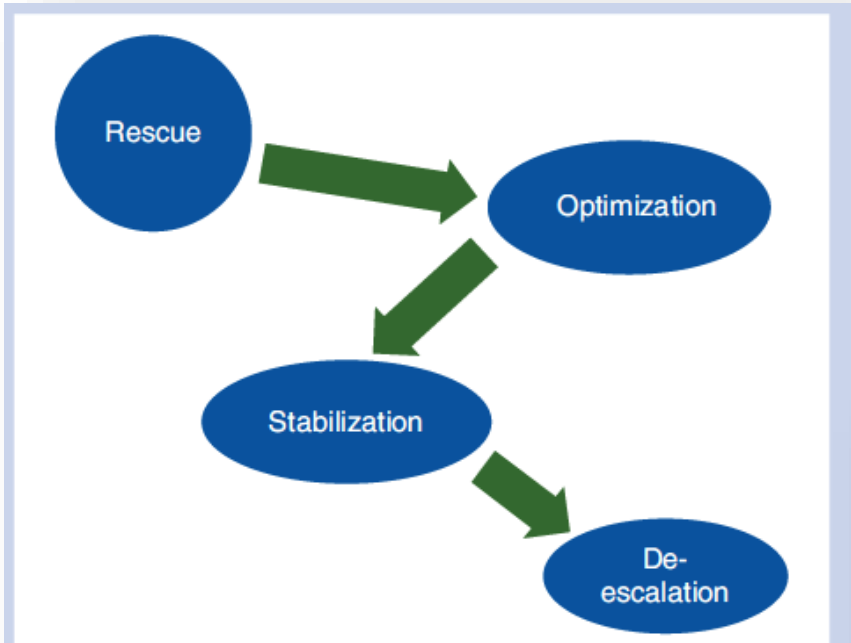


Fig 2 Patients' volume status at different stages of resuscitation. Reproduced with permission from ADQI (www.ADQI.org).

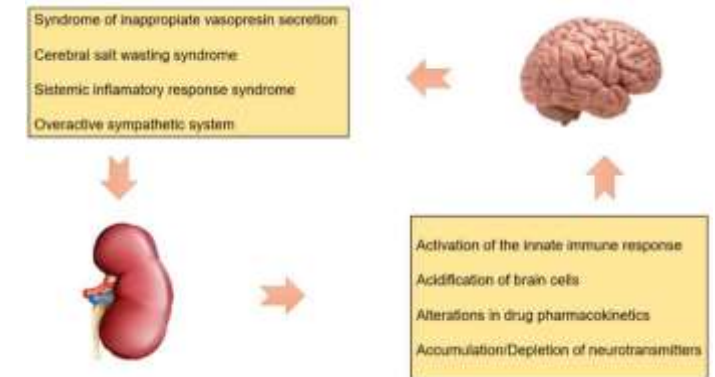
Renal, Coagulation, Metabolic Support

- AKI & Trauma
 - Shock & ipoperfusione
 - ACR traumatico
 - Rabdomiolisi
 - Fluid overload
 - Renal Trauma
 - Reboa zona 1



Indications for RRT:

- Severe metabolic acidosis.
- Hyperkalemia unresponsive to medical treatment.
- Significant fluid overload causing respiratory distress.
- Uremic complications such as encephalopathy.



... Piccolo THM



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BOLOGNA 13-14 DICEMBRE 2024

Resuscitate Before Intubate!

C problem is NOT 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.

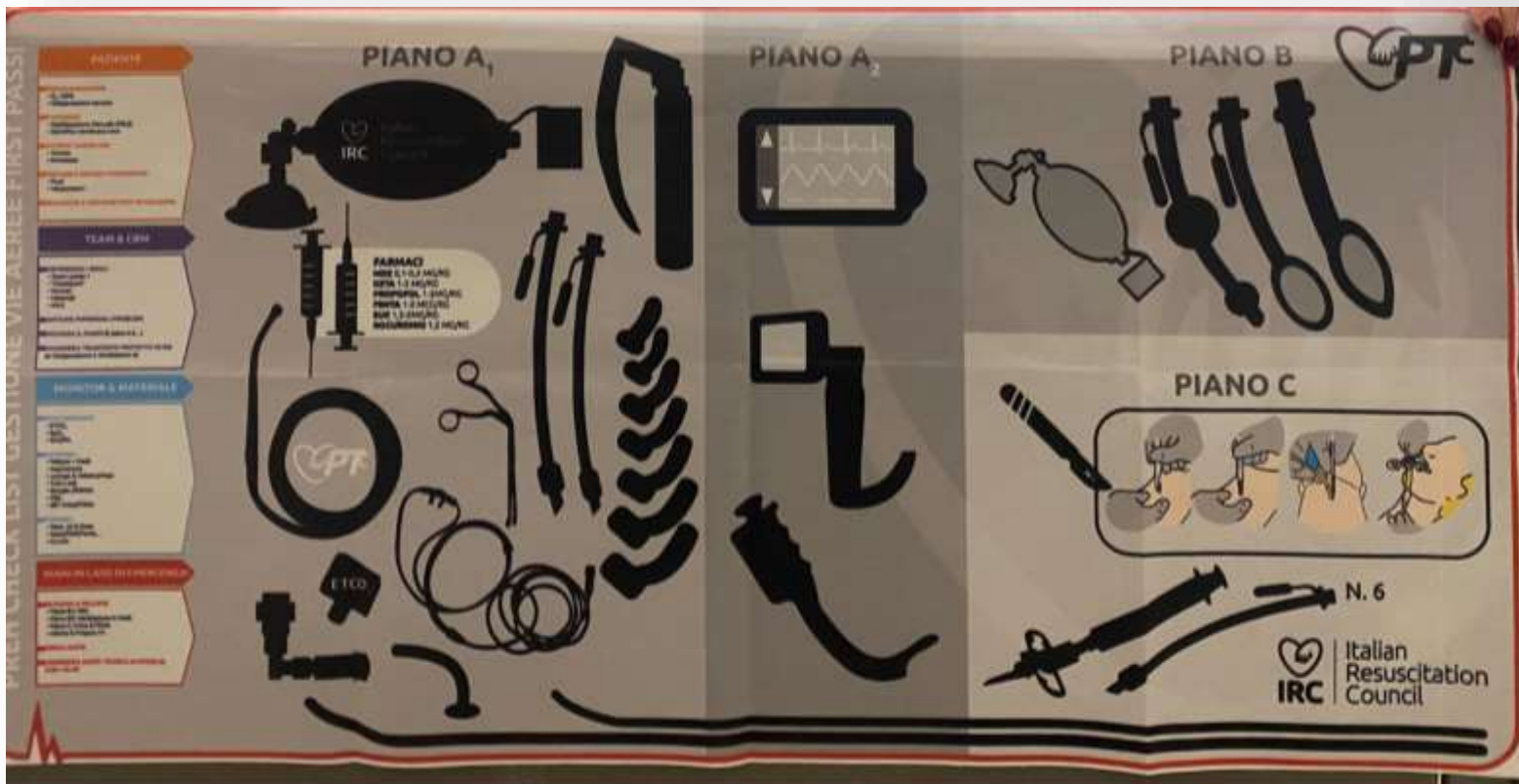
Drug or Dosage: What is the Important Factor?

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.



Piccolo Spot pubblicitario...



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Grazie



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