HEMS

FONDAZIONE ALESSANDRO VOLTA

VII EDIZIONE

ELISOCCORSO SANITARIO

TRA PROSPETTIVE E REALTA'

PROGRAMMA

PALERMO
24-26
MAGGIO
2018

24 Maggio 2018
Palazzo dei Normanni
Sala Gialla
25-26 Maggio 2018
NH Hotel, Palermo

REGIONE SICILIANA
ASSESSORATO DELLA SALUTE
118

Programma

25 MAGGIO 2018
NH HOTEL, PALERMO

9.00 Tavola rotonda " I percorsi clinici diagnostico-terapeutici"
moderatore: *M. Palmeri*

Gestione dello shock emorragico e protocolli di trasfusione massiva - *G. Perone*

Patologie tempo-dipendenti: le cenerentole IRA - *G. Misuraca*

ECLS: ACC extra ospedaliero e ECMO - *A. Forti, A. Peris*

La gestione delle vie aeree: sempre e solo intubazione ? - *A. Paoli*

Discussione

TRAUMA

I decessi sono imputabili a :

Emorragia → controllo delle perdite, trattamento della coagulopatia, mantenimento della perfusione, gestione della risposta infiammatoria

Lesioni neurologiche → utilizzo DPI (prevenzione primaria ed educazione alla popolazione)

1 causa di morte per età < 40aa

PREHOSPITAL-LEVEL CARE

HOSPITAL-LEVEL CARE

Primary Prevention and Education

Community-based violence prevention
AAA surveillance
Peripartum oxytocin
Helicobacter pylori eradication

Education courses:
- Bleeding Control Basic (B-Con Basic) Course
- Prehospital Trauma Life Support (PHTLS) Course
- Rural Trauma Team Development Course (RTTDC)
- Advanced Trauma Life Support (ATLS) Student Course

Rapid Identification of Hemorrhagic Shock

Prehospital history of major blood loss and treatment with anticoagulants or antiplatelets
Physical examination, radiographs, and ultrasonography of the torso (FAST) to determine sources of bleeding
Laboratory work (blood type, blood gas with lactate, CBC, electrolytes, coagulation studies, and TEG or TEM)
Immediate resuscitation for patients in shock with the use of rapid infuser and fluid warmer
Early massive-transfusion-protocol activation for patients in shock

0 Bleeding Event → 1 → 2 → 3 → 4

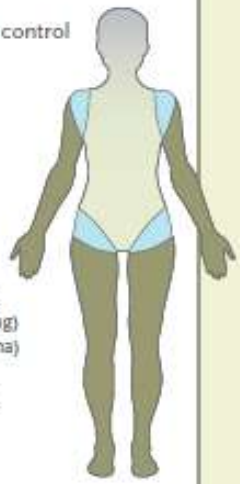
Prehospital Interventions

Hemorrhagic identification and control

Compressible sites
Use direct pressure or tourniquet proximal to bleeding site

Junctional sites
Apply hemostatic dressing

Noncompressible sites
Signs may be obvious (e.g., in gastrointestinal bleeding) or occult (e.g., after trauma)
Apply pelvic binder for suspected pelvic fracture



Limited resuscitation
Hypothermia prevention
Rapid transport to medical facility

Definitive Hemostasis

Rapidly control all sites of hemorrhage
Examples:
- Surgical exploration
- Angiography with embolization
- Endoscopic intervention

Posthemostasis

Reassess patient for ongoing bleeding, coagulopathy, and unpaid oxygen debt
Perform repeat laboratory tests (blood gas with lactate, CBC, electrolytes, coagulation studies, and TEG or TEM)
Transfusions should be compatible with blood group if possible
Avoid over- or under-resuscitation
Perform ultrasonography to assess intravascular volume status and cardiac function

What	Cosa ???
When	Quando ???
Where	Dove ???
Who	Chi ???
Why	Perché ???

Con cosa rimpiazziamo

Optimal Fluid Therapy for Traumatic Hemorrhagic Shock

Ronald Chang, MD[1,2,3] and John B. Holcomb, MD[1,2]

Balanced Resuscitation in Trauma Management

* Corresponding author.
E-mail address: Bryan.A.Cotton@uth.tmc.edu

Surg Clin N Am 97 (2017) 999–1014
http://dx.doi.org/10.1016/j.suc.2017.06.002

Patient-Centered Outcomes and Resuscitation Fluids

N ENGL J MED 378;9 NEJM.ORG MARCH 1, 2018

John Myburgh, M.D., Ph.D.

The effectiveness of a 'Code Red' transfusion request policy initiated by pre-hospital physicians

Injury, Int. J. Care Injured 47 (2016) 3–6

Anne E. Weaver[a], Ceri Hunter-Dunn[b,*], Richard M. Lyon[a], David Lockey[c,d,e], Charlotte L. Krogh[e]

Rossaint et al. Critical Care (2016) 20:100
DOI 10.1186/s13054-016-1265-x

Critical Care

RESEARCH Open Access

The European guideline on management of major bleeding and coagulopathy following trauma: fourth edition

Cosa infondere … e quanto

- cristalloidi
- colloidi
- Sangue intero !? (in uso sui campi di guerra)
- Emoderivati ….. quale rapporto
- Emostatici: fibrinogeno ac.tranexamico fattore VII ricombinante

	Fresh whole blood	1:1:1 component therapy
Hematocrit (%)	38–50	29
Platelets (x 109/L)	150–400	88
Coagulation factor activity (%)	100	65

Quando è necessario rimpiazzare

Summary points

- Critically injured trauma patients may have normal cardiovascular and respiratory parameters (pulse, blood pressure, respiratory rate) and no single physiological or metabolic factor accurately identifies all patients in this group
- Initial resuscitation for severely injured patients is based on a strategy of permissive hypovolaemia (hypotension) (that is, fluid resuscitation delivered to increase blood pressure without reaching normotension, aiming for cerebration in the awake patient, or 70-80 mm Hg in penetrating trauma and 90 mm Hg in blunt trauma) and blood product based resuscitation
- This period of hypovolaemia (hypotension) should be kept to a minimum, with rapid transfer to the operating theatre for definitive care
- Crystalloid or colloid based resuscitation in severely injured patients is associated with worse outcome
- Once haemostasis has been achieved, resuscitation targeted to measures of cardiac output or oxygen delivery or use improves outcome
- Tranexamic acid administered intravenously within 3 h of injury improves mortality in patients who are thought to be bleeding

Crit Care Clin 33 (2017) 71–84

Prediction of Massive Transfusion in Trauma

Basta la clinica???

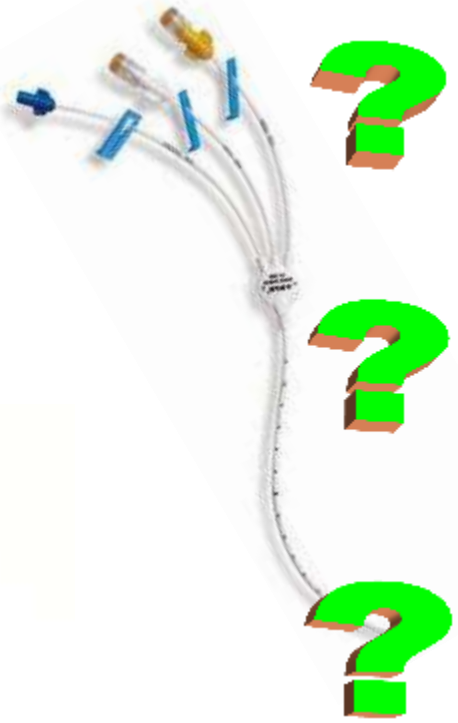
Esperienza personale???

Alcune certezze:

PAS 70-80mmHg (trauma penetrante) PAS 90mmHg (trauma chiuso)

se PAS 110mmHg (trauma cranico)

Dove!? Accesso infusivo idoneo!!



Chi necessita di rimpiazzo

1) Trauma penetrante ???
2) Trauma cranico grave ???
3) Trauma chiuso ???

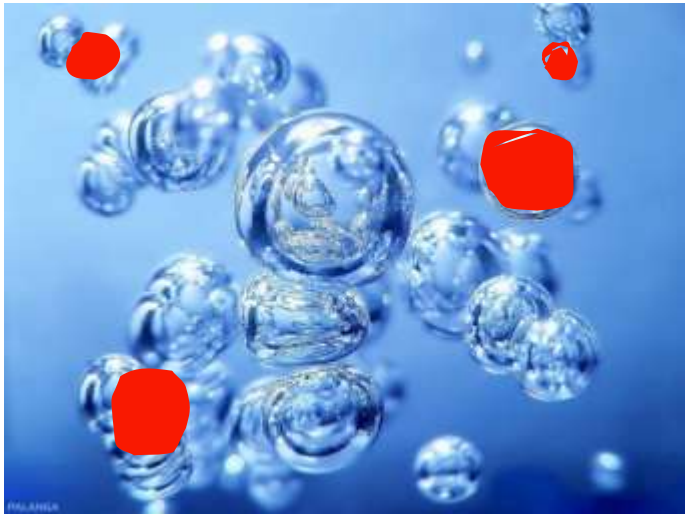
Chi necessita di rimpiazzo

Table 2. Classification of Hemorrhagic Shock.*

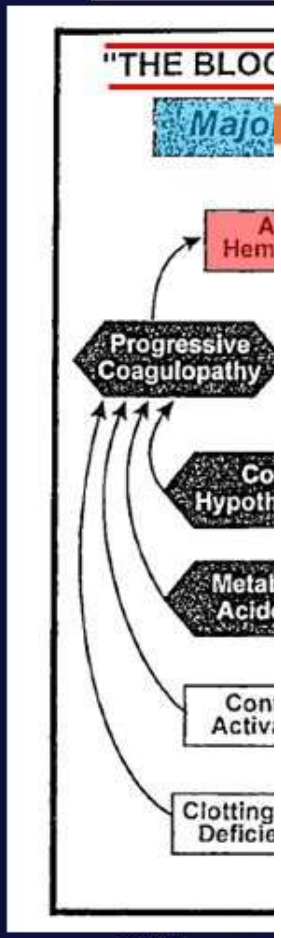
Shock Class	Blood Loss†	Heart Rate	Blood Pressure	Pulse Pressure	Respiratory Rate	Mental Status
	ml (%)	*beats/min*			*breaths/min*	
I	<750 (15)	<100	Normal	Normal	14–20	Slightly anxious
II	750–1500 (15–30)	100–120	Normal	Narrowed	20–30	Mildly anxious
III	1500–2000 (30–40)	120–140	Decreased	Narrowed	30–40	Anxious, confused
IV	>2000 (>40)	>140	Decreased	Narrowed	>35	Confused, lethargic

* Data are from the American College of Surgeons Committee on Trauma.[42]
† Blood-loss volume and percentage of total blood volume are for a male patient with a body weight of 70 kg.

Evitare la triade

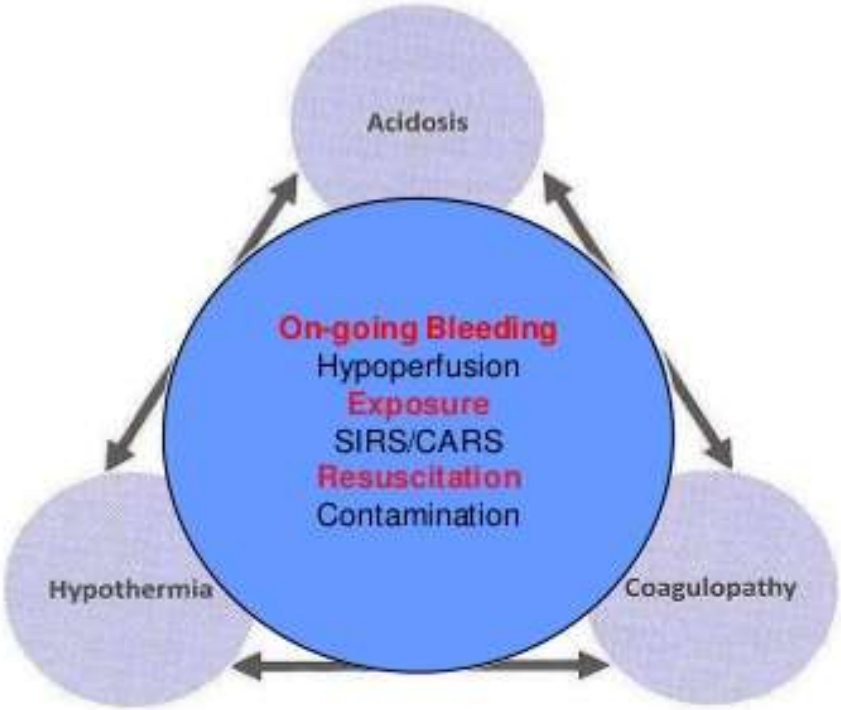


The Trauma Triad of Death: Hypothermia, Acidosis, and Coagulopathy



E. Moore

DCR Priorities Beyond ABCDE of ATLS

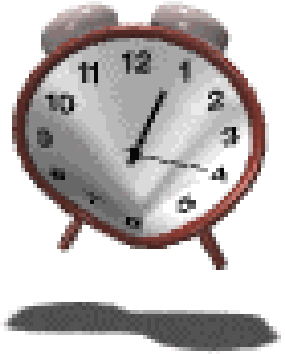


Balanced Resuscitation or Permissive Hypotension	Haemostatic Resuscitation	Damage Control Surgery

TIC trauma induce coagulopathy

Causes of acute coagulopathy of trauma-shock

Causes	Effects
Tissue trauma	Exposing the subendothelial matrix with platelet activation Liberation of Factor VII and thrombin
Fibrinolysis	Tissue thromboplastin increases in the resence of thrombin
Shock	Mechanism unknown; related to depletion of Protein C
Hypothermia	Inhibits coagulation serinases. Decreases platelet function
Haemodilution	Dilution of clotting factors. Incorporation of colloids into clot.
Acidosis	Reduction of Xa-Va prothrombinase complex activity Platelet form spheres which are devoid of aggregating tendency
Inflamation	Activated by neutrophils with platelet dysfunction Monocyte adherence to platelets
Hypocalcaemia	Due to citrate in blood and blood components



E’ sempre necessario il rimpiazzo

perché!!!!

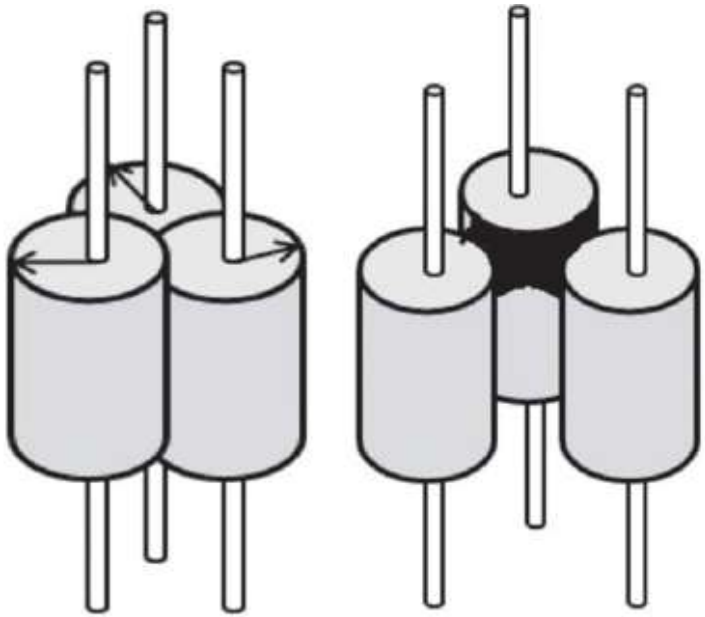
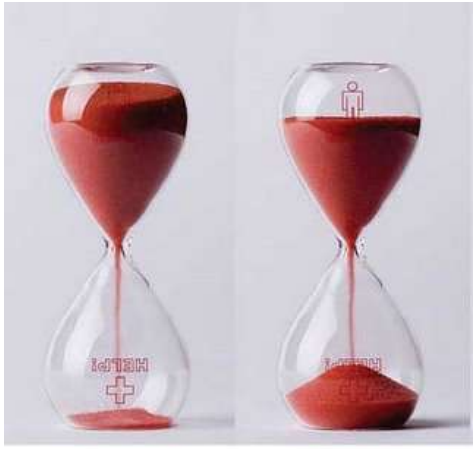
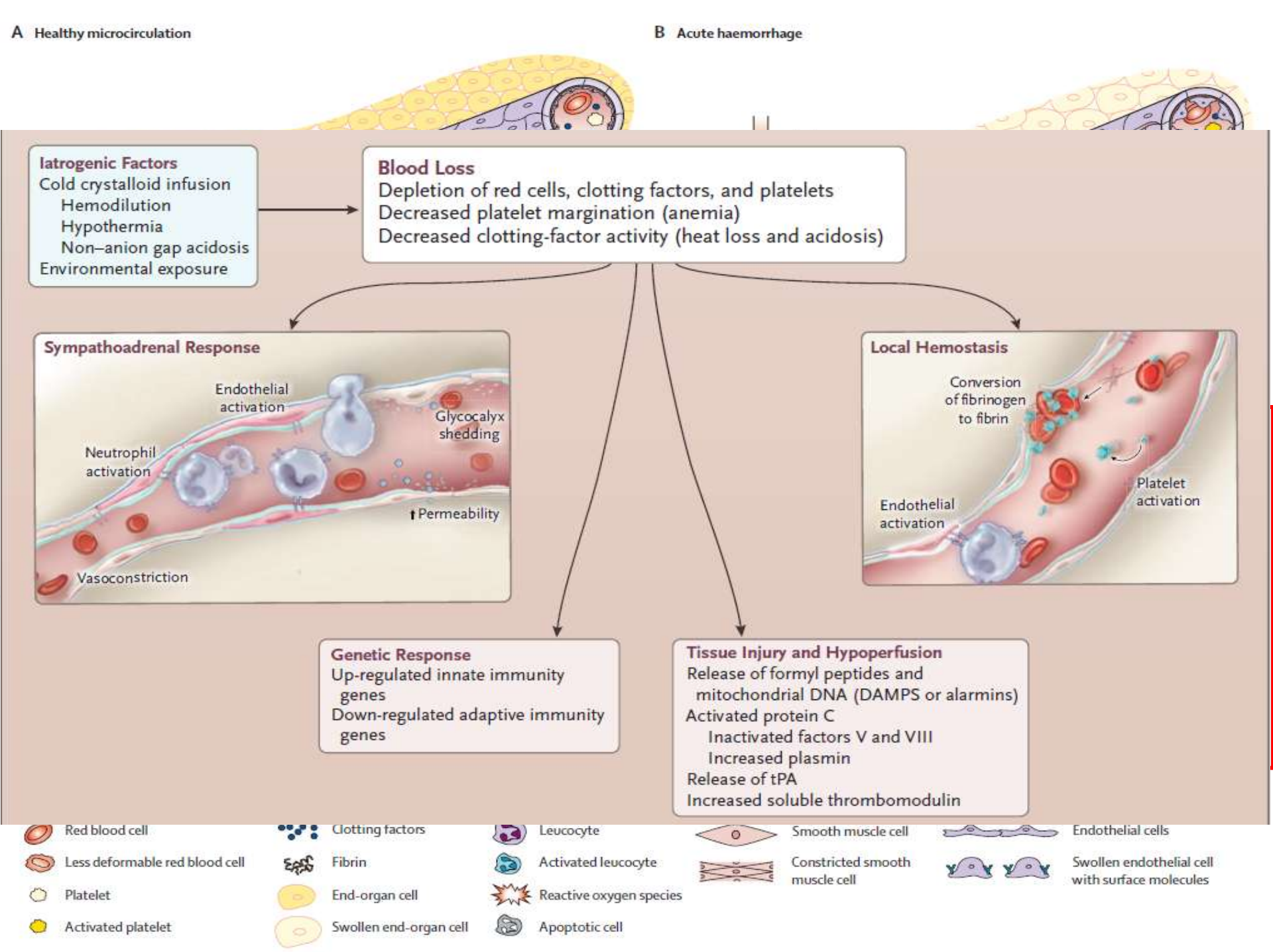


Fig. 2: Diagrammatic Presentation of Krogh's Model of Tissue Perfusion. Cylindrical area of supply around each capillary normally overlaps. Tissue oedema separates the cylinders, causing hypoperfusion in the intervening area (black).




A Healthy microcirculation
B Acute haemorrhage
Iatrogenic Factors
Cold crystalloid infusion
Hemodilution
Hypothermia
Non–anion gap acidosis
Environmental exposure
Blood Loss
Depletion of red cells, clotting factors, and platelets
Decreased platelet margination (anemia)
Decreased clotting-factor activity (heat loss and acidosis)
Sympathoadrenal Response
Endothelial activation
Glycocalyx shedding
Neutrophil activation
Permeability
Vasoconstriction
Local Hemostasis
Conversion of fibrinogen to fibrin
Platelet activation
Endothelial activation
Genetic Response
Up-regulated innate immunity genes
Down-regulated adaptive immunity genes
Tissue Injury and Hypoperfusion
Release of formyl peptides and mitochondrial DNA (DAMPS or alarmins)
Activated protein C
Inactivated factors V and VIII
Increased plasmin
Release of tPA
Increased soluble thrombomodulin
Red blood cell
Less deformable red blood cell
Platelet
Activated platelet
Clotting factors
Fibrin
End-organ cell
Swollen end-organ cell
Leucocyte
Activated leucocyte
Reactive oxygen species
Apoptotic cell
Smooth muscle cell
Constricted smooth muscle cell
Endothelial cells
Swollen endothelial cell with surface molecules

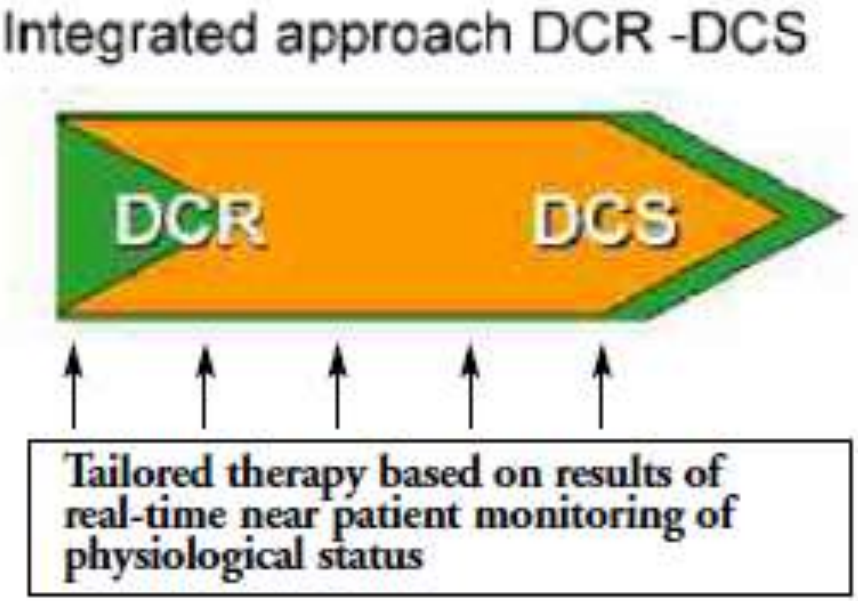
Perché?

Damage Control Resuscitation DCR

Rianimazione dilazionata

Emostasi precoce

Ipotensione permissiva →minimizzo/ottimizzo il riempimento volemico fino all'arresto chirurgico dell'emorragia



Ridurre al minimo il periodo di rianimazione ipotensiva-ipovolemica

L'organizzazione dei soccorsi **deve** prevedere un ***PDTA*** per la risoluzione rapida e definitiva della perdita ematica

Comunicazione ottimale tra extra ed intra-ospedaliero

MTP

Table S1. Massive transfusion prediction scores

	Elements Included	AUROC	Notes; number of patients used to develop score
Clinical Gestalt[1]	Physician experience	0.62	PROMMTT data; n=966
ABC[2]	HR, SBP, +FAST, penetrating mechanism	0.86†	1 point for each positive element; score range 0-4; activate at ≥ 2; n=596
Individual Transfusion Trigger[3]	SBP, Hb, BE, INR, Temp	0.83†	n=170
LASSO Machine Learning[4]	HR, SBP, mechanism, gender, BE	0.96†	Algorithm programmed into a software application; n=10,900
			=3442
			=190
			=558
			to balance =0.97;
	fracture, FAST+, Lactate		ilable as an application; n=119
tPA Challenge[12]	Lt-LY30; Ht-TMA	0.86; 0.78	Obtained by adding tPA to TEG samples. Lt=low-dose tPA; Ht= high-dose tPA; n=324

†Based on retrospective data analysis

ABC, assessment of blood consumption; AUROC, area under the receiver-operator curve; BE, base excess; FAST, focused abdominal sonography for trauma; Hb, hemoglobin; HCT, hematocrit; HR, heart rate; INR, international normalized ratio; LASSO, least absolute shrinkage and selection operator; MTS, massive transfusion score; SBP, systolic blood pressure; TASH, trauma associated severe hemorrhage; TBSS, traumatic bleeding severity score; TEG, trhomboelastography; TMA, time to maximal amplitude; tPA, tissue plasminogen activator

Assessment of blood consumption (ABC) score. Score of ≥2 points predicted need for MT within 24 hours with sensitivity 75–90%, specificity 67–86%, and overall accuracy 84–86%

- Penetrating mechanism (no=0; yes=1)
- Emergency department systolic blood pressure <90 mmHg (no=0; yes=1)
- Emergency department heart rate >120 bpm (no=0; yes=1)
- Positive FAST exam (no=0; yes=1)

MT, massive transfusion; FAST, focused assessment with sonography in trauma.

Ruolo del SIMT

MTP noti ed attivi

Brescia 2013

Udine ?!

Legnano 2014

Trento 201?

Belluno 2017

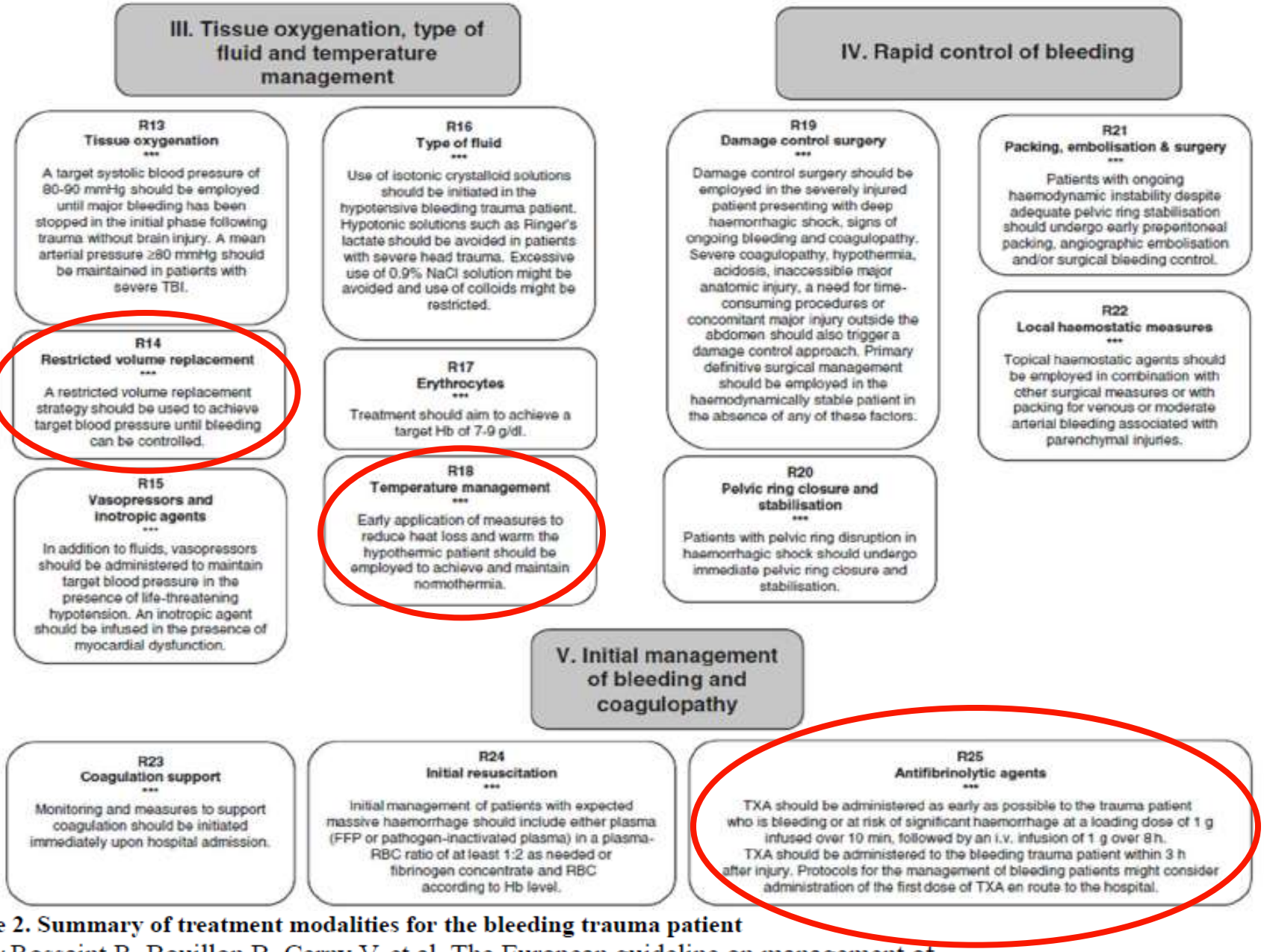


Figure 2. Summary of treatment modalities for the bleeding trauma patient

From: Rossaint R, Bouillon B, Cerny V, et al. The European guideline on management of major bleeding and coagulopathy following trauma: Fourth edition. Critical Care (2016): 20:100.

Stop sanguinamento

- N Engl J Med 378;9 nejm.org March 1, 2018 Patient-centered outcomes and resuscitation fluids
- Air Medical Journal 37 (2018) 151–153 The Tranexamic Acid Conundrum
- N Engl J Med 2018;378:370-9 Hemorrhagic shock
- Crit Care Clin 33 (2017) 71–84 Prediction of massive trasfusion in trauma
- Surg Clin N Am 97 (2017) 985–998 Assessment and resuscitation in trauma management
- Surg Clin N Am 97 (2017) 999–1014 Balanced Resuscitation in trauma management
- Critical Care (2016) 20:100 The European guideline on management of major bleeding and coagulopathy following trauma: fourth edition