



Italian
Resuscitation
Council

TRAUMA 2016

Moderatori: *Giovanni Gordini, Bologna - Giovanni Sesana, Milano*

- 14.30 Novità in ambito extraospedaliero *Carlo Coniglio, Bologna*
- 14.50 Novità in ambito intraospedaliero *Elvio De Blasio, Benevento*
- 15.10 PTC base *Brigida Panzarino, Putignano*
- 15.30 PTC avanzato *Alberto Spella, Carrara*
- 15.50 Nuovo corso trauma pediatrico *Giampaolo Garani, Ferrara*
- 16.10 Discussione

CONGRESSO NAZIONALE IRC

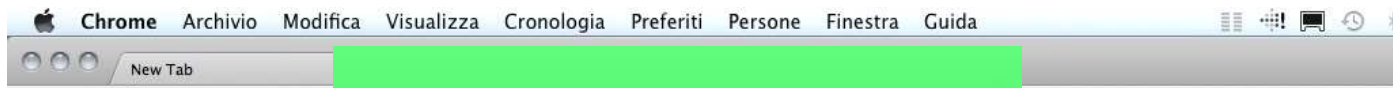
2016

20 - 21 OTTOBRE

KIDS SAVE LIVES MASS TRAINING

22 OTTOBRE 2016

NH MILANO CONGRESS CENTER ASSAGO



convegni

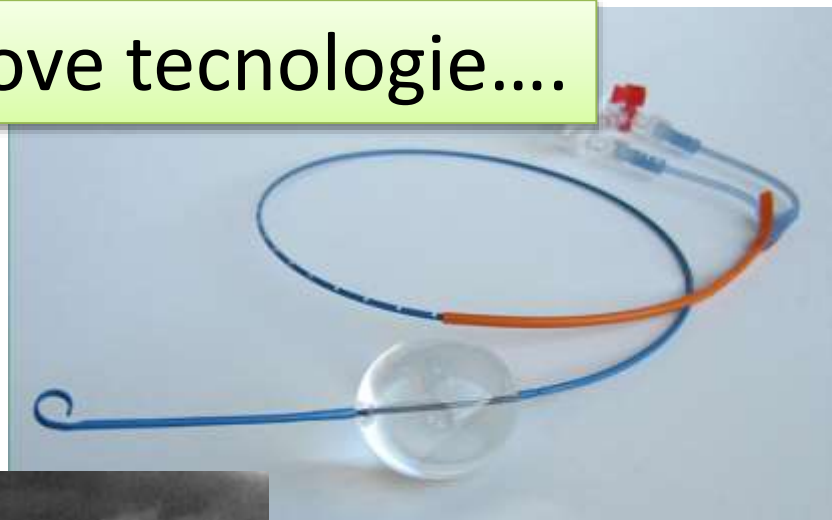


Novità in ambito intraospedaliero



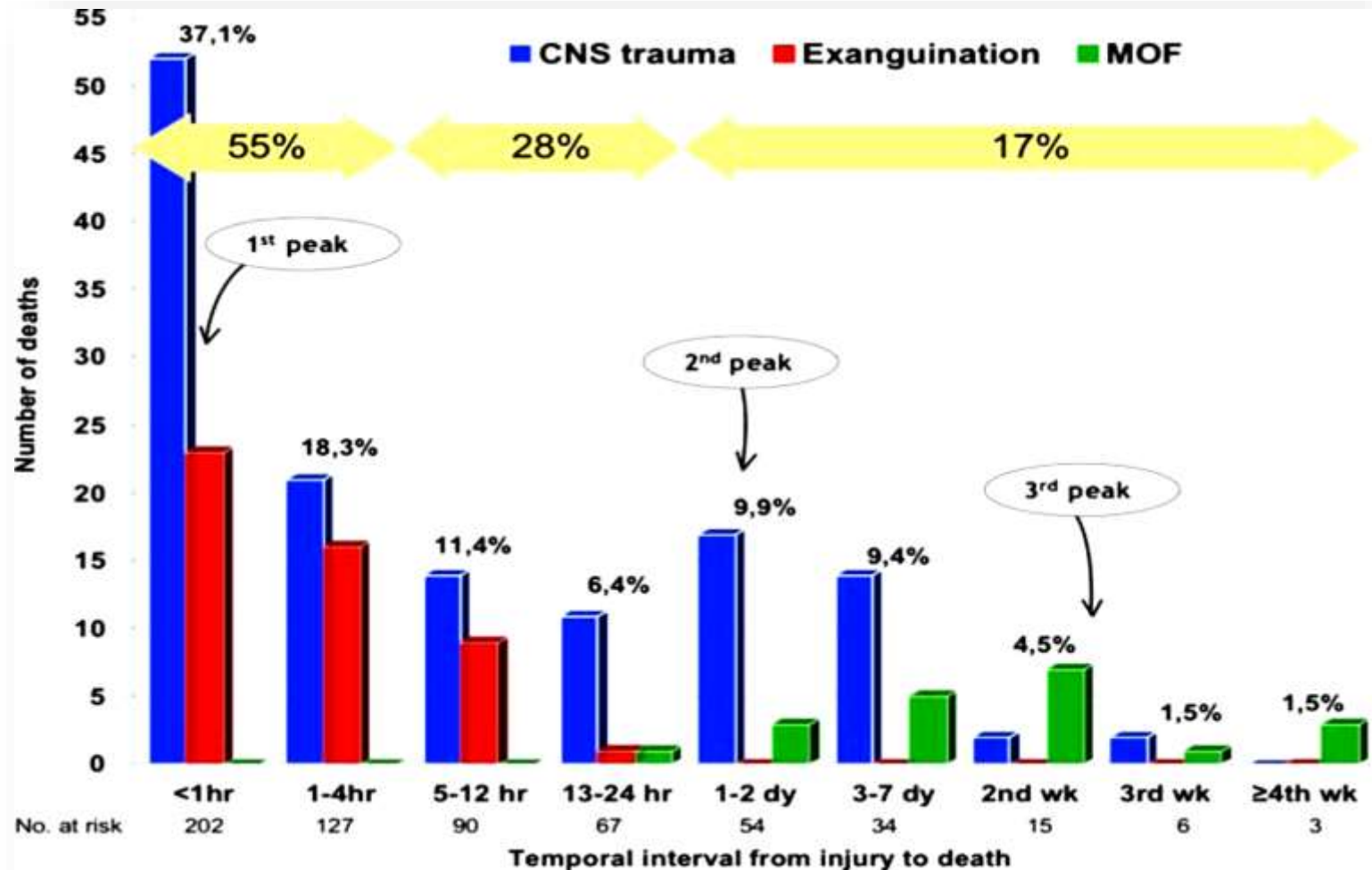
Nuovi farmaci.....

nuove tecnologie....



....o nuove strategie.....?

Di cosa si muore ?



Di cosa si muore ?

Mortality Patterns in Patients with Multiple Trauma: A Systematic Review of Autopsy Studies

Roman Pfeifer^{1*}, Michel Teuben¹, Hagen Andruszkow¹, Bilal M. Barkatali², H. Christoph Pape¹

PLOS ONE | DOI:10.1371/journal.pone.0148844 February 12, 2016

Table 4. Pattern of mortality and three most frequent causes of death over the period of 30 years.

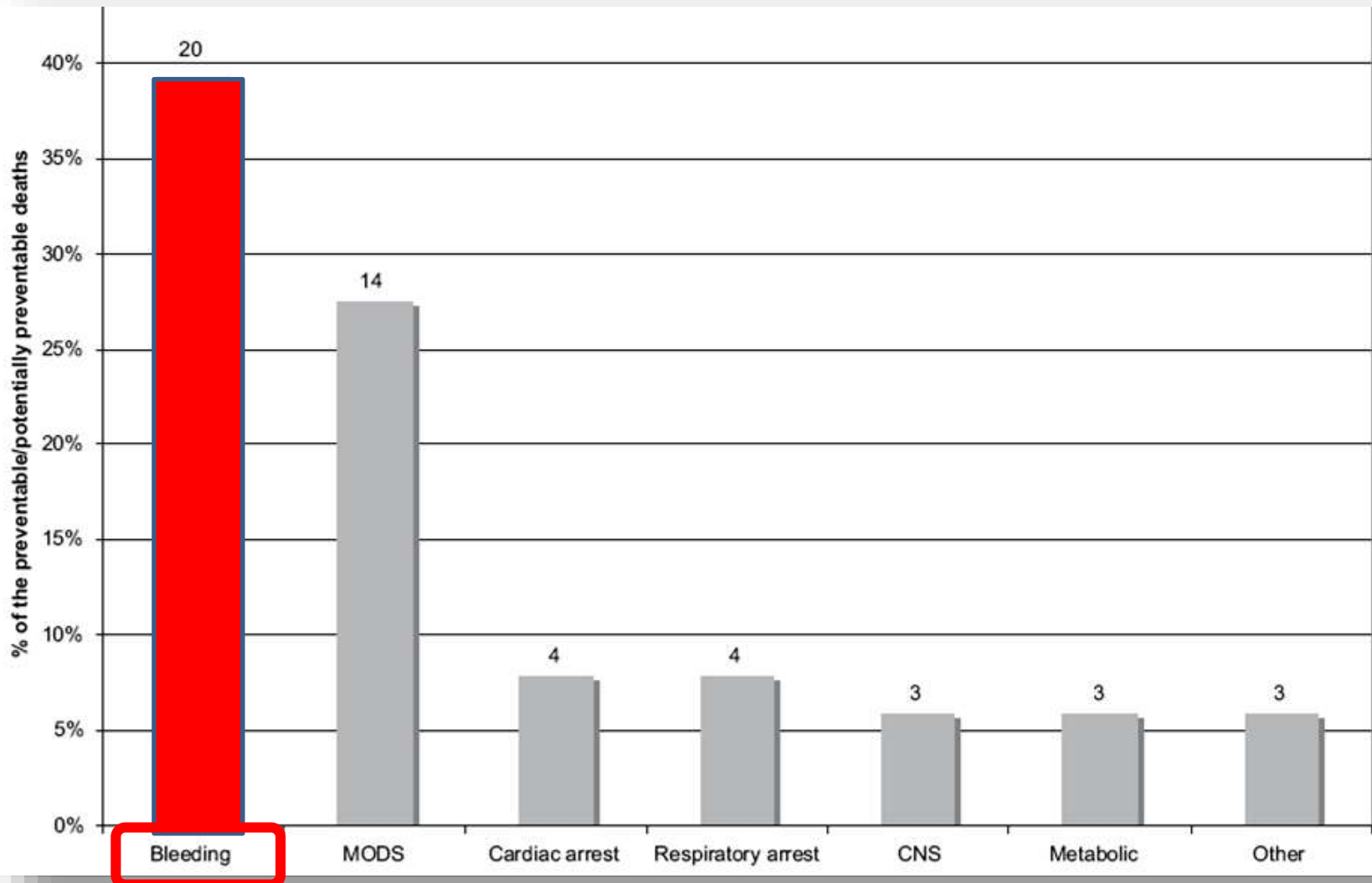
References	Pattern of mortality	Caused of deaths
(Baker et al., 1980)[7]	ND	BI ; TI ; HS
(Pories et al., 1989)[19]	ND	BI, HS ; Other
(Shackford et al., 1989)[20]	ND	BI ; HS ; TI
(Sahdev et al., 1994)[9]	Four peaks	BI, HS ; BI+HS
(Sauaia et al., 1995)[18]		BI ; HS ; MOF
(Meislin et al., 1997)[17]		BI ; HS ; Other
(Hodgson et al., 2000)[2]		BI ; Sepsis ; HS
(Marson et al., 2001)[22]		BI; HS; BI+HS
(Chiara et al., 2002)[14]		BI+HS ; HS ; BI
(Stewart et al., 2003)[23]		BI ; HS ; BI+HS
(Tien et al., 2007)[24]		BI ; HS ; BI+HS
(Søreide et al., 2007)[11]	Mode-dependent	BI ; HS ; MOF
(Pang et al., 2008)[25]	Unimodal	BI; HS; BI+HS
(Evans et al., 2010)[15]	Unimodal	BI; HS; BI+HS
(Kleber et al. 2012)[26]	Bimodal	PT; BI; HS

Trauma cranico
Shock emorragico

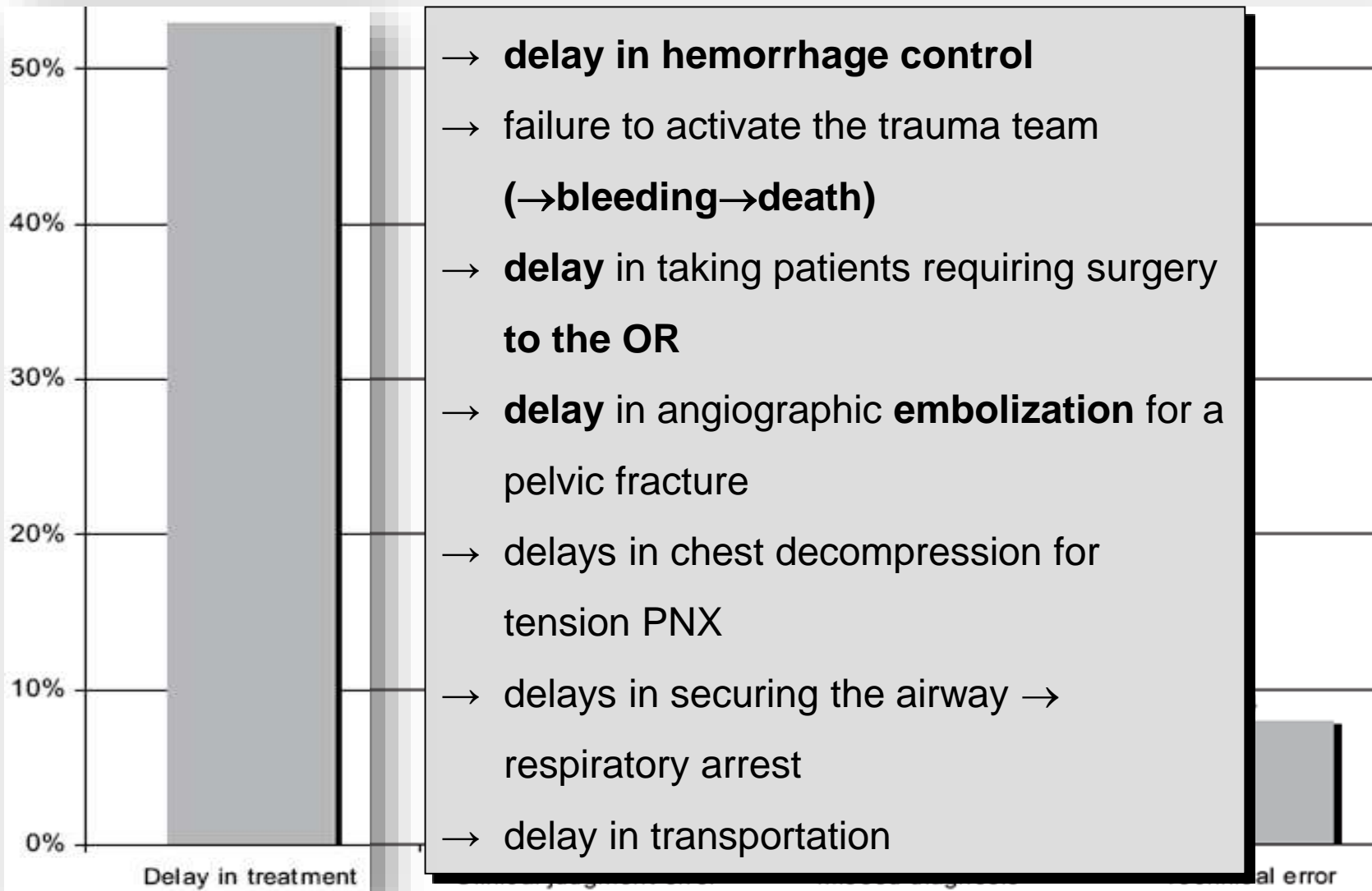
A trimodal distribution has not been confirmed in autopsy studies. Unimodal and bimodal distribution of deaths has been described. Moreover, brain injury, exsanguination and combination of brain injury and severe bleeding were the leading causes of death after trauma.

ND = No Data; BI = Brain Injury; TI = Thoracic Injury; HS = Haemorrhagic Shock; MOF = Multiple Organ Failure; PT = Polytrauma

Le morti prevenibili



Le morti prevenibili



Le linee guida 2016

Rossaint et al. *Critical Care* (2016) 20:109
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



Emorragia



September 2016

Trauma cranico

Guidelines for the Management of
Severe Traumatic Brain Injury
4th Edition

Major trauma: assessment and initial management

NICE guideline

Published: 17 February 2016

nice.org.uk/guidance/ng39

NICE



guideline

La gestione iniziale

Cosa dicono le recenti linee guida

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

Immediate intervention

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)

Fermare presto le perdite

We recommend that the time elapsed between injury and bleeding control be minimised. (Grade 1A)

Recommendation 3 We recommend the avoidance of hypoxaemia. (Grade 1A)

E intanto garantire il DO₂

Recommendation 16 We recommend that fluid therapy using isotonic crystalloid solutions be initiated in the hypotensive bleeding trauma patient. (Grade 1A)

Arrestare le perdite



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

Arrestare le perdite

Pelvic ring closure and stabilisation

Recommendation 20 We recommend that patients with pelvic ring disruption in haemorrhagic shock undergo immediate pelvic ring closure and stabilisation. (Grade 1B)



Arrestare le perdite



Recommendation 8 We recommend that patients with significant intra-thoracic, intra-abdominal or retroperitoneal bleeding and haemodynamic instability undergo urgent intervention. (Grade 1A)

dove si muore ?

Delays in controlling bleeding after blunt trauma

Site of Bleed	Age	ISS Score	Initial Base Deficit	Delay (hours)	Nature of the Delay
Chest	46	38	3	5.5	Missed aortic injury on CT; died in OR after rupture
Abdomen	29	28	4	10	Missed bleeding vessel (in spasm) on first laparotomy; died during second laparotomy
Pelvis	84	50	10	3.2	Delay from obtaining CT (had arterial extravasation); died waiting for angiography
Pelvis	59	30	8	3.5	Delay from obtaining CT (had arterial extravasation) and then negative lap; died in OR
Pelvis	49	41	6	8	Delay from obtaining CT (no arterial extravasation). Had angiographic embolization despite negative CT
Pelvis	63	66	5	4.5	Delay from obtaining CT (no arterial extravasation). Had angiographic embolization despite negative CT
Pelvis	79	35	11	3.5	Delay from having CT scan (no arterial extravasation) and then negative laparotomy; died in OR
Pelvis	88	54	4	1.5	Delay from going for laparotomy and ex fix. Died in OR, awaiting angiography
Pelvis	42	24	13	4.5	Delay from going for laparotomy and ex fix. Died in OR, awaiting angiography
Pelvis	70	41	7	6	Delay from going for laparotomy and ex fix. Died in OR, awaiting angiography
Pelvis	55	57	10	3.5	Delay from going for laparotomy and ex fix. Died in OR, awaiting angiography
Pelvis	46	50	23	2.5	Delay from going for laparotomy and ex fix. Died in OR, awaiting angiography
Pelvis	27	42	15	4.0	Delay from going for laparotomy and ex fix. Died in OR, awaiting angiography
Pelvis	21	41	16	5.5	Delay from going for laparotomy and ex fix. Had angiographic embolization, then died ICU

Guadagnare tempo

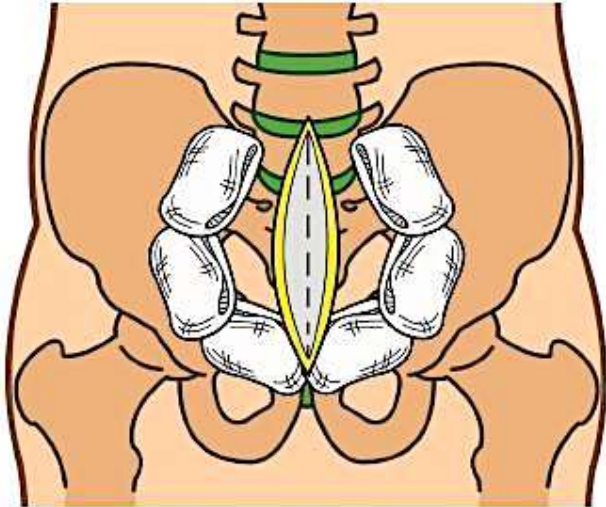
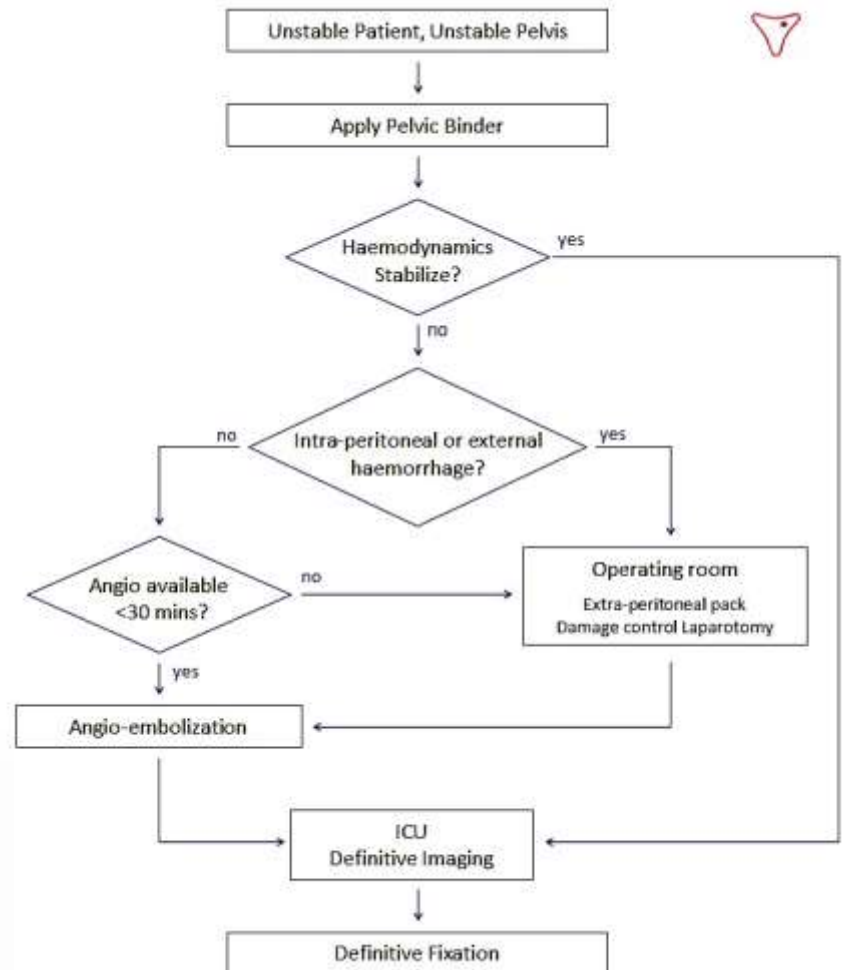


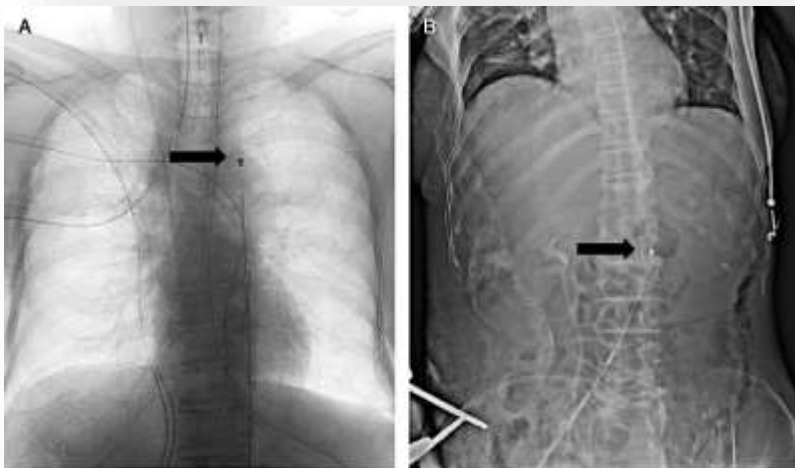
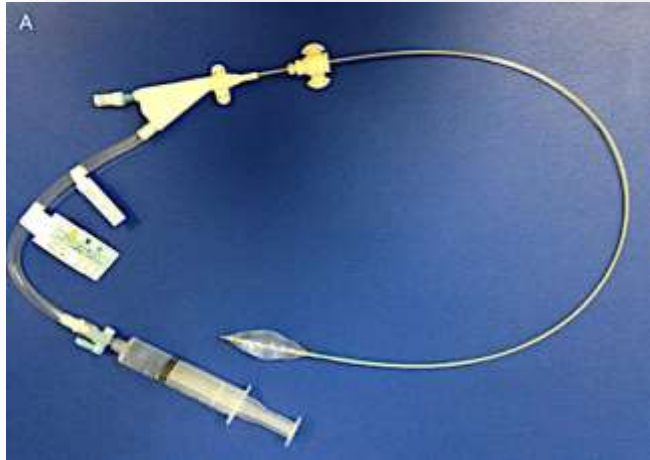
FIG. 8. Packing pélvico: localização da colocação das compressas e via de abordagem.

Packing, embolisation and surgery

Recommendation 21 We recommend that patients with ongoing haemodynamic instability despite adequate pelvic ring stabilisation receive early pre-peritoneal packing, angiographic embolisation and/or surgical bleeding control. (Grade 1B)



Guadagnare tempo



DHMC Algorithm: Management of Patient with Unstable Pelvic Fractures and Severe Hemorrhagic Shock

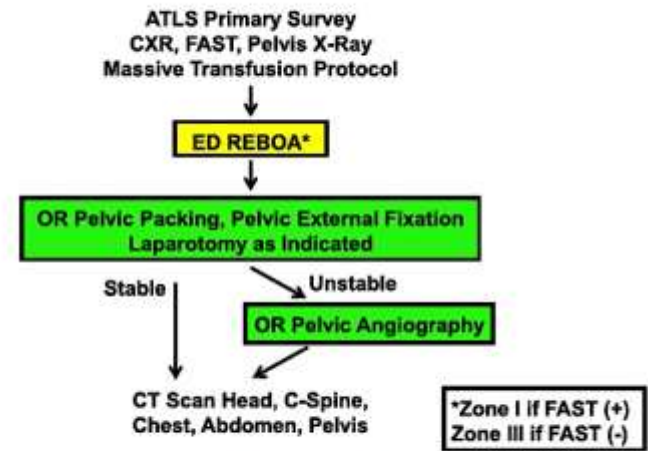


Figure 3. Revised Denver Health Medical Center (DHMC) algorithm for the management of hemodynamically unstable patients with mechanically unstable pelvic fractures. ATLS, advanced trauma life support.

The role of REBOA in the control of exsanguinating torso hemorrhage

Walter L. Biffl, MD, Charles J. Fox, MD, and Ernest E. Moore, MD, Denver

J Trauma Acute Care Surg
Volume 78, Number 5

Algorithm for Control of Torso Hemorrhage

Localize Hemorrhage with CXR, FAST, Pelvis X-Ray

	SBP	A CPR	B <60	C 60-80	D > 80
1 Thoracic Hemorrhage		EDT	EDT	EDT vs OR	OR Thoracotomy
2 Abdominal Hemorrhage		EDT	EDT vs REBOA	OR vs REBOA	OR Laparotomy
3 Pelvic Hemorrhage		EDT	REBOA vs EDT	REBOA	OR Pelvic Packing

Figure 1. Algorithm for torso hemorrhage control. EDT, emergency department resuscitative thoracotomy.

Trattare precocemente la coagulopatia

Acute Traumatic Coagulopathy in Severe Injury

Incidence, Risk Stratification, and Treatment Options

FIGURE 2

Severely Injured patients (%)

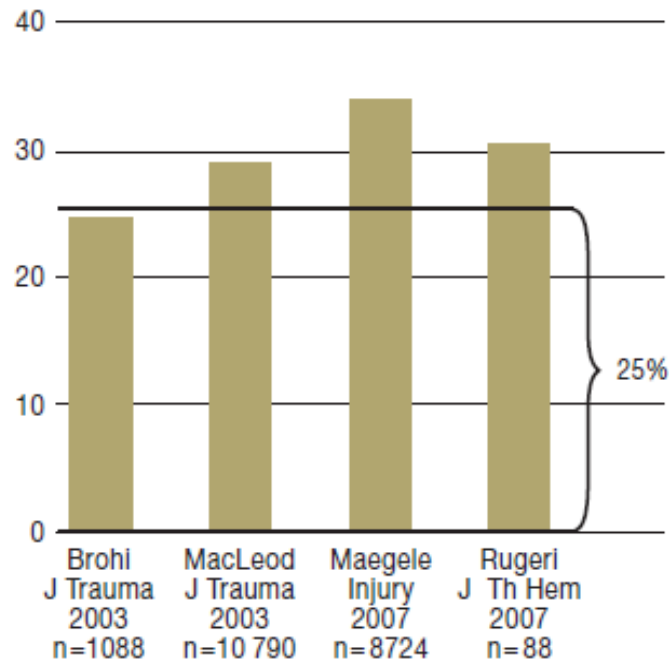
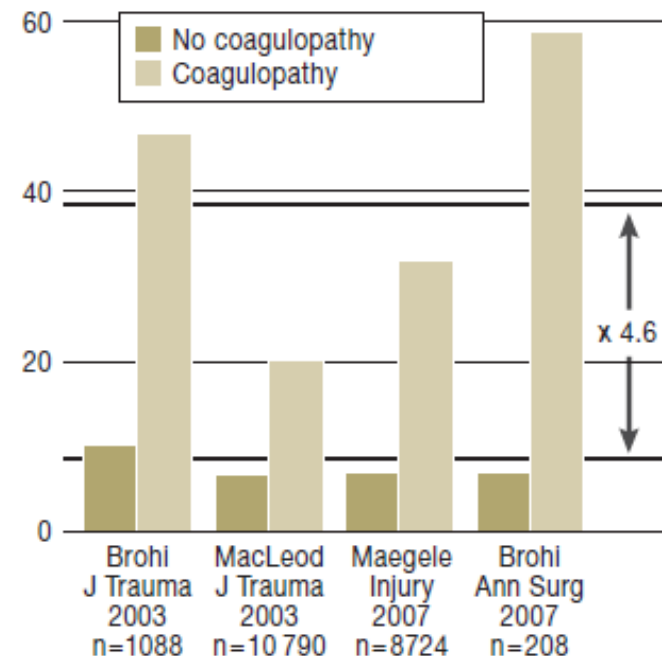


FIGURE 3

Mortality (%)



Trattare precocemente la coagulopatia

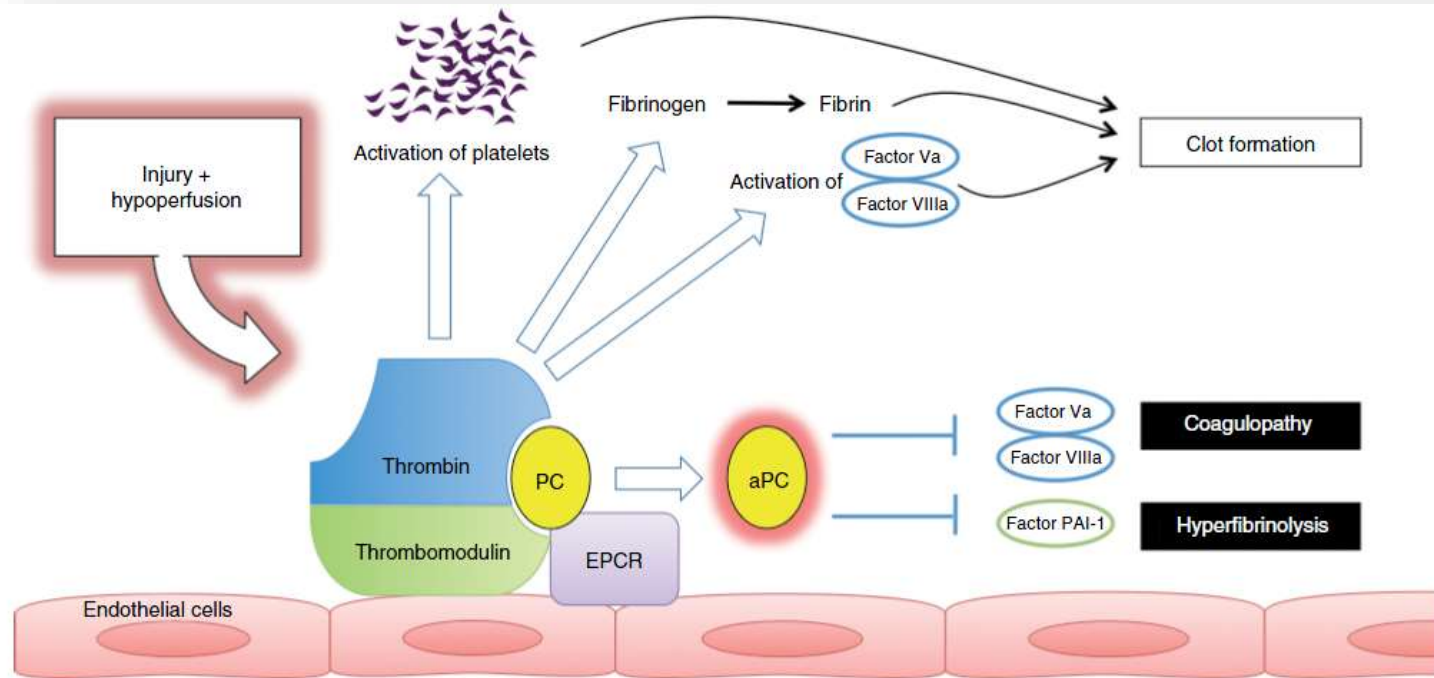


Fig. 3 Simple overview of the thrombin–thrombomodulin complex and protein C (PC) in inducing coagulopathy after trauma. Injury and hypoperfusion induce excess expression of thrombomodulin on the endothelial cell wall. Following a thrombin burst, thrombin combines with thrombomodulin and the endothelial protein C receptor (EPCR); this complex activates protein C. Activated protein C (aPC) probably plays an essential role by inhibiting factors V, VIII and plasminogen activator inhibitor (PAI) 1, causing a hypocoagulable and hyperfibrinolytic state

Trattare precocemente la coagulopatia

Recommendation 23 We recommend that monitoring and measures to support coagulation be initiated immediately upon hospital admission. (Grade 1B)

Initial coagulation resuscitation

Recommendation 24 In the initial management of patients with expected massive haemorrhage, we recommend one of the two following strategies:

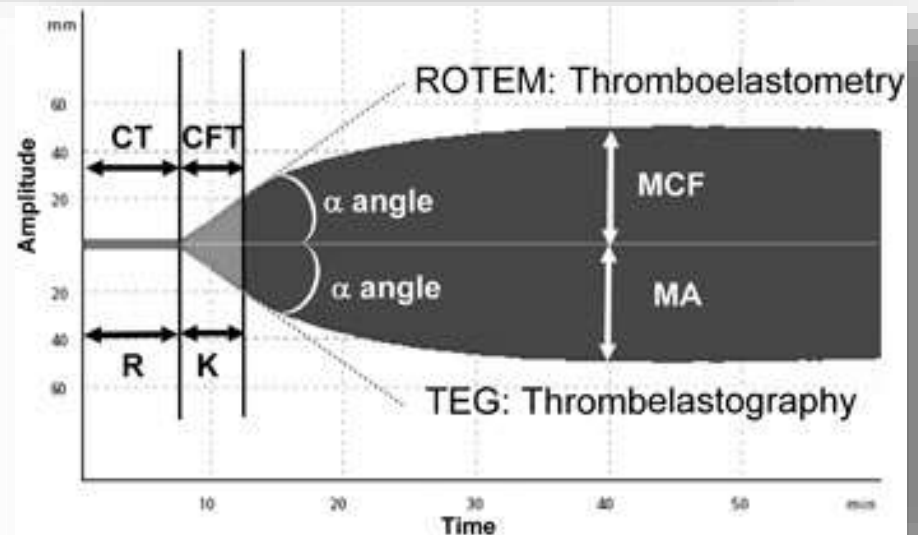
- Plasma (FFP or pathogen-inactivated plasma) in a plasma–RBC ratio of at least 1:2 as needed. (Grade 1B)
- Fibrinogen concentrate and RBC according to Hb level. (Grade 1C)

Recommendation 25 We recommend that tranexamic acid be administered as early as possible to the trauma patient who is bleeding or at risk of significant haemorrhage at a loading dose of 1 (Grade 1A)

Trattare precocemente la coagulopatia

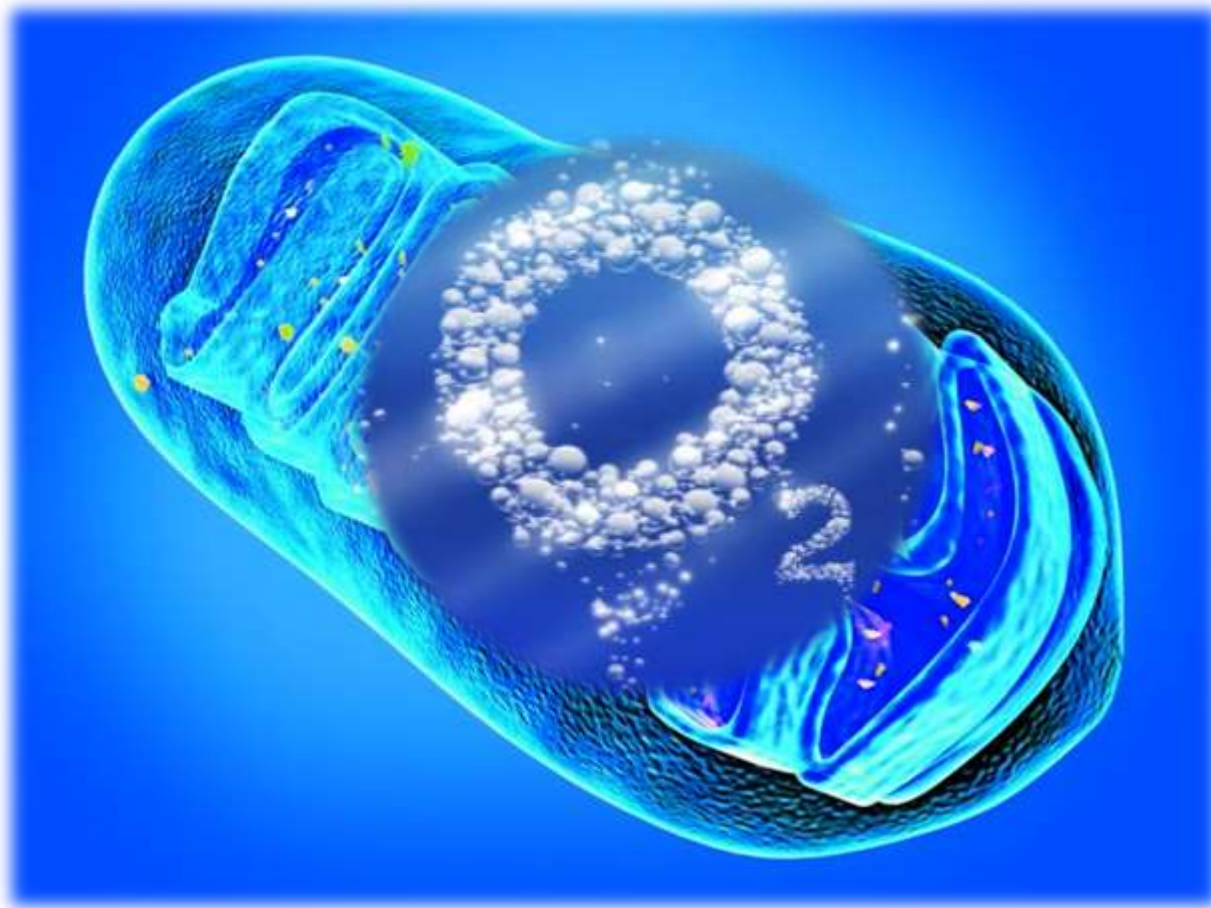
Goal-directed therapy

Recommendation 26 We recommend that resuscitation measures be continued using a goal-directed strategy guided by standard laboratory coagulation values and/or viscoelastic tests. (Grade 1C)

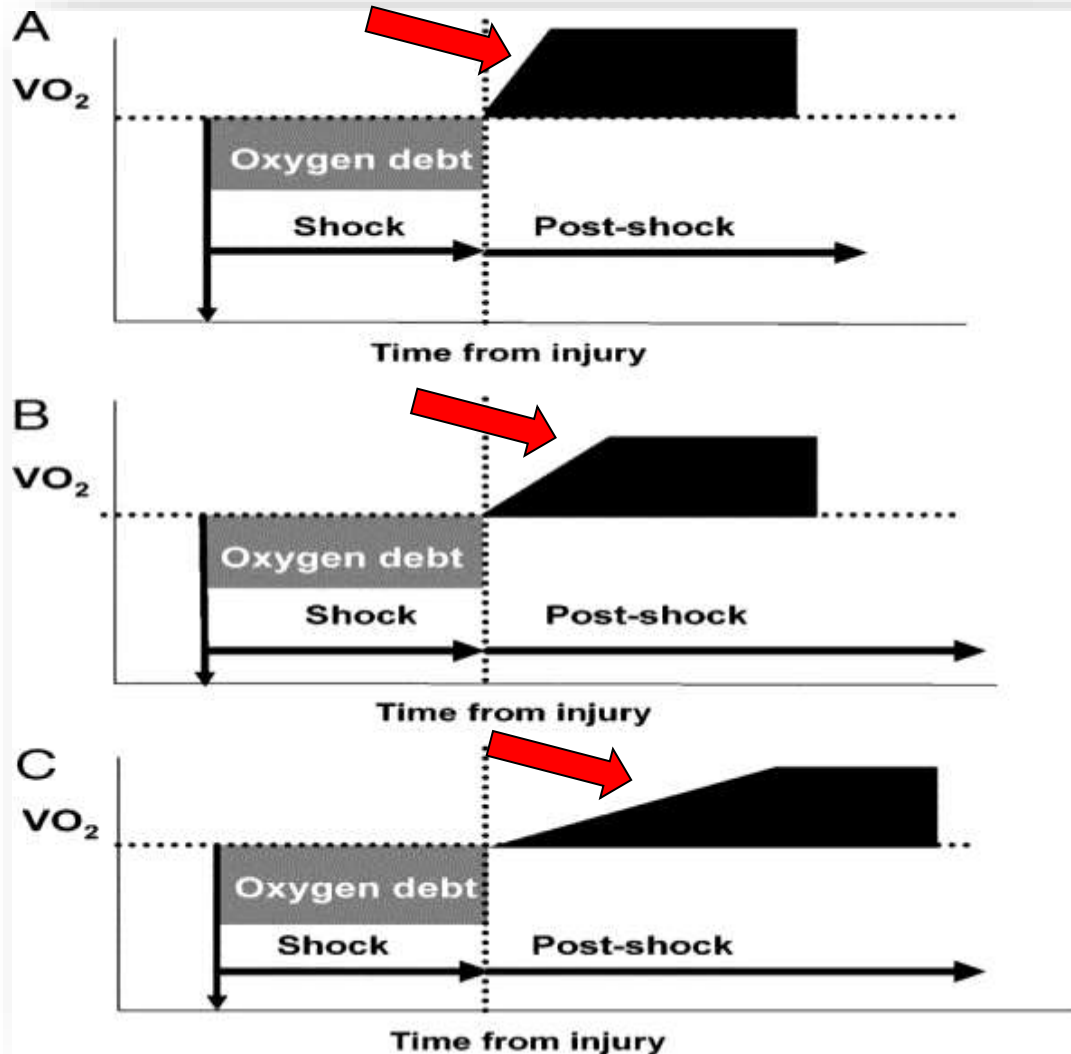


Rossaint et al. *Critical Care* (2016) 20:100
DOI 10.1186/s13054-016-1265-x

Garantire il DO₂



Una lezione dalla sepsi



migliore

OUTCOME

peggiore

Essere permissivi

Rianimazione ipovolemica

Tissue oxygenation

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

Restricted volume replacement

Recommendation 14 We recommend use of a restricted volume replacement strategy to achieve target blood pressure until bleeding can be controlled. (Grade 1B)

Essere permissivi

Rianimazione ipovolemica

- 1.5.23 In hospital settings do not use crystalloids for patients with active bleeding. See the section on resuscitation in the NICE guideline 'Intravenous fluid therapy in adults in hospital' and the section on fluid resuscitation in the NICE guideline 'Intravenous fluid therapy in children and young people in hospital' for advice on tetrastarches.
- 1.5.24 For adults (16 or over) use a ratio of 1 unit of plasma to 1 unit of red blood cells to replace fluid volume.

NICE guideline

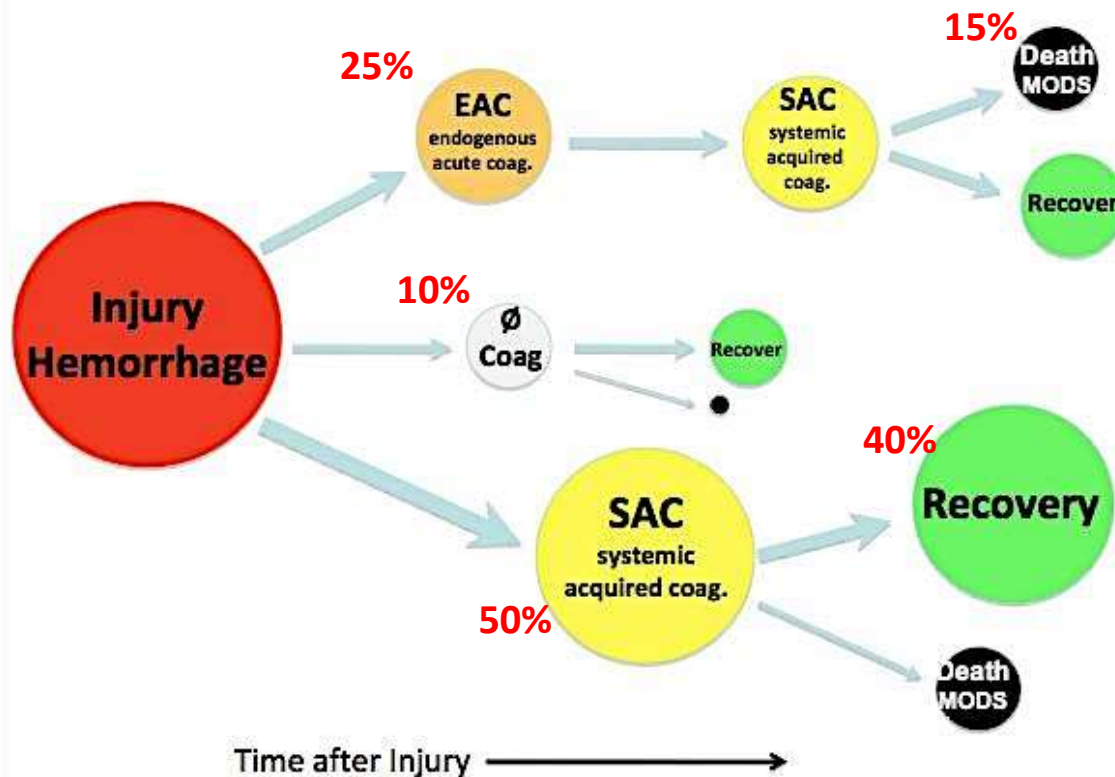
Published: 17 February 2016

[nice.org.uk/guidance/ng39](https://www.nice.org.uk/guidance/ng39)

Essere permissivi

Coagulopatia sistemica acquisita

Acute Traumatic Coagulopathy: From Endogenous Acute Coagulopathy to Systemic Acquired Coagulopathy and Back



Essere permissivi Evitare danni iatrogeni

Fluid overload in the ICU: evaluation and management

Claire-Del Granado and Mehta *BMC Nephrology* (2016) 17:109
DOI 10.1186/s12882-016-0323-6



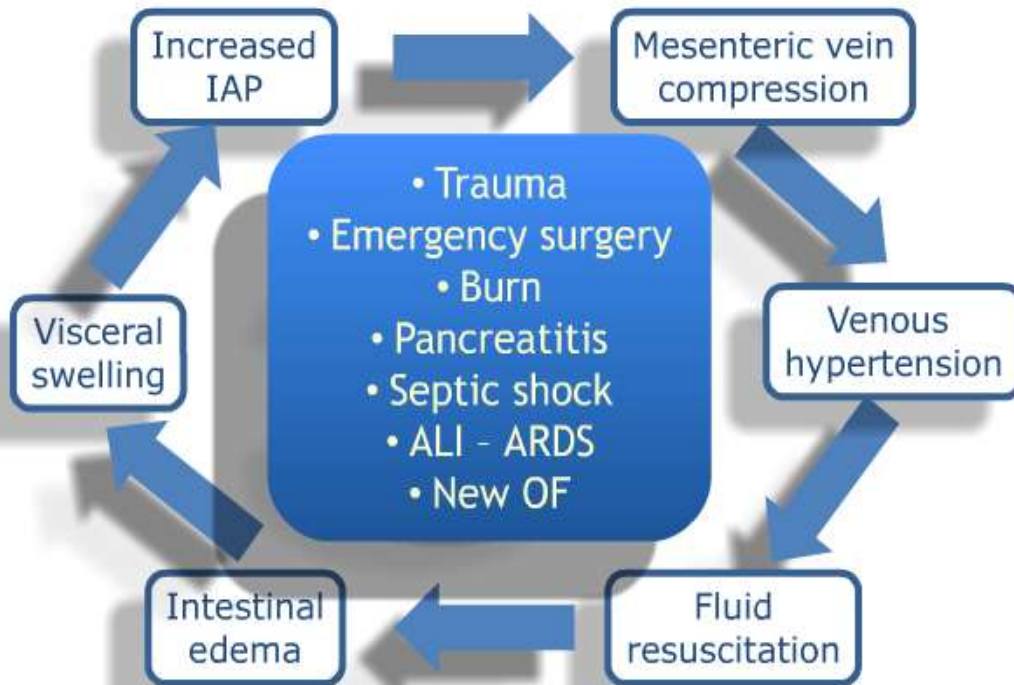
Table 1 Consequences of fluid overload in organ systems

Organ	Consequences
Cerebral edema	Impaired cognition Delirium
Myocardial edema	Conduction disturbance Impaired contractility Diastolic dysfunction
Pulmonary edema	Impaired gas exchange Reduced compliance Increased work of breathing
Renal interstitial edema	Reduced RBF Increased interstitial pressure Reduced GFR Uremia Salt and water retention
Hepatic congestion	Impaired synthetic function Cholestasis
Gut edema	Malabsorption Ileus
Tissue edema	Poor wound healing Wound infection Pressure ulceration

RBF renal blood flow, GFR glomerular filtration rate

Essere permissivi Prevenire i circoli viziosi

• Avoid futile overresuscitation !



Malbrain, ESICM 2011

Le amine nello shock emorragico



C'è qualcosa di nuovo oggi nel sole, anzi d'antico....

Vasopressors and inotropic agents

Recommendation 15 In the presence of life-threatening hypotension, we recommend administration of vasopressors in addition to fluids to maintain target arterial pressure. (Grade 1C)

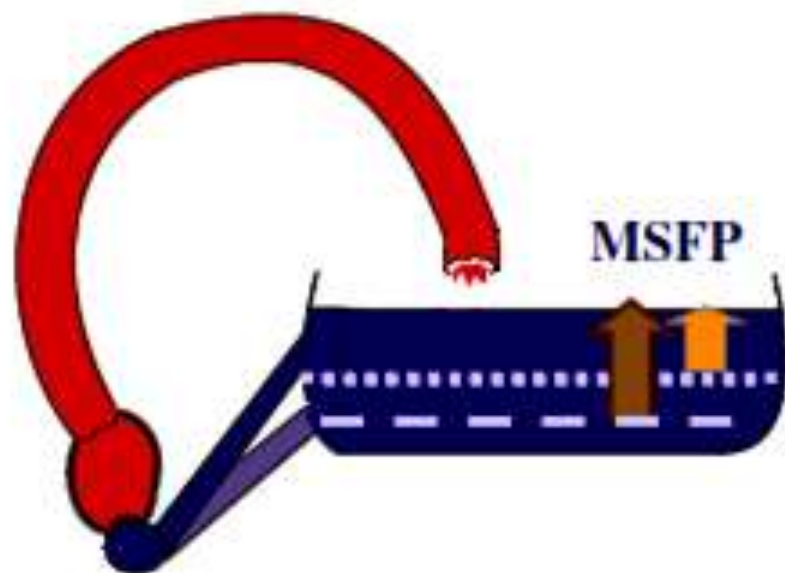
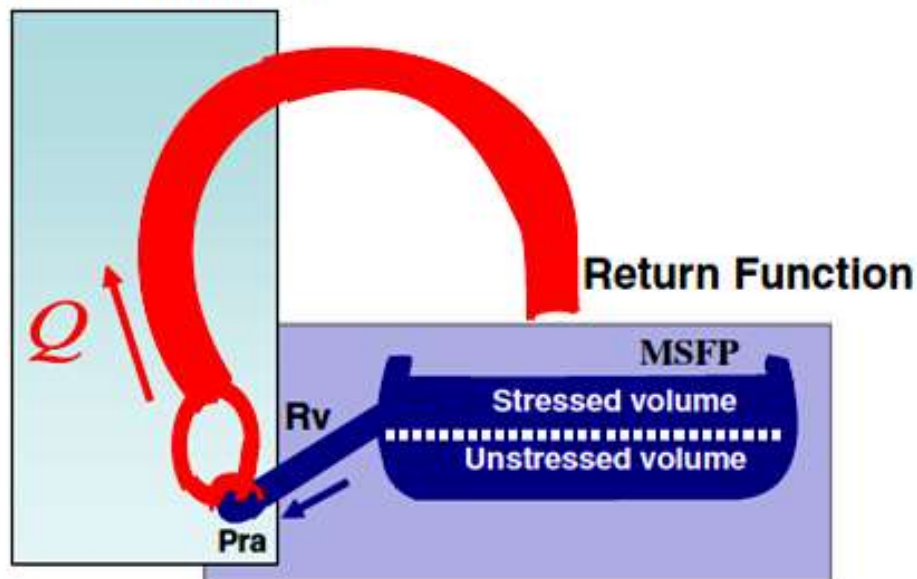
We recommend infusion of an inotropic agent in the presence of myocardial dysfunction. (Grade 1C)

Le amine nello shock emorragico

Volume and its relationship to cardiac output and venous return

Magder *Critical Care* (2016) 20:271
DOI 10.1186/s13054-016-1438-7

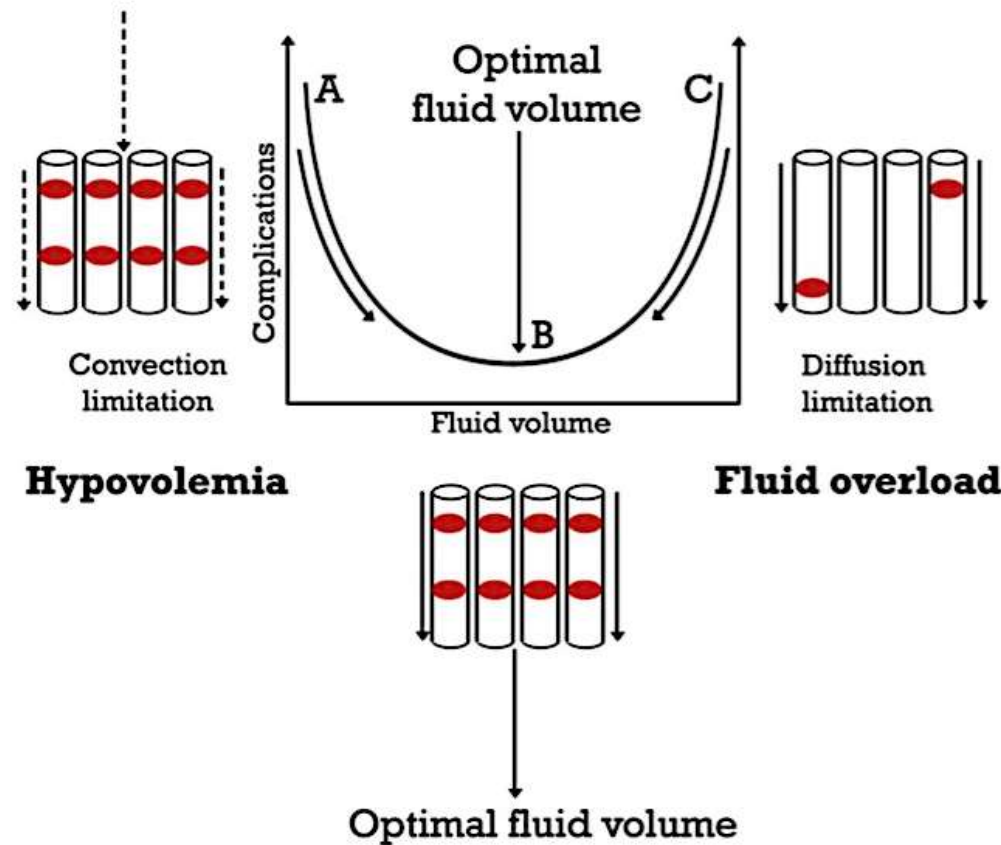
Cardiac function



Il difficile equilibrio

Low convective flow

Large diffusion distance



Una finestra sul metabolismo periferico

Recommendation 11 We recommend serum lactate and/or base deficit measurements as sensitive tests to estimate and monitor the extent of bleeding and shock. (Grade 1B)

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

Emorragia e trauma cranico



Emorragia e trauma cranico

In patients with severe TBI (GCS ≤ 8), we recommend that a mean arterial pressure ≥ 80 mmHg be maintained. (Grade 1C)

It should be noted that a damage control resuscitation strategy using restrictive volume replacement is contraindicated in patients with TBI and spinal injuries, because an adequate perfusion pressure is crucial to ensure tissue oxygenation of the injured central nervous system [229]. Rapid bleeding control is of particular importance in these patients. In addition, the concept of permissive hypotension should be carefully considered in the elderly patient, and may be contraindicated if the patient suffers from chronic arterial hypertension [230].

....e per quanto riguarda il trauma cranico ?

5. Ventilation Therapies

15. Blood Pressure

18. Advanced Cerebral

2. Prophylactic Hypothermia

Level I

• **Advanced Cerebral Monitoring**

There was insufficient evidence to support a Level I recommendation for this topic.

12. Intracranial Pressure Monitoring

Perfusion Pressure Monitoring

Anticoagulants, Analgesics, and Sedatives

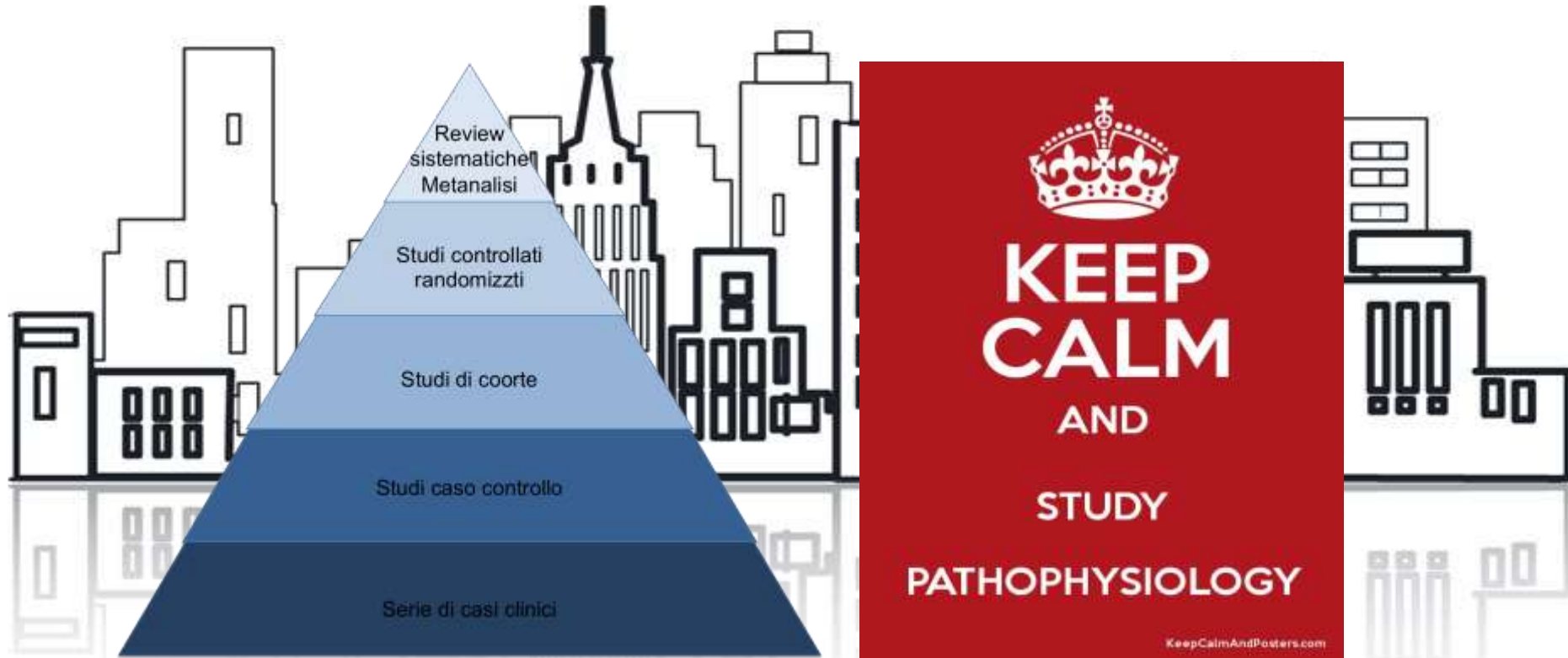
....e per quanto riguarda il trauma cranico ?

7. Steroids

Level I

- The use of steroids is not recommended for improving outcome or reducing ICP. In patients with severe TBI, high-dose methylprednisolone was associated with increased mortality and is contraindicated.

....e per quanto riguarda il trauma cranico ?



Favorire l'omeostasi

Critical care management of severe traumatic brain injury in adults

Haddad and Arabi *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine* 2012, **20**:12
<http://www.sjtrem.com/content/20/1/12>

- Stabilization of the patient, if still unstable
- Prevention of intracranial hypertension
- Maintenance of an adequate and stable cerebral perfusion pressure (CPP)
- Avoidance of systemic, secondary brain insults (SBI)
- Optimization of cerebral hemodynamic and oxygenation

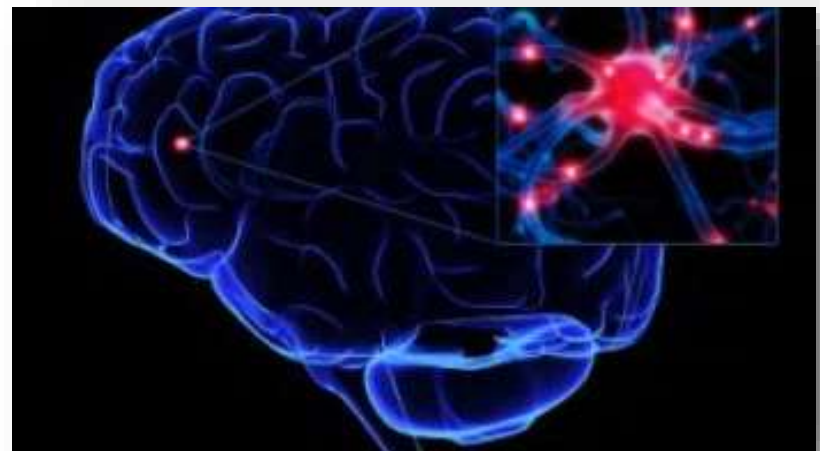
Favorire l'omeostasi

Critical care management of severe traumatic brain injury in adults

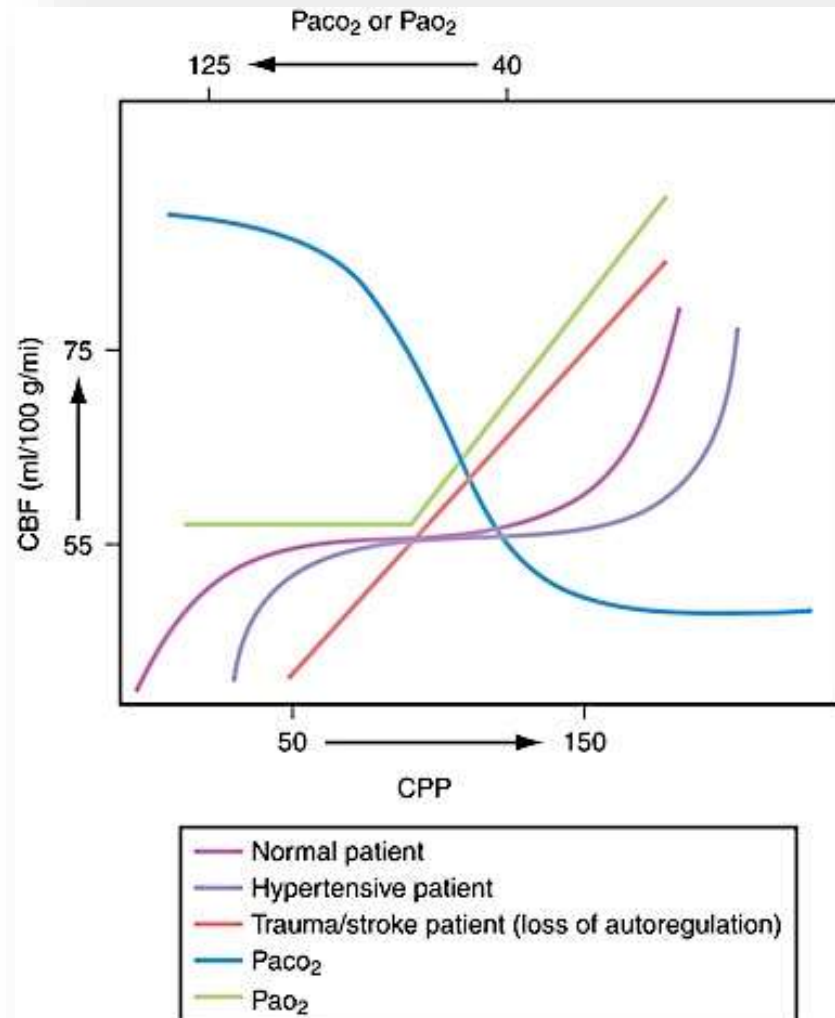
- Hypotension (systolic blood pressure [SBP] < 90 mm Hg)
- Hypoxemia (PaO_2 < 60 mm Hg; O_2 Saturation < 90%)
- Hypocapnia (PaCO_2 < 35 mm Hg)
- Hypercapnia (PaCO_2 > 45 mm Hg)
- Hypertension (SBP > 160 mm Hg, or mean arterial pressure [MAP] > 110 mm Hg)

- Anemia (Hemoglobin [Hb] < 100 g/L, or hematocrit [Ht] < 0.30)
- Hyponatremia (serum sodium < 142 mEq/L)
- Hyperglycemia (blood sugar > 10 mmol/L)
- Hypoglycemia (blood sugar < 4.6 mmol/L)
- Hypo-osmolality (plasma osmolality [P Osm] < 290 mOsm/Kg H_2O)
- Acid-base disorders (acidemia: pH < 7.35; alkalemia: pH > 7.45)
- Fever (temperature > 36.5°C)
- Hypothermia (temperature < 35.5°C)

Haddad and Arabi *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine* 2012, **20**:12
<http://www.sjtreem.com/content/20/1/12>



Integrando le diverse variabili



I target di pressione nel trauma cranico

Injury. 2012 Nov;43(11):1833-7. doi: 10.1016/j.injury.2011.08.014. Epub 2011 Sep 21.

Redefining hypotension in traumatic brain injury.

Berry C¹, Ley EJ, Bukur M, Malinoski D, Margulies DR, Mirocha J, Salim A.

Author information

Abstract

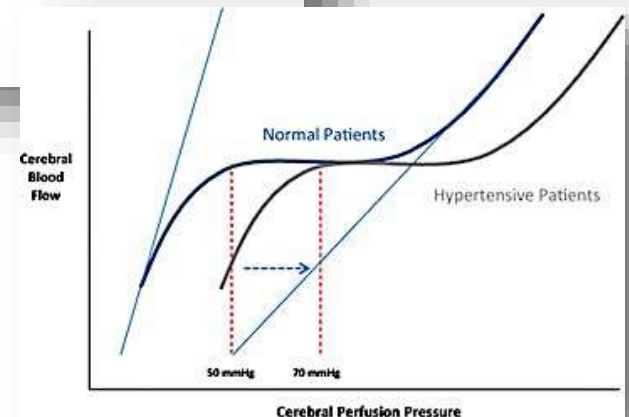
BACKGROUND: Systemic hypotension is a well documented predictor of increased mortality following traumatic brain injury (TBI). Hypotension is traditionally defined as systolic blood pressure (SBP) <90 mmHg. Recent evidence defines hypotension by a higher SBP in injured (non-TBI) trauma patients. We hypothesize that hypotension threshold requires a higher SBP in isolated moderate to severe TBI.

PATIENTS AND METHODS: A retrospective database review of all adults (≥ 15 years) with isolated moderate to severe TBI (head abbreviated injury score (AIS) ≥ 3 , all other AIS ≤ 3), admitted from five Level I and eight Level II trauma centres (Los Angeles County), between 1998 and 2005. Several fit statistic analyses were performed for each admission SBP from 60 to 180 mmHg to identify the model that most accurately defined hypotension for three age groups: 15-49 years, 50-69 years, and ≥ 70 years. The main outcome variable was mortality, and the optimal definition of hypotension for each group was determined from the best fit model. Adjusted odds ratios (AOR) were then calculated to determine increased odds in mortality for the defined optimal SBP within each age group.

RESULTS: A total of 15,733 patients were analysed. The optimal threshold of hypotension according to the best fit model was SBP of 110 mmHg for patients 15-49 years (AOR 1.98, CI 1.65-2.39, $p < 0.0001$), 100 mmHg for patients 50-69 years (AOR 2.20, CI 1.46-3.31, $p = 0.0002$), and 110 mmHg for patients ≥ 70 years (AOR 1.92, CI 1.35-2.74, $p = 0.0003$).

CONCLUSIONS: Patients with isolated moderate to severe TBI should be considered hypotensive for SBP <110 mmHg. Further research should confirm this new definition of hypotension by correlation with indices of perfusion.

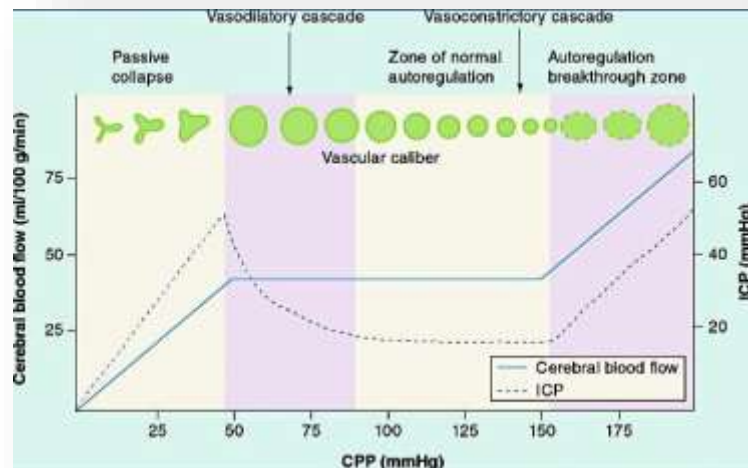
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I target di pressione nel trauma cranico

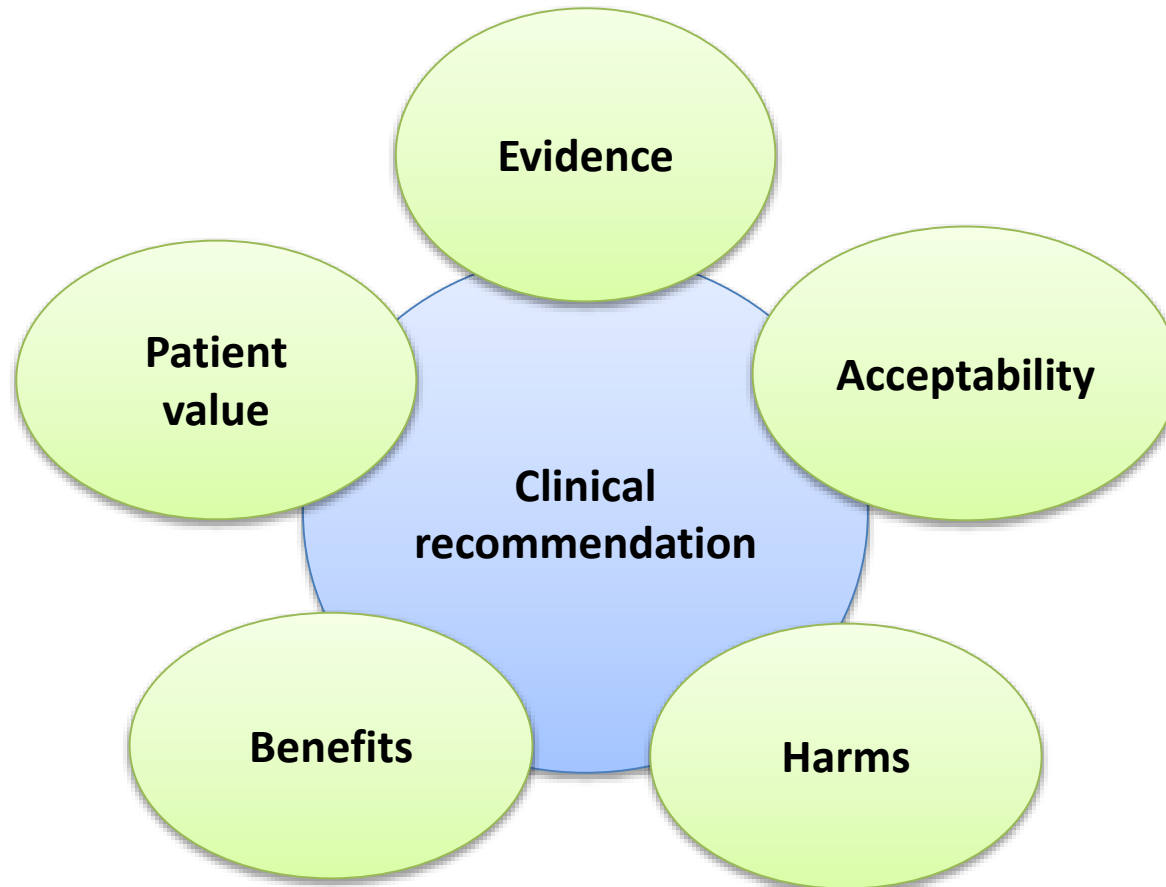
Level III

- Maintaining SBP at ≥ 100 mm Hg for patients 50 to 69 years old or at ≥ 110 mm Hg or above for patients 15 to 49 or over 70 years old may be considered to decrease mortality and improve outcomes.

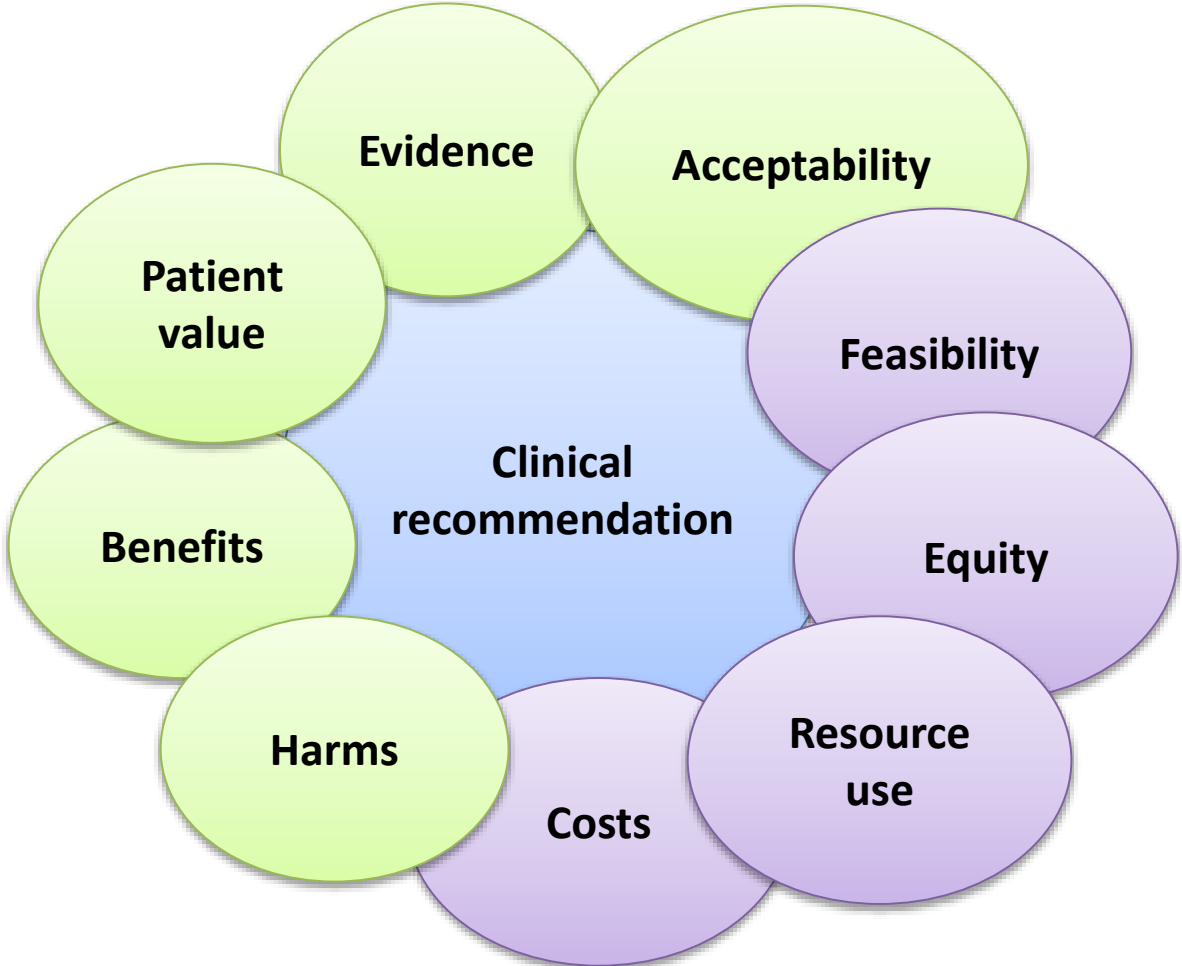


Neurosurgery 0:1–10, 2016

In patients (clinical) guidelines



In public health guidelines



1. Decompressive Craniectomy



Level I

- There was insufficient evidence to support a Level I recommendation for this topic.

Level II A

- Bifrontal DC is not recommended to improve outcomes as measured by the Glasgow Outcome Scale–Extended (GOS-E) score at 6 months post-injury in severe TBI patients with diffuse injury (without mass lesions), and with ICP elevation to values >20 mm Hg for more than 15 minutes within a 1-hour period that are refractory to first-tier therapies. However, this procedure has been demonstrated to reduce ICP and to minimize days in the intensive care unit (ICU).

*The committee is aware that the results of the RESCUEicp trial¹³ may be released soon after the publication of these Guidelines. The results of this trial may affect these recommendations and may need to be considered by treating physicians and other users of these Guidelines. We intend to update these recommendations after the results are published

Trial of Decompressive Craniectomy for Traumatic Intracranial Hypertension

P.J. Hutchinson, A.G. Koliakos, I.S. Timofeev, E.A. Corteen, M. Czosnyka, J. Timothy, I. Anderson, D.O. Bulters, A. Belli, C.A. Eynon, J. Wadley, A.D. Mendelow, P.M. Mitchell, M.H. Wilson, G. Critchley, J. Sahuquillo, A. Unterberg, F. Servadei, G.M. Teasdale, J.D. Pickard, D.K. Menon, G.D. Murray, and P.J. Kirkpatrick, for the RESCUE Trial Collaborators*

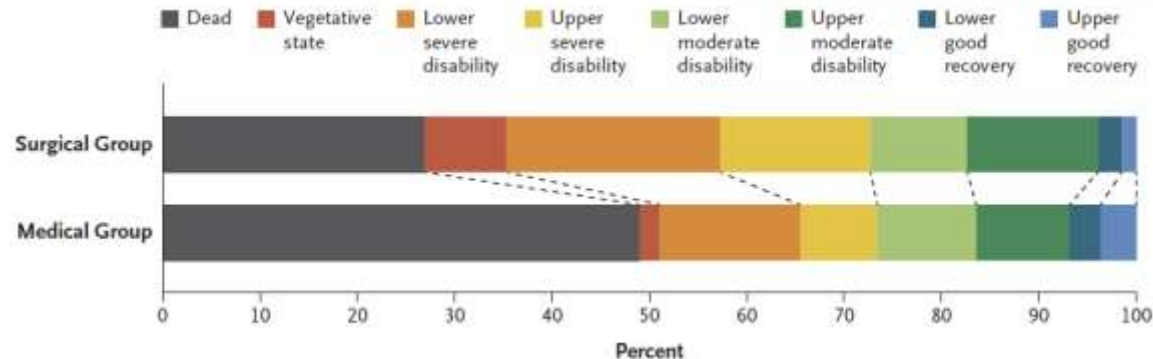
The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812

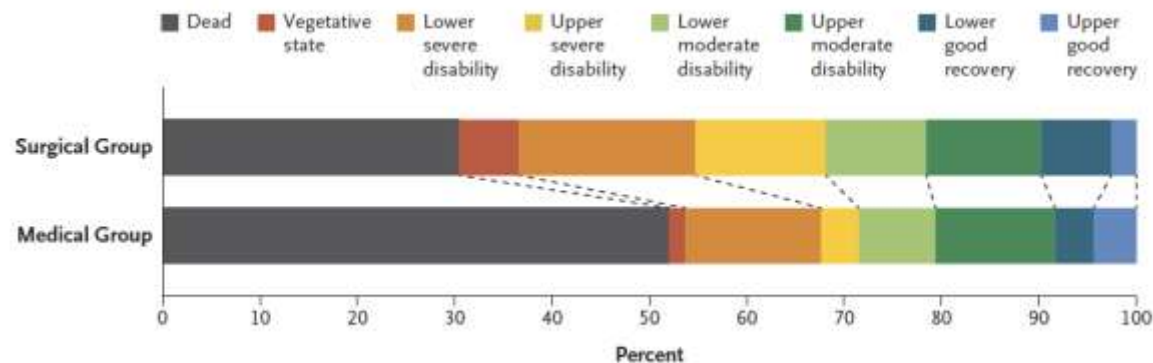
SEPTEMBER 22, 2016

VOL. 375 NO. 12

A GOS-E Results at 6 Mo (primary end point)

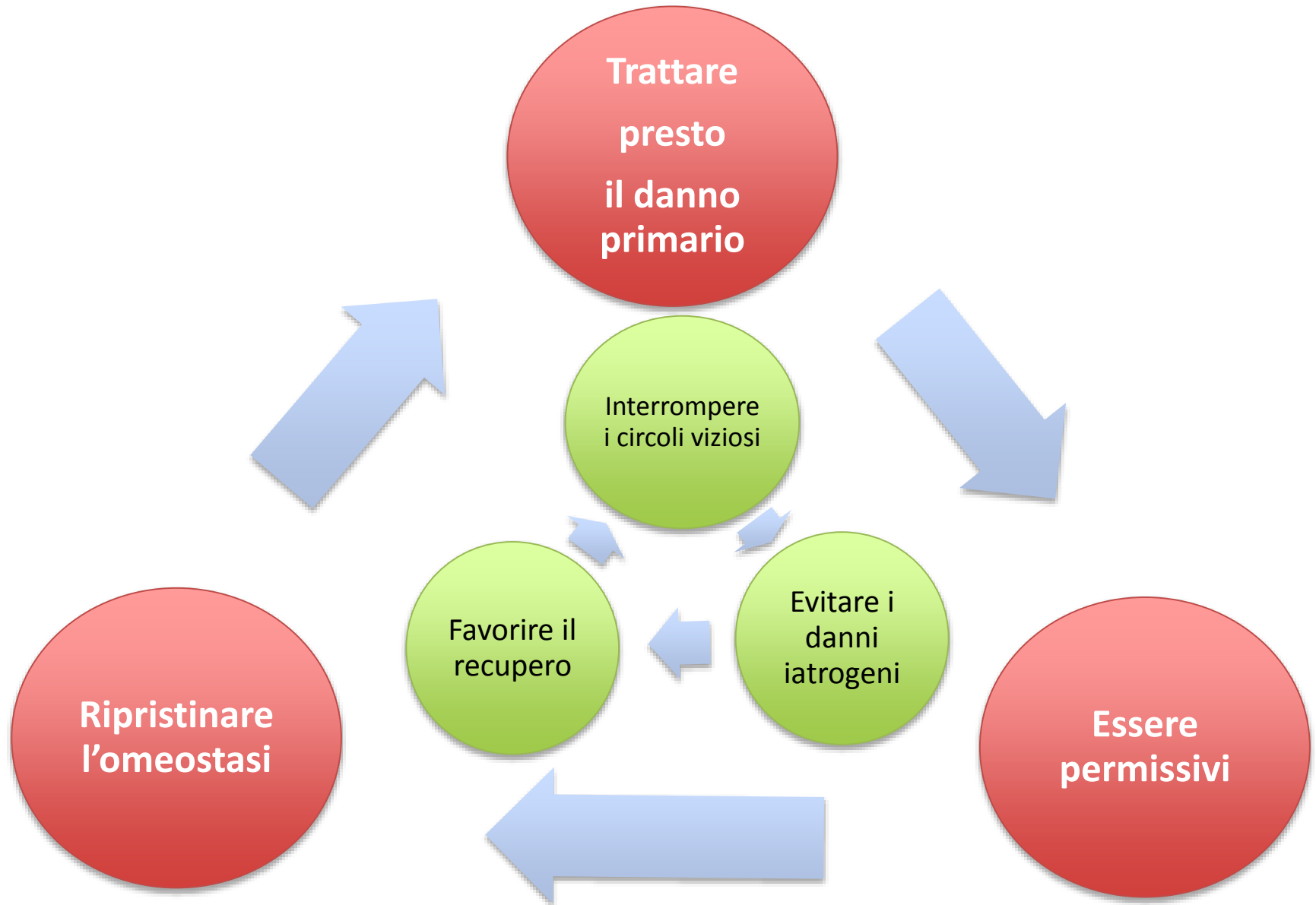


B GOS-E Results at 12 Mo (secondary end point)



dependent and independent living. Clinicians and family members will need to be aware of this issue when making decisions regarding treatment options. Improved control of intracranial

La strategia



Our favorite unproven ideas for future critical care

Marini *et al. Critical Care* 2013, 17(Suppl 1):S9
<http://ccforum.com/content/17/S1/S9>

After rescue, we should adapt patients to their critical illness physiology

Idea

A two-stage approach of initial rescue – that emphasizes **minimizing demand, full support**, gentle transitions, and assuming physiological control – followed by an adaptive phase – characterized by **ongoing targeted reduction of vital supports** and imposed intermittent stresses and rest periods,

Our favorite unproven ideas for future critical care



Marini *et al. Critical Care* 2013, 17(Suppl 1):S9
<http://ccforum.com/content/17/S1/S9>

poetically: 'First shelter the critically ill patient during the storm and then teach the patient to dance in the rain.'



