Anesthésie du traumatisé

David Kahn

Cliniques universitaires
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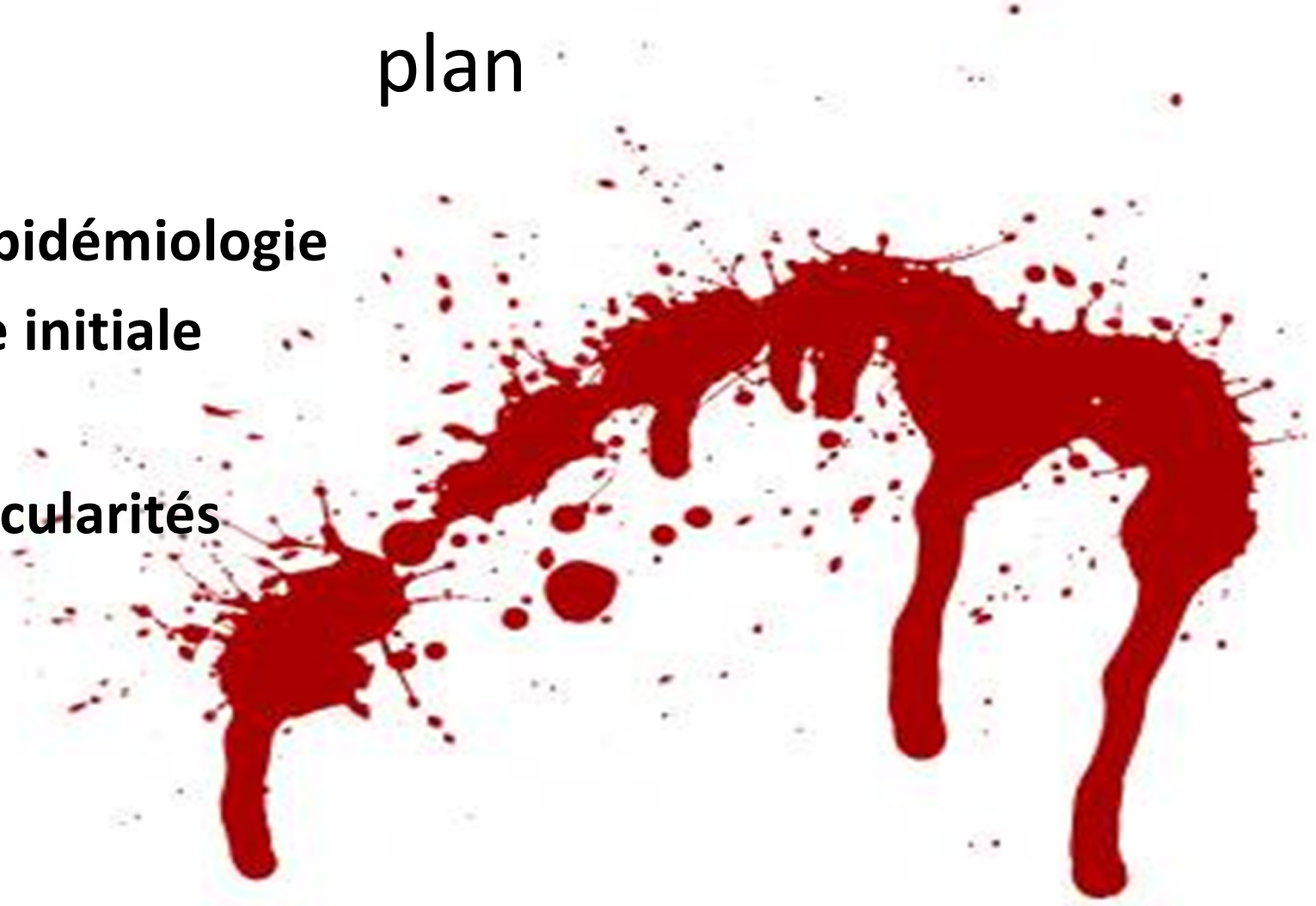
plan

- **Définition et épidémiologie**
- **Prise en charge initiale**
- **DCR**
- **Quelques Particularités**
- **Conclusion**



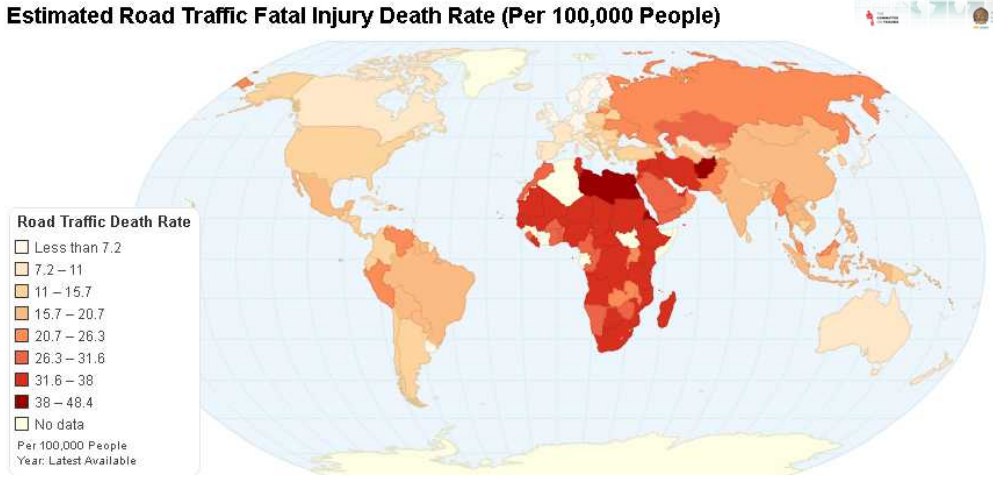
Définition:

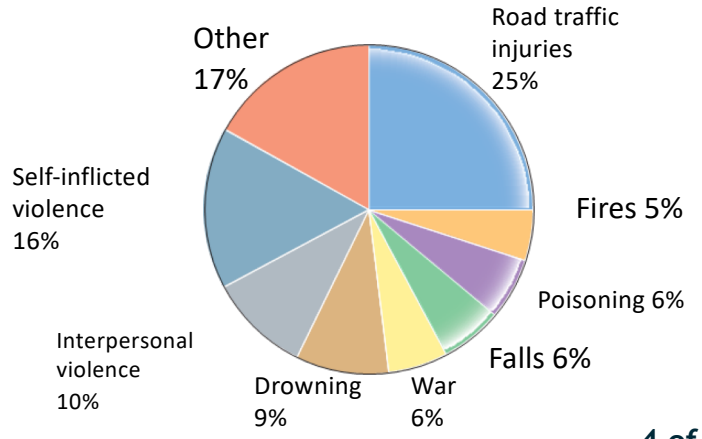
Polytraumatisé: blessé grave atteint de plusieurs lésions dont au moins une met en jeu le pronostic vital à court terme

contextualisation

The Need:

- 5.8 million people die every year from unintentional injury and violence -- more than nine people every minute.
- Injury accounts for 18% of the world's burden of disease.
- Motor vehicle crashes alone cause more than 1 million deaths annually and 20 to 50 million significant injuries.
- First cause of death among people under 40!





Problème de santé publique partout dans le monde.

- Mortalité importante, morbidité majeure.
- 25 à 30% des morts de polytraumatisme peuvent être évitées par une prise en charge systématisée et organisée.

<u>BUT initial de la prise en charge:</u>

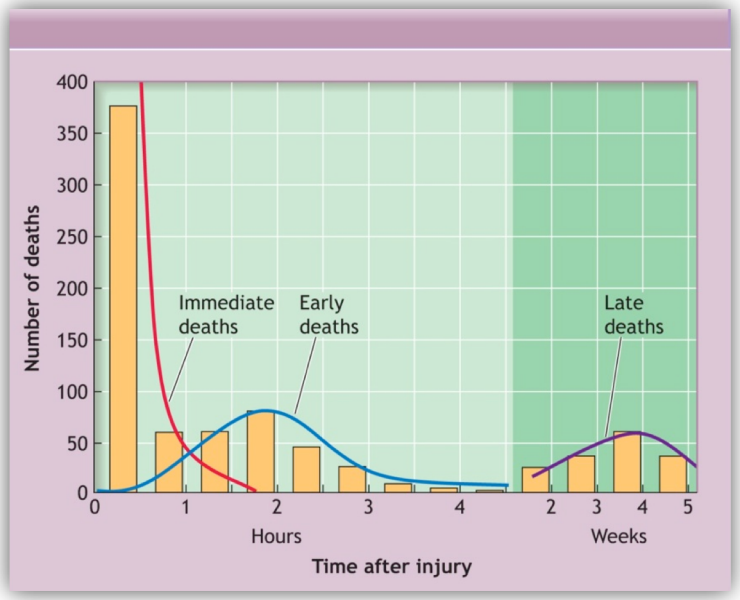
- Identifier et traiter les lésions qui tuent rapidement.

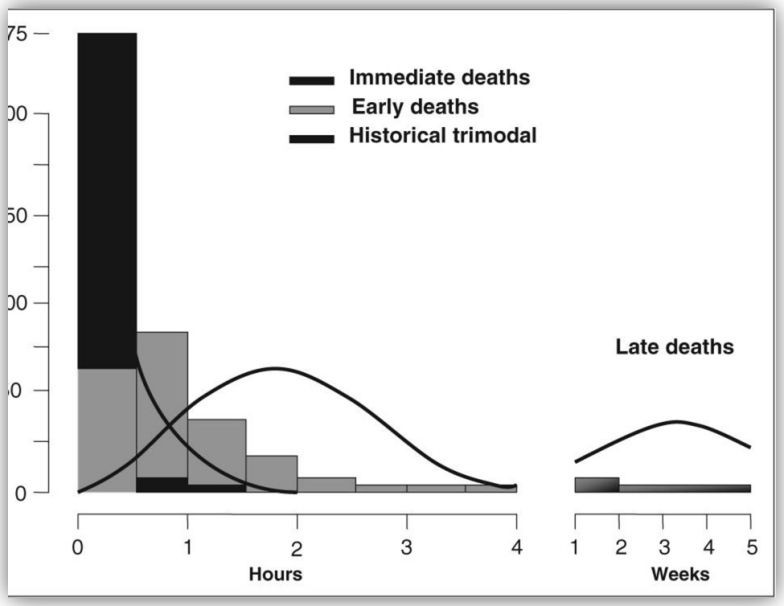
- Etablir la priorité des prises en charge.

- Prise en charge rapide et agressive.

Course Overview

Trimodal to Bimodal Distribution





In the early 1980s, Dr. Trunkey described a trimodal distribution of trauma deaths based on the time interval from injury to death.

Since that time, trauma systems have been developed and trauma education standardized.
A 2010 population study involving a similar analysis failed to show the same 3 peaks. The immediate peak persisted, as did the early peak, likely reflecting improved prehospital care and the arrival of sicker patients faster from the field. The late peak was greatly diminished. Only 4% of deaths occurred after the first 24 hours.

First peak of death/Immediate trauma death

- Severe head injury
- Brain stem injury
- High cord injury
- Heart and major vessel injury
- Massive blood loss

Score prédictifs: iss, Ticc,…

Injury Severity Score; ISS

Region	Injury Description	AIS	Square Top Three
Head & Neck	Cerebral Contusion	3	9
Face	No Injury	0	
Chest	Flail Chest	4	16
Abdomen	Minor Contusion of Liver Complex Rupture Spleen	2 5	25
Extremity	Fractured femur	3	
External	No Injury	0	
		Injury Severity Score:	50

AIS Score	Injury
1	Minor
2	Moderate
3	Serious
4	Severe
5	Critical
6	Survivable

ISS	
1-8	Minor
9-15	Moderate
16-24	Serious
25-49	Severe
50-74	Critical
75	Maximum

Dr. Susan Baker

ABOUT THE CREATOR

Susan Baker, MPH, is an professor and epidemiologist specializing in injury prevention at Johns Hopkins Bloomberg School of Public Health and was the first director of the Center for Injury Research and Policy. She is well known for authoring the Injury Fact Book. Professor Baker's teaching and research is aimed at influencing policy changes that will reduce the likelihood of injury for thousands of people.

Mechanism, Glasgow Coma Scale, Age, and Arterial Pressure (MGAP): A new simple prehospital triage score to predict mortality in trauma patients*

Danielle Sartorius, MD; Yannick Le Manach, MD; Jean-Stéphane David, MD, PhD; Elisabeth Rancurel, MD; Nadia Smail, MD; Michel Thicoïpé, MD; Eric Wiel, MD, PhD; Agnès Ricard-Hibon, MD, PhD; Frédéric Berthier, MD; Pierre-Yves Gueugniaud, MD, PhD; Bruno Riou, MD, PhD

Table 4. Multivariate analysis of prehospital predictors of in-hospital death

	Odds Ratio [95% CI]	Points of the MGAP Score
Glasgow Coma Scale by point increase	0.71 [0.68–0.74]	GCS value
Systolic arterial blood pressure		
>120 mm Hg	1	+5
60–120 mm Hg	2.7 [2.0–3.6]	+3
<60 mm Hg	5.4 [4.1–7.3]	0
Blunt trauma (vs. penetrating)	0.24 [0.13–0.45][a]	+4
Age	0.21 [0.13–0.35][a]	+5
<60 yrs		
		Total: 3 to 29

MGAP, Mechanism, Glasgow Coma Scale, Age, and Arterial Pressure; GCS, Glasgow Coma Scale; OR, odds ratio; CI, confidence interval.

[a]The OR associated with penetrating trauma was 4.1 [2.3–7.6] and that associated with age >60 yrs, 4.7 [2.9—7.9], explaining the +4 and +5 points of the score. Lower MGAP scores are associated with higher mortality rate (Hosmer Lemeshow statistic: $\chi^2 = 5.16$; $p = .65$. c-index = 0.90).

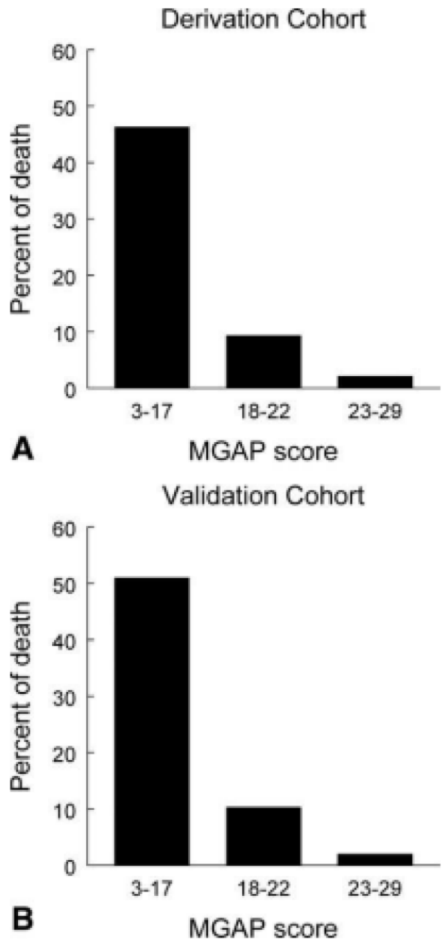


Figure 2. Percentage of death observed according to Mechanism, Glasgow Coma Scale, Age, and Arterial Pressure (*MGAP*) score in the derivation cohort (*A*, n = 1360) and the validation cohort (*B*, n = 1003).

Quelles sont les causes de décès évitables chez les traumatisés graves?

13500 dossiers: 12% de décès évitables. Cayten *et Al*. Ann Surg 1991;214:510-20

Cause évitable (trauma fermés uniquement)	%
Délai avant chirurgie trop long	40%
Erreur de réanimation	52%
Erreur technique	38%

35311 admissions(level 1 trauma center): 2081 décès (6%) dont 51 (3%) étaient évitables

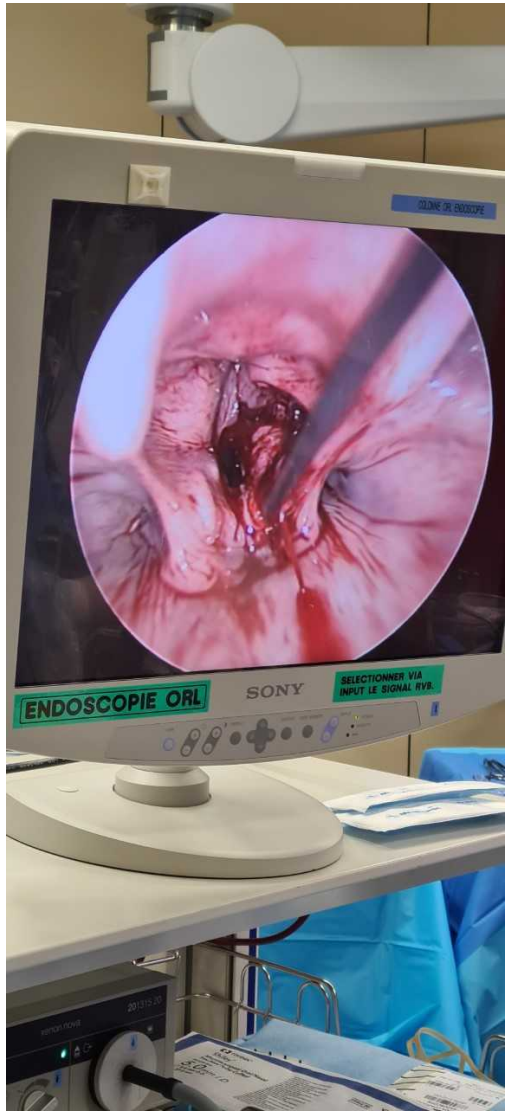
Evènement évitable (75% de trauma fermés)	%
Syndrome hémorragique	40%
Défaillance multiviscérale	28%

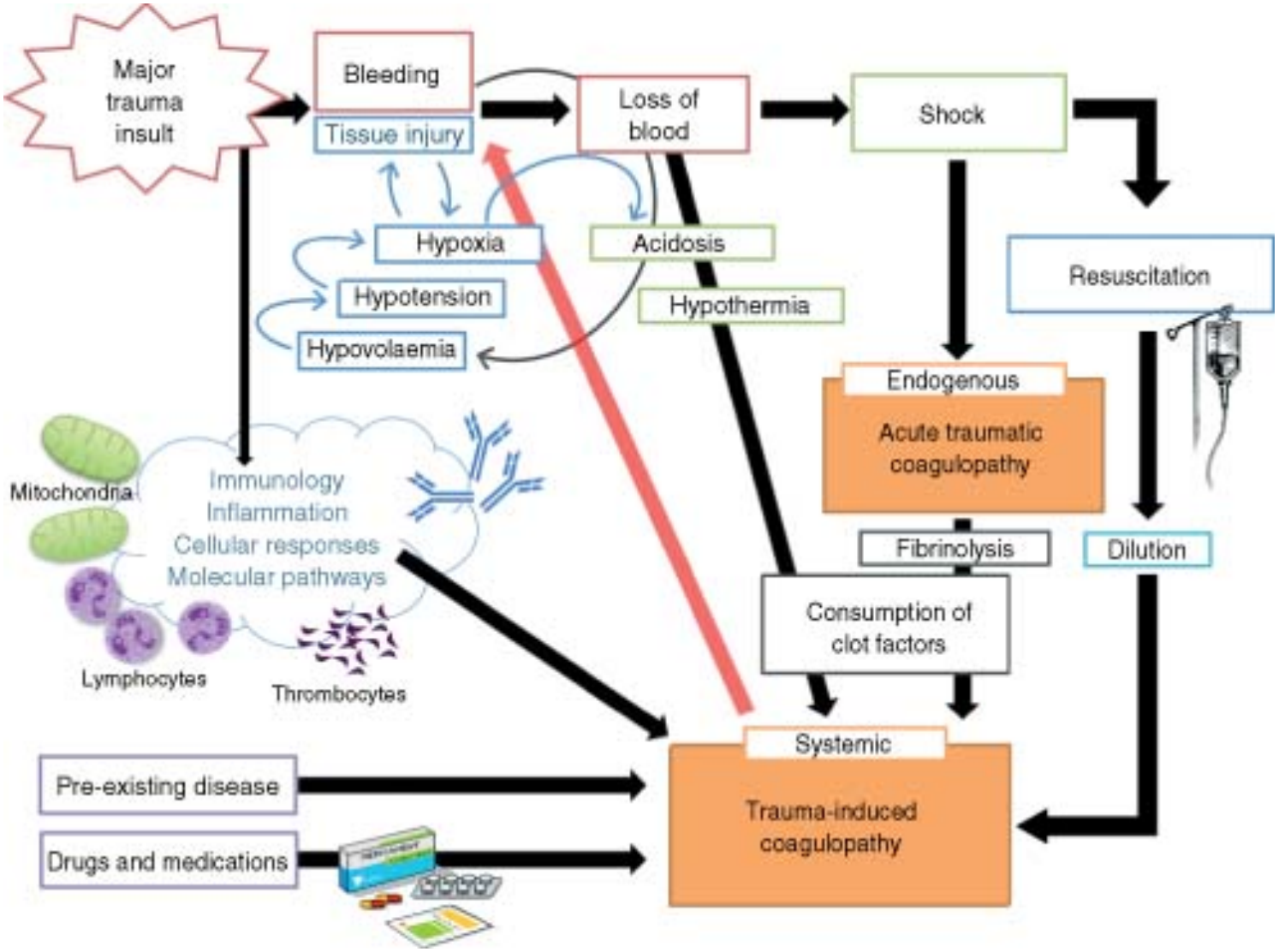
Défaillance de la prise en charge observée	
Retard de prise en charge	*53%*
Lésion non diagnostiquée ou erreur diagnostic	34%

Teixeira *et A*l. J. Trauma 2007;63:1338-47

<u>Ma</u> fin de nuit ce Lundi 13 Mars 2023,

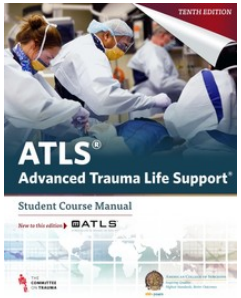
plaie par arme blanche en ARCA à l'arrivée du SMUR, récupéré facilement en extrahospitalier,…




Major trauma insult
Bleeding
Tissue injury
Loss of blood
Shock
Hypoxia
Acidosis
Hypotension
Hypothermia
Hypovolaemia
Resuscitation
Endogenous
Acute traumatic coagulopathy
Mitochondria
Immunology
Inflammation
Cellular responses
Molecular pathways
Lymphocytes
Thrombocytes
Fibrinolysis
Dilution
Consumption of clot factors
Systemic
Pre-existing disease
Drugs and medications
Trauma-induced coagulopathy

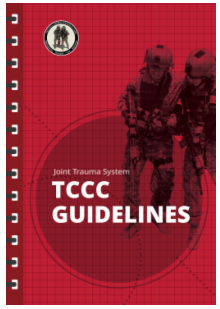
Prise en charge initiale:

Civilian **(ATLS 1977)**



- Security
- **A** - Airways and C-spine
- **B** - Breathing
- **C** - Circulation
- **D** - Dissabilities
- **E** - Environment

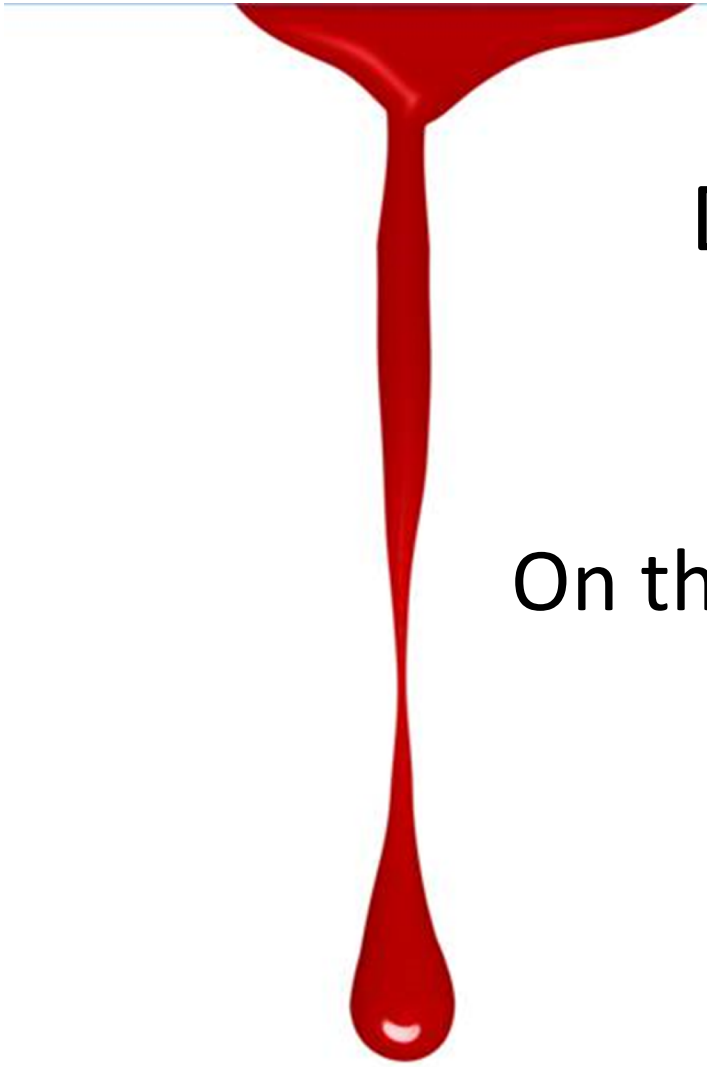
Military **(TCCC)**



- The best treatment for a patient under fire… is to gain fire superiority!
- Security
- **M** – Massive Bleeding
- **A** – Airway
- **R** – Respirations
- **C** – Circulation
- **H** - Head

Deux messages:

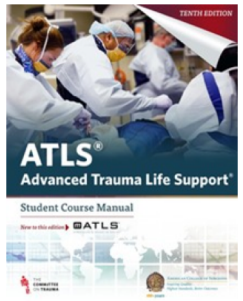
- STOP THE BLEEDING
- FIGHT LETHAL TRIAD



D’où saigne t’on à mort?

On the floor

… and four more.

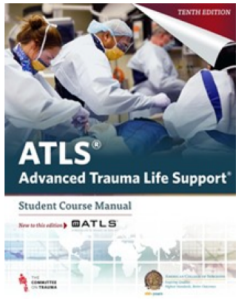


Les 5 "boxs" de saignement:

- Extérieur

  +

- Chest
- Retroperitoneum
- Abdomen
- Pelvis and long bones



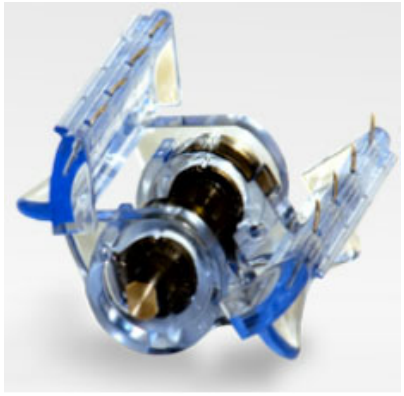
Je fais quoi si ça saigne ?

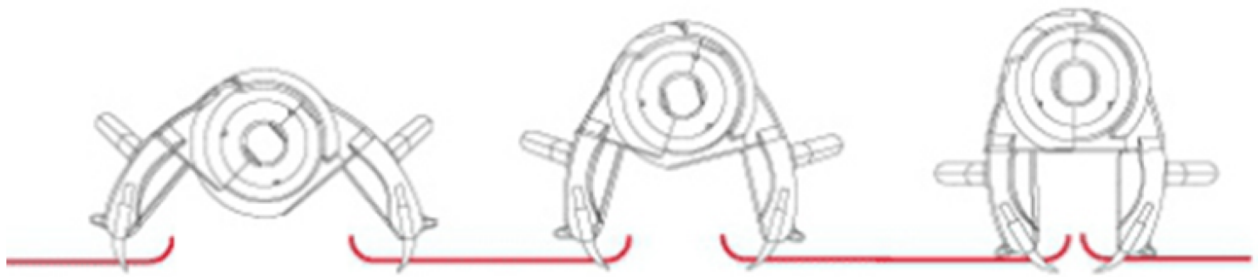
Compression directe

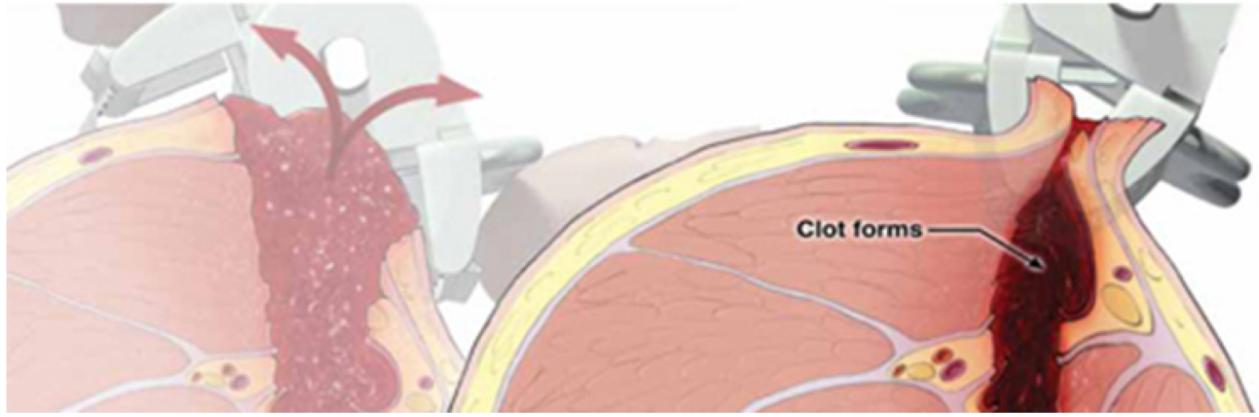
Il existes des solutions plus avancées que la simple compression.

Marathon de Boston

iTClamp ™







Poudres et pansements Hémostatiques

- L'Hemcon®, Celox® sont constitués de chitosans.

Dérivés de la carapace de certains animaux marins.

Appliqué sur une plaie hémorragique formation d'un « gel »

Aucune action sur la cascade de l'hémostase.

- Le QuikClot ACS+® est constitué de zéolithes.

Ce sont des granules circulaires dérivées des laves volcaniques qui ont la particularité d'absorber fortement l'eau. « effet concentration».
Réaction exothermique.

Poudres et pansements Hémostatiques

- CELOX Hemostatic Granule, Quikclot Granule ont été abandonnées malgré leur grande efficacité!!

embolies vasculaires de matériel granuleux, forces spéciales US en Irak en 2009. Confirmés par modèles porcins.

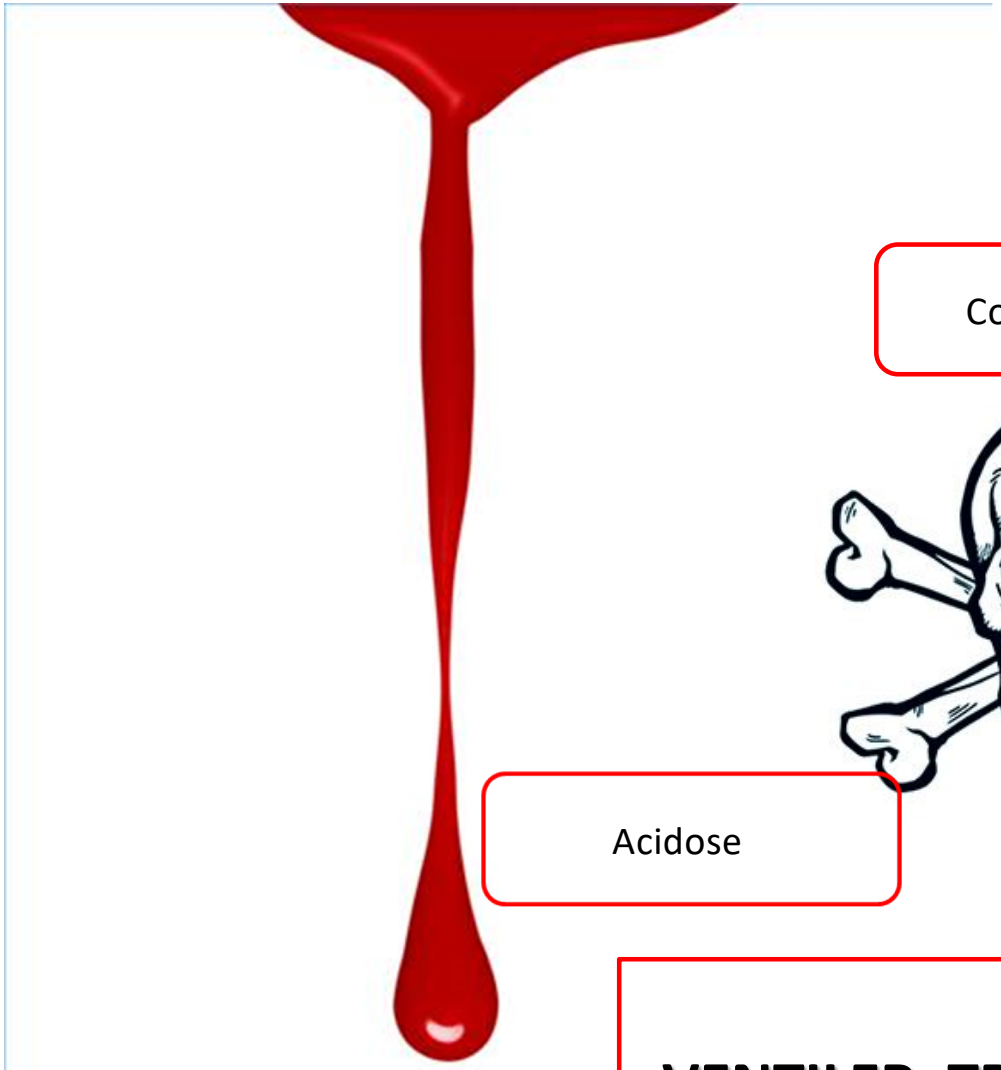
Inaba K, et Al. Long-term preclinical evaluation of the intracorporeal use of advanced local hemostatics in a damage-control swine model of grade IV liver injury, J Trauma Acute Care Surg 2013 Feb;74(2):538-45

- gazes, de type Quikclot Combat Gauze, qui sont des compresses de bourrage imprégnées de kaolin.

efficacité quasi équivalente mais moins d'effets secondaires

Bennett B, Littlejohn Review of new topical hemostatic dressings for combat casualty care.Mil Med. 2014 May;179(5):497-514.

Triade létale



Coagulopathie

Acidose

Hypothermie

VENTILER, TRANSFUSER, RECHAUFFER.

Concept de DCS
Dammage control surgery

Prioritizing the early control of the cause of bleeding by non-definitive means, while haemostatic control resuscitation seeks early control of coagulopathy.

Management of major blood loss: an update.
Johansson et Al. Acta Anaesthesiol Scand. 2010 Oct;54(9):1039-49

The concept of damage control: extending the paradigm to emergency general surgery.
Stawicki et Al. Injury. 2008 Jan;39(1):93-101

Packing for damage control of nontraumatic intra-abdominal massive hemorrhages.
Filicori etb Al. World J Surg. 2010 Sep;34(9):2064-8.

Veterinary Clinics of North America: Small Animal Practice
Volume 50, Issue 6, November 2020, Pages 1385-1396

Resuscitation Strategies for the Small Animal Trauma Patient

Standard surgical teaching

Damage Control Surgery
Karim Brohi, trauma.org 5:6, June 2000

DCS et DCR

Patients Likely To Need Damage Control Operations

Thoracic Trauma

- Penetrating thoracic wound and systolic blood pressure <90 mmHg
- Pericardial fluid on surgeon-performed ultrasound after blunt or penetrating thoracic trauma
- S/p emergency department thoracotomy for penetrating thoracic wound

Abdominal or Pelvic Trauma

- Penetrating abdominal wound and systolic blood pressure <90 mmHg
- Blunt abdominal trauma, systolic blood pressure <90 mmHg, and peritoneal fluid on surgeon-performed ultrasound or gross blood on diagnostic peritoneal tap
- Closed pelvic fracture, systolic blood pressure <90 mmHg, and peritoneal fluid on surgeon-performed ultrasound or gross blood on diagnostic peritoneal tap
- Open pelvic fracture

Trauma to an Extremity

- Shotgun wound to femoral triangle of thigh
- Mangled extremity from blunt trauma

General

- Emergency laparotomy to be followed by emergent craniotomy for compressive lesion, emergent thoracotomy for repair of ruptured descending thoracic aorta, or therapeutic embolization of pelvic bleeder related to fracture

Champ d'application de la DCR

Mattox. Trauma 2008

Damage control resuscitation principles.

- Rapid recognition of high risk for trauma-induced coagulopathy (massive transfusion prediction)
- Permissive hypotension
- Rapid definitive/surgical control of bleeding (DCS)
- Prevention/treatment of hypothermia, acidosis, and hypocalcemia
- Avoidance of hemodilution by minimizing use of crystalloids
- Early transfusion of red blood cells:plasma:platelets in a 1:1:1 unit ratio
- Use of thawed plasma and fresh whole blood when available
- Appropriate use of coagulation factor products (rFVIIa) and fibrinogen-containing products
- Use of fresh RBCs (storage age of <14 days)
- When available thromboelastography to direct blood product and the hemostatic adjunct (anti-fibrinolytics and coagulation factor) administration.

Optimal use of blood in trauma patients

John B. Holcomb[a,*], Philip C. Spinella[b,c]

PRISE EN CHARGE DES 5 H

Hémorragie : STOP the BLEEDING

Hypotension : tolérer le choc pour éviter de faire sauter les caillots !

Hémostase : produits sanguins rapidement et souvent ! Point of care testing!

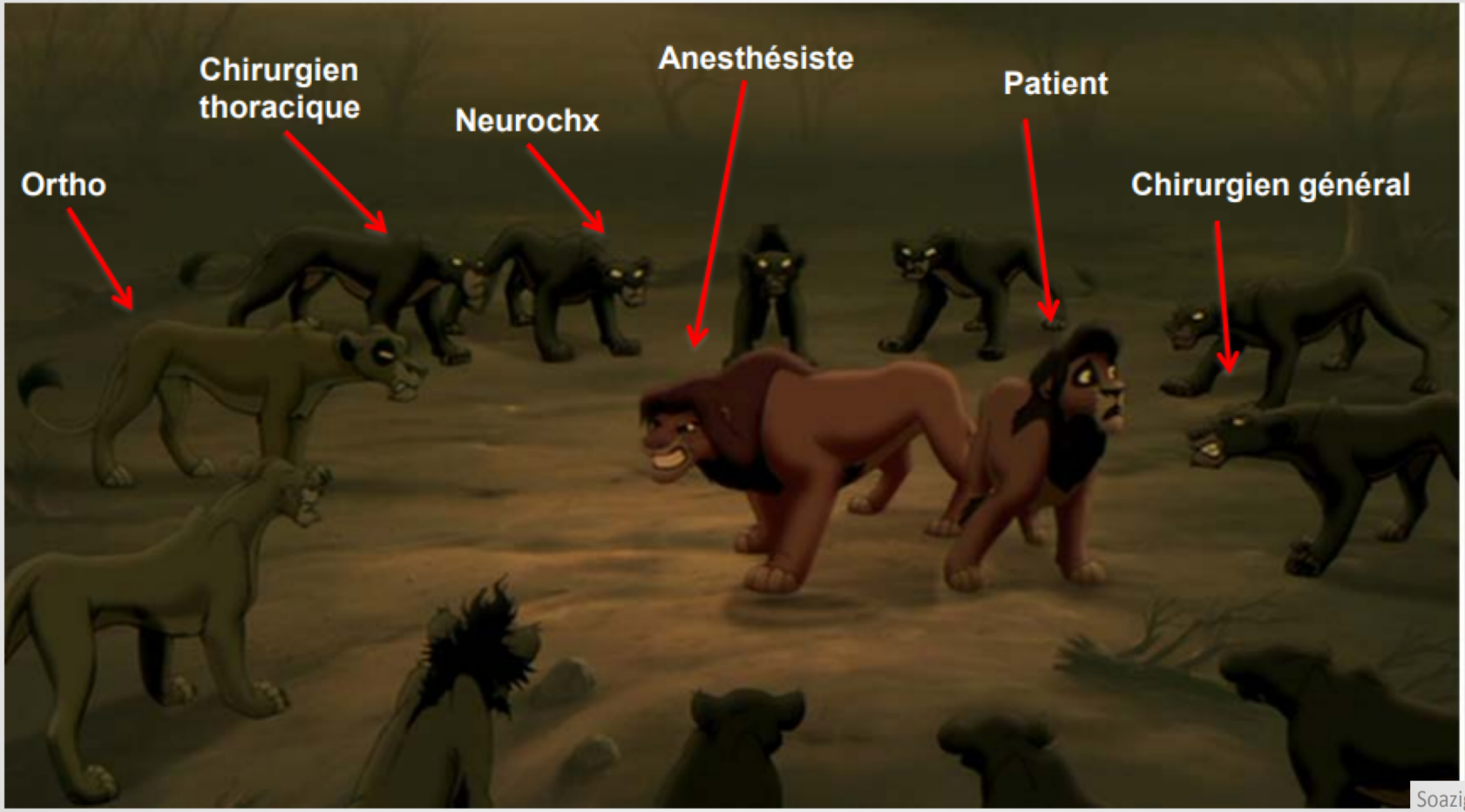
Homéostasie : lutter contre l'acidose et l'hypothermie

Hypnose : les faire dormir !

Références :

Holcomb JB. *Damage control resuscitation*.J Trauma 2007;62:S36-7.
Resucsitation from massive hemorraghe and developpement of MTP. A. Frankfurt, Irwin, Texas.

Qui fait quoi???



Soazig Le Guillan, md frcsc
Université de Montréal

Quelles bases scientifiques?

Changes in resuscitation strategies.

Author	Year	Patient number	Origin	Main finding
Gonzalez	2007	200	Level 1 Center	FFP should be administered during resuscitation, not just volume
Duchesne	2010	124	Level 1 Center	DCR and DCL improve survival and reduce ICU stay
Cotton	2011	390	Level 1 Center	Damage Control Resuscitation improves 30 days survival
Holcomb	2015	680	PROPPR Study	1:1:1 plasma:platelet:pRBCS improves 24 hours exsanguination
Perl	2016	346	PROPPR Study	No side effect by permissive resuscitation on emergency laparotomy
Meyer	680	680	PROPPR Study	Critical administration threshold should be respected
Robinson	454	454	PROPPR Study	Excess crystalloids increase the risk of ARDS

FFP = Fresh Frozen Plasma.
DCR = Damage Control Resuscitation.
DCL = Damage Control Laparotomy.
pRBCs = packed Red Blood Cells.
ARD = Acute Respiratory Distress Syndrome.

Il existe des guidelines, beaucoup,…trop?

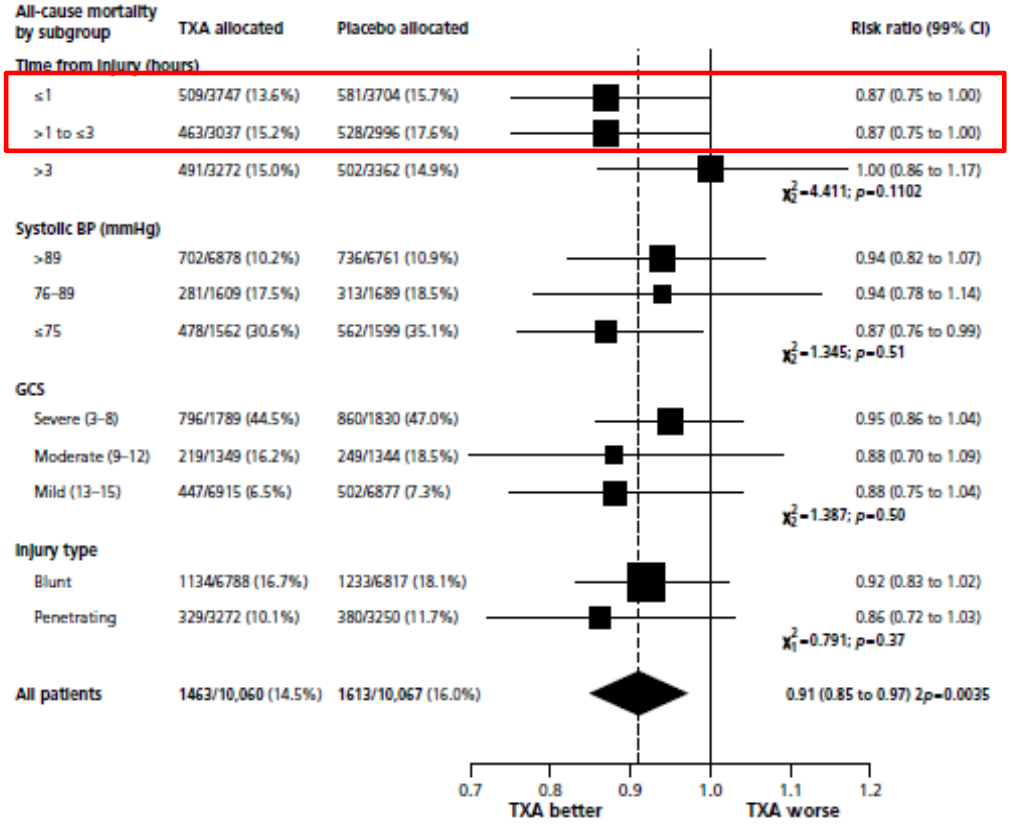
European Journal of Trauma and Emergency Surgery (2018) 44 (Suppl 1):S3–S271
https://doi.org/10.1007/s00068-018-0922-y

GUIDELINE

Level 3 guideline on the treatment of patients with severe/multiple injuries

The CRASH-2 trial: a randomised controlled trial and economic evaluation of the effects of tranexamic acid on death, vascular occlusive events and transfusion requirement in bleeding trauma patients

treatment	ampoules	dose (tranexamic acid or placebo)	infusion rate and duration
Loading	2	1 gram	100 mL over 10 minutes
Maintenance	2	1 gram	120 mg/hr [60 mL/hr] for about 8 hour



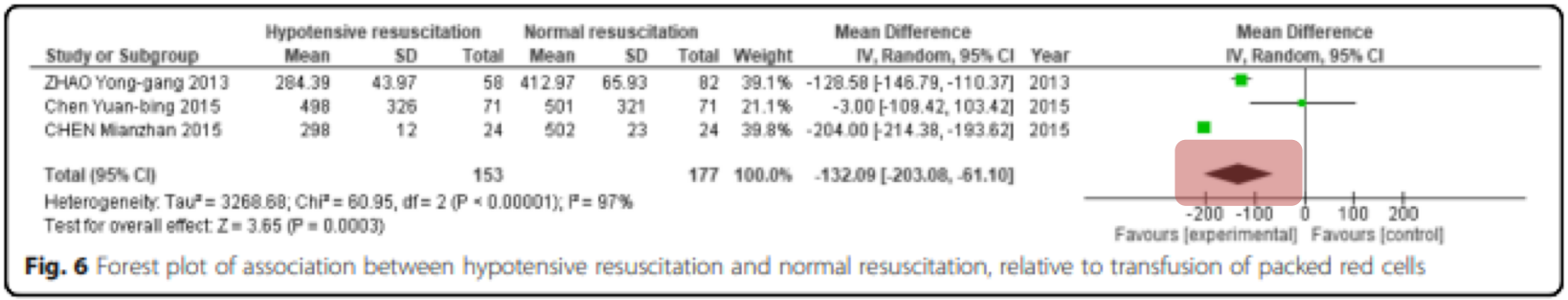


Fig. 6 Forest plot of association between hypotensive resuscitation and normal resuscitation, relative to transfusion of packed red cells

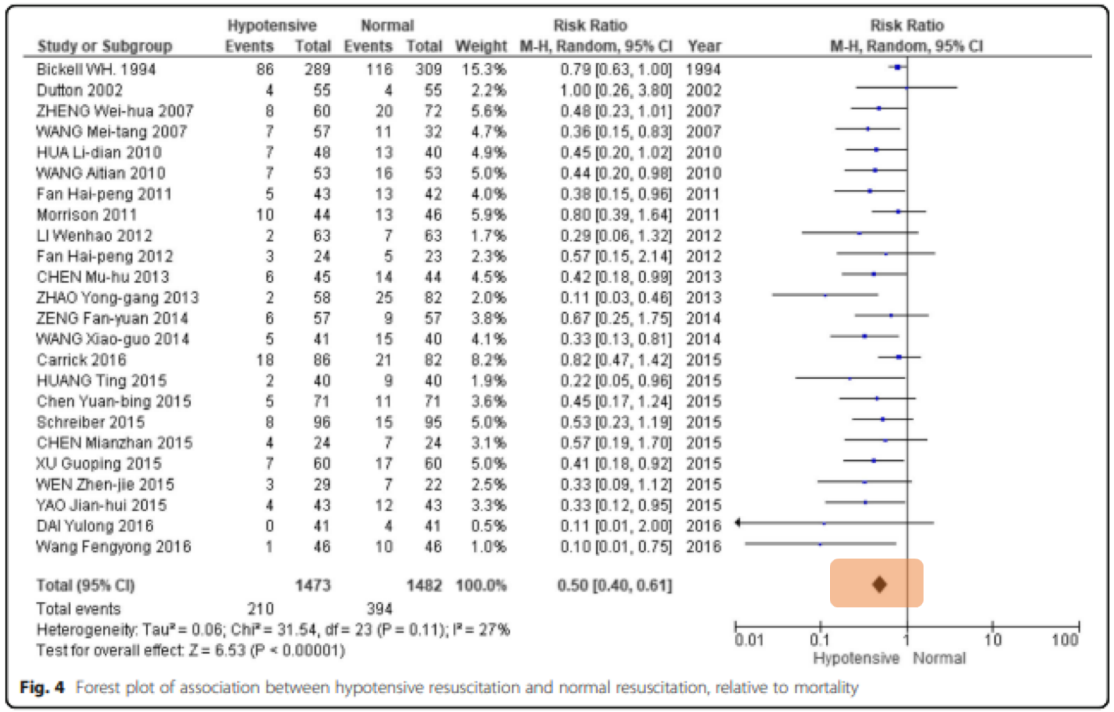


Fig. 4 Forest plot of association between hypotensive resuscitation and normal resuscitation, relative to mortality

Owattanapanich *et al. Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine* (2018) 26:107
https://doi.org/10.1186/s13049-018-0572-4

Scandinavian Journal of Traum
Resuscitation and Emergency Medicir

ORIGINAL RESEARCH Open Acces

Risks and benefits of hypotensive resuscitation in patients with traumatic hemorrhagic shock: a meta-analysis

Natthida Owattanapanich[1], Kaweesak Chittawatanarat[2], Thoetphum Benyakorn[3] and Jatuporn Sirikun[1*]

Conclusions: This meta-analysis revealed significant benefits of hypotensive resuscitation relative to mortality in traumatic hemorrhagic shock patients. It not only reduced the need for blood transfusions and the incidences of ARDS and multiple organ dysfunction, but it caused a non-significant AKI incidence.

Original Investigation

Transfusion of Plasma, Platelets, and Red Blood Cells in a 1:1:1 vs a 1:1:2 Ratio and Mortality in Patients With Severe Trauma

The PROPPR Randomized Clinical Trial

John B. Holcomb, MD[1]; Barbara C. Tilley, PhD[2]; Sarah Baraniuk, PhD[2]; et al

Table 3. Adjudicated Cause of Death by Treatment Group and Period From Randomization

	First 24 Hours			30 Days		
	No. (%)			No. (%)		
	1:1:1 Group (n = 338)	1:1:2 Group (n = 342)	Difference (95% CI),%[a]	1:1:1 Group (n = 335)	1:1:2 Group (n = 341)	Difference (95% CI), %[a]
Total No. of deaths	43	58		75	89	
Cause of death[b]						
Exsanguination	31 (9.2)	50 (14.6)	−5.4 (−10.4 to −0.5)	36 (10.7)	50 (14.7)	−3.9 (−9.1 to 1.2)
Traumatic brain injury	11 (3.3)	12 (3.5)	−0.3 (−3.2 to 2.7)	27 (8.1)	35 (10.3)	−2.2 (−6.7 to 2.2)
Respiratory, pulmonary contusion, or tension pneumothorax	3 (0.9)	1 (0.3)	0.6 (−0.9 to 2.4)	5 (1.5)	2 (0.6)	0.9 (−0.8 to 3.0)
Sepsis	0	0	0 (−1.1 to 1.1)	1 (0.3)	2 (0.6)	−0.3 (−1.9 to 1.2)
Multiple organ failure	0	0	0 (−1.1 to 1.1)	10 (3.0)	8 (2.3)	0.6 (−2.0 to 3.4)
Type of cardiovascular event						
Stroke	0	1 (0.3)	−0.3 (−1.7 to 0.9)	2 (0.6)	1 (0.3)	0.3 (−1.1 to 1.9)
Myocardial infarction	1 (0.3)	1 (0.3)	0 (−1.4 to 1.4)	1 (0.3)	2 (0.6)	−0.3 (−1.9 to 1.2)
Pulmonary embolism	0	1 (0.3)	−0.3 (−1.7 to 0.9)	0	1 (0.3)	−0.3 (−1.7 to 0.9)
Transfusion-related fatality	0	0	0 (−1.1 to 1.1)	1 (0.3)	0	0.3 (−0.8 to 1.7)

[a] Calculated using exact unconditional methods based on the Farrington-Manning score statistic.

[b] A patient may have had more than 1 cause of death.

JAMA. 2015;313(5):471-482. doi:10.1001/jama.2015.12

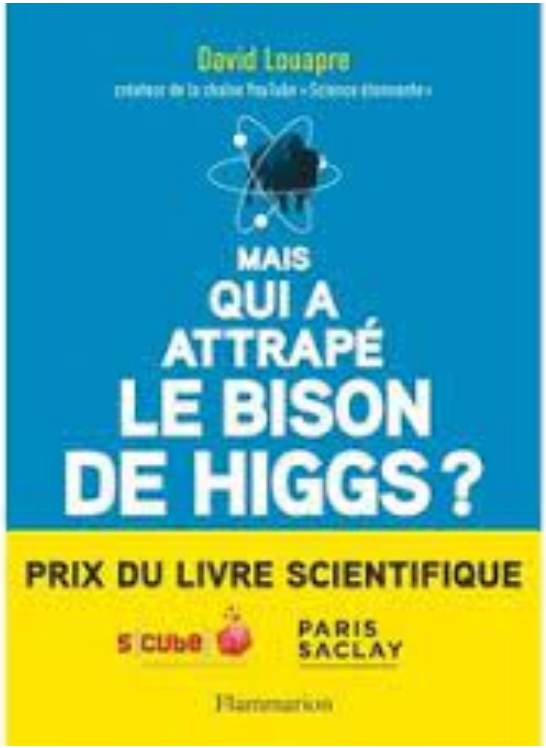
CONCLUSIONS AND RELEVANCE Among patients with severe trauma and major bleeding, early administration of plasma, platelets, and red blood cells in a 1:1:1 ratio compared with a 1:1:2 ratio did not result in significant differences in mortality at 24 hours or at 30 days. However, more patients in the 1:1:1 group achieved hemostasis and fewer experienced death due to exsanguination by 24 hours. Even though there was an increased use of plasma and platelets transfused in the 1:1:1 group, no other safety differences were identified between the 2 groups.

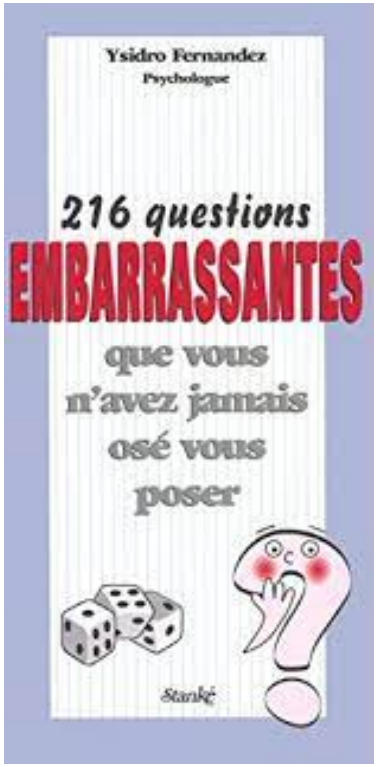
On vise quoi?

- Physiological parameters:
  - Mental status
  - Urine output (>0.5ml/kg/hr)
  - Peripheral pulses / MAP
  - CVP
  - Temp (>35C)
- Haematological parameters
  - Hb (>90g/l)
  - Platelets (>50-80 x 10^9)
  - Coag's: INR (<1.5), Fibrinogen(>1g/l)
  - CV SaO2 (>70%) / lactate (<4mmol/l) / pH (>7.2)
  - iCa2+ (>1.1mmol/l)
  - K+

Quelques particularités:

- F.A.Q. des questions que vous n'avez jamais osé poser!





MEDICAL INTELLIGENCE

Anesth Analg 2005;101:524–34

Revising a Dogma: Ketamine for Patients with Neurological Injury?

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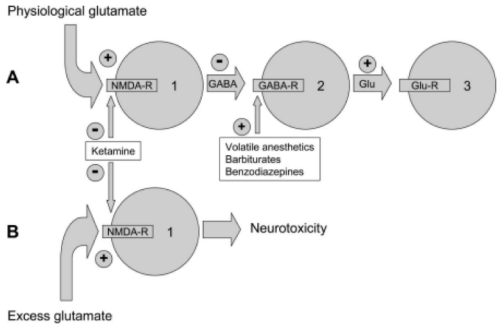
Table 1. Cerebral Hemodynamic Effects of Ketamine in Human

Reference	Quality score	Size/study group	Dose, ketamine	Hemodynamics ↑ increase, ↓ decrease, ↔ no change	Study setting/ intracranial compliance	Concomitant medication	Ventilation
Mayberg et al. (11) 1995	NA	20 Ket	1 mg/kg bolus, racemic	↔ MAP, CPP, $AVDO_2$ ↓ VMCA, ICP	Neurosurgical patients, mildly raised ICP	Isoflurane anesthesia with N_2O	Controlled, normoventilation
Strebel et al. (12) 1995	3	6/6/6/6 Ket/ C/Mid/ Esm	2 mg/kg bolus, racemic	↑ VMCA and ↑ MAP ↓ VMCA and ↔ MAP ↑ VMCA and ↓ MAP	Neurosurgical patients, no cerebral compromise	Isoflurane anesthesia + 0.1 kg/mg midazolam, or 5 mg esmolol boli	Controlled, normoventilation
Kolenda et al. (16) 1996	5	16/17 Ket/ Fen	65 mg/kg/d racemic, cont. infusion	↑ MAP and CPP, compared to fentanyl	Head-injured patients, ICU/ increased ICP	6.5 mg/kg/d midazolam, cont. infusion	Controlled, normoventilation
Albanese et al. (17) 1997	NA	8 Ket	1, 3, 5 mg/kg racemic, bolus	↔ MAP, CPP, $SvjO_2$, ↔ VCMA/ ↓ ICP	Head-injured patients, ICU/ increased ICP	3 mg/kg/h propofol, cont. infusion	Controlled, normoventilation
Bourgoin et al. (18) 2003	5	12/13 Ket/ Suf	4.92 ± 1.5 mg/ kg/h racemic, cont. infusion	↔ ICP and CPP, ↑ HR, compared to sufentanil	Head-injured patients, ICU/ increased ICP	98.4 ± 30 mg/kg/h midazolam, cont. infusion	Controlled, normoventilation
Sakai et al. (26) 2000	3	7/7/8 Awa/ Pro/ProKet	2 mg/kg/h racemic, cont. infusion	↔ MAP, HR, VMCA no cerebral compromise ↔ VMCA, $paCO_2$, compared to propofol alone	Surgical patients, propofol, cont. infusion	6 mg/kg/h normoventilation	Controlled or hypo- or hyper- ventilation
Nagase et al. (27) 2001	3	15/15 Ket/C	1 mg/kg racemic, bolus	↔ VMCA, compared to isoflurane alone	Surgical patients, no cerebral compromise	Isoflurane anesthesia without N_2O	Controlled, hypoventilation
Engelhard et al. (28) 2001	3	12/12 ProKet/ Sevo	2.5 mg/kg/h S+, cont. infusion	↔ autoregulatory index, compared to sevoflurane anesthesia	Surgical patients, no cerebral compromise	1.5–2.5 μg/kg/ml propofol, targeted plasma concentration	Controlled, normoventilation
Vollenweider et al. (29) 1997	NA	10/10/10 S+/R−/C	Each isomer: 15 mg bolus + 0.84–1.2 mg/kg/h, cont. infusion	S+: ↑ rCMRGlu anterior cingulate, frontal, parietal, left sensorimotor cortices, thalamus R−: ↓ rCMRGlu temporomedial cortex, left insula	Volunteers, no cerebral compromise	None	Spontaneous
Holcomb et al. (30) 2001	NA	13/10 Ket/C	0.3 mg/kg bolus, racemic	↑ rCBF in anterior cingulate, medial, inferior, frontal cortices ↓ rCBF (relative) in cerebellum	Volunteers, no cerebral compromise	None	Spontaneous
Langsjö et al. (8) 2003	NA	9 Ket	30, 100, 300 ng/ ml racemic, targeted plasma concentration	Global ↑ rCBF, highest in anterior cingulate, thalamus, putamen, frontal cortices, ↔ $rCMRO_2$, ↑ rCBV frontal cortex	Volunteers, no cerebral compromise	None	Spontaneous

cont. = continuous, N_2O = nitrous oxide, MAP = mean arterial pressure, HR = heart rate, VMCA = flow velocity in middle cerebral artery, rCMRGlu = regional cerebral metabolic rate of glucose, rCBF = regional cerebral blood flow, $rCMRO_2$ = regional cerebral metabolic rate of oxygen, rCBV = regional cerebral blood volume, ICP = intracranial pressure, ICU = intensive care unit, CPP = cerebral perfusion pressure, $AVDO_2$ = arteriovenous difference in oxygen content, $SvjO_2$ = jugular venous oxygen saturation, $paCO_2$ = partial pressure of carbon dioxide, Ket = ketamine, C = control, Mid = midazolam, Esm = esmolol, Fen = fentanyl, Suf = sufentanil, Awa = awake, Pro = Propofol, Sevo = sevoflurane, S+ = S(+)-ketamine, R− = R(−)-ketamine, NA = not applicable.



Ketamine can be used safely in neurologically impaired patients under conditions of controlled ventilation, coadministration of a {gamma}-aminobutyric acid receptor agonist, and avoidance of nitrous oxide.

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PMCID: PMC6707499
PMID: 31485122

Blood Pressure Target in Acute Brain Injury

Vivek Jain,[1] Jitendra Choudhary,[2]

Blood Pressure Mangement in Traumatic Brain Injury (TBI) Patients Systolic blood pressure plays a very important role in contributing secondary injury cascade after severe traumatic brain injury. As early as 1989, Klauber et al. reported a mortality of 35% in patient admitted with SBP <85 mm Hg, compared with only 6% in patients with a higher SBP.[9] Additionally, hypotension has been shown to correlate with diffuse brain swelling.[10] If autoregulation is not intact, there is dependency on SBP to prevent cerebral ischemia which is the single most important secondary insult.[12]

The 4th edition of BRAIN TRAUMA FOUNDATION recommends maintaining SBP >100 mm Hg for age 50–69 years (>110 mm Hg for age 15–49 years) is considered to decrease mortality and improve outcome. Though majority of guidelines target systolic BP, targeting cerebral perfusion pressure (CPP) is more physiological. Brain Trauma Foundation guidelines recommend routine CPP monitoring in severe TBI patients, which is said to decrease 2 weeks mortality. CPP target for survival and favourable outcome is between 60 mm Hg and 70 mm Hg.[13]

During initial phase of traumatic brain injury, till bleeding is not controlled one should aim for SBP target of >90 mm Hg. During hyperemic phase there is "luxury perfusion" because of increased cerebral blood flow due to vessel dilatation. During this phase one must target for CPP of around 60 mm Hg. Also, during late phase of TBI, there may be vasospastic phase, so you should be targeting slightly higher perfusion pressures by targeting higher SBP and MAP.

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Hypertension after Severe Traumatic Brain Injury: Friend or Foe?

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Abstract

Traumatic brain injury (TBI) is a major public health problem, with severe TBI contributing to a large number of deaths and disability worldwide. Early hypotension has been linked with poor outcomes following severe TBI, and guidelines suggest early and aggressive management of hypotension after TBI. Despite these recommendations, no guidelines exist for the management of hypertension after severe TBI, although observational data suggests that early hypertension is also associated with an increased risk of mortality after severe TBI. The purpose of this review is to discuss the underlying pathophysiology of hypertension after TBI, provide an overview of the current clinical data on early hypertension after TBI, and discuss future research that should test the benefits and harms of treating high blood pressure in TBI patients.

Acta Neurochir (2011) 153:1351–1355
DOI 10.1007/s00701-011-0993-6

CLINICAL ARTICLE

Traumatic brain injuries in illustrated literature: experience from a series of over 700 head injuries in the Asterix comic books

Marcel A. Kamp · Philipp Slotty · Sevgi Sarikaya-Seiwert · Hans-Jakob Steiger · Daniel Hänggi

Conclusions

Although over half of patients had an initially severe impairment of consciousness after TBI, no permanent deficit could be found. Roman nationality, hypoglossal paresis, lost helmet, and ingestion of the magic potion were significantly correlated with severe initial impairment of consciousness ($p \leq 0.05$).

VP ou VC?

Champ de vitesse d'un écoulement de Poiseuille

Dans un tube

La vitesse est parallèle à l'axe du tube (noté z) : $\vec{v} = v\vec{u}_z$.

L'équation du profil de vitesse est alors donnée par :

$$v(r, z, \theta) = v(r) = v_{\max} \left(1 - \frac{r^2}{R^2}\right)$$

où la vitesse maximale (au centre du tube) est liée au gradient de pression, à la viscosité dynamique et au rayon :

$v_{\max} = \frac{R^2}{2\,\eta} \left|\frac{\mathrm{d}p}{\mathrm{d}z}\right|$ en deux dimensions et $v_{\max} = \frac{R^2}{4\,\eta} \left|\frac{\mathrm{d}p}{\mathrm{d}z}\right|$ en trois dimensions.

VP - plus facile à poser et plus rapide. Gros diamètre et court (moins de résistances), pas de liquides froids dans le cœur directement.

Alternative: INTRA-OSSEUSE

Propofol et polytauma?

Ketamine/propofol admixture vs etomidate for intubation in the critically ill: KEEP PACE Randomized clinical trial

Journal of Trauma and Acute Care Surgery 87(4):p 883-891, October 2019.

CONCLUSION

In a heterogeneous critically ill population, ketamine/propofol admixture was not superior to a reduced dose of etomidate at preserving per-intubation hemodynamics and appears to be a safe alternative induction agent in the critically ill.

Propofol Versus Midazolam

Safety and Efficacy for Sedating the Severe Trauma Patient

Anesth Analg. 1998 Jun;86(6):1219-24.

We conclude that both Mz and Pf are safe and efficacious in the sedation of severe trauma patients. The use of Pf in these patients is associated with a high incidence of hypertriglyceridemia and a shorter wake-up time.

Dexmedetomidine versus propofol for prolonged sedation in critically ill trauma and surgical patients

The Surgeon

Volume 19, Issue 3, June 2021, Pages 129-134

Conclusions: Our results suggest that, similar to medical and cardiac surgery patients, dexmedetomidine and propofol are safe and effective sedation agents in critically ill trauma and surgical patients; however, dexmedetomidine achieves target sedation better than propofol for this specific population.

EVITER TECHNIQUE A.S.E

Femme Enceinte

EUROPEAN RESUSCITATION COUNCIL

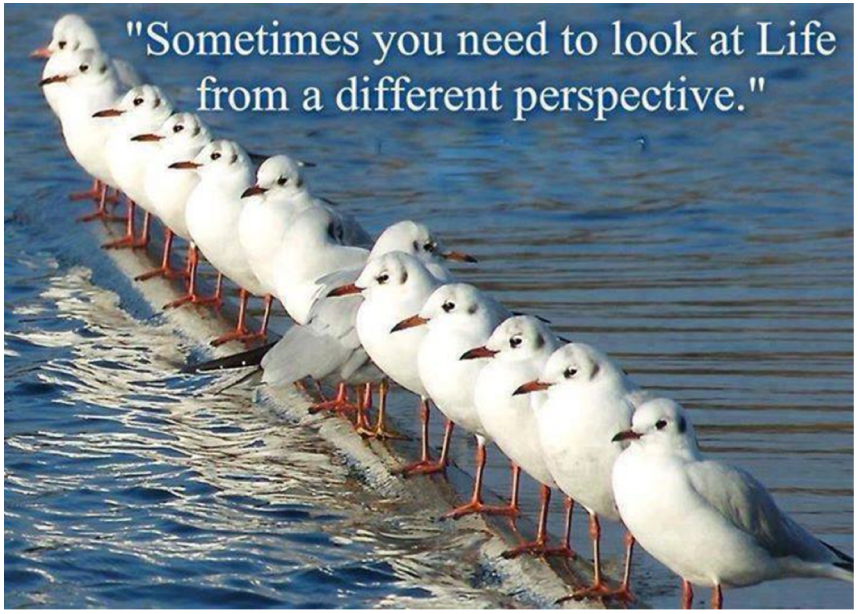
- **S'occuper de la maman c'est donner sa chance au bébé!**

The management of the mother should take precedence, as this affords the best chance of positive outcomes for both mother and fetus. However, monitoring of fetal heart tones should be done frequently during the work-up of the mother. In addition to signaling fetal distress, abnormal fetal heart tones may be an early indicator of impending shock in the mother. Early obstetrical consultation should be obtained as well.

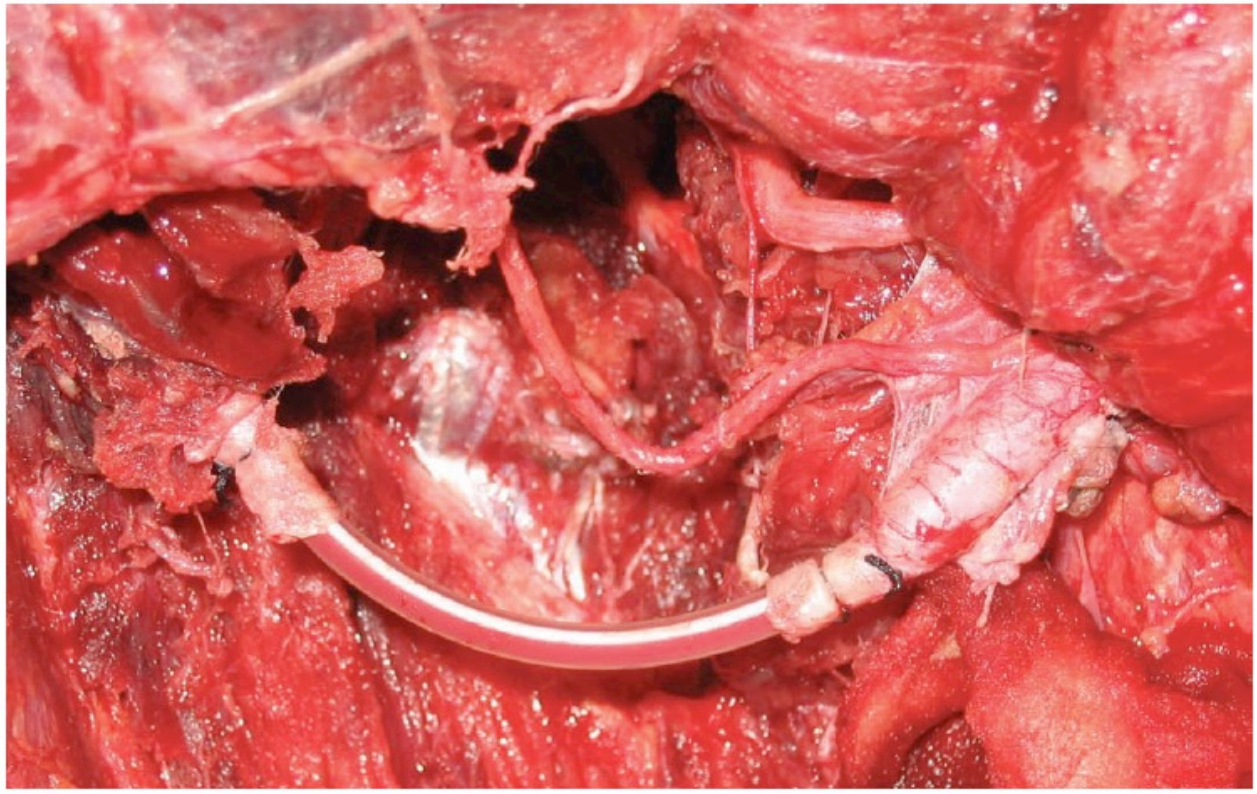
- Prévenir Obstétriciens et pédiatres.
- C/S en urgence et immediate (après 20 w) si absence de ROSC après 4 minutes de RCP.
- S'organiser pour une délivrance dans les 5 minutes qui suivent le début de la RCP.

Conclusion

- Protocoles clairs et équipes formées
- Appliquer principes de DCR: **5H**
- Si perdu à un moment prendre une bonne respiration et REEVALUER le patient en reprenant l'ABCDE.



Think outside of the box



Merci, des questions?